IMPLEMENTATION OF TARGET COST MANAGEMENT (TCM) AND ITS KEY ENABLERS: A CASE STUDY OF AN AUTOMOTIVE COMPANY

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2016

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ABSTRACT

Studies show that many established Japanese companies use Target Cost Management (TCM) as a profit planning management tool and a competitive tool for pricing their products. Despite the proven benefits of TCM as a key competitive tool, studies also show that many companies, especially in developing countries, still lag behind in the implementation of TCM. Furthermore, even if implemented, TCM practices outside of Japan are a standalone process and the fundamental characteristics of TCM practices in these companies are not the same as in the Japanese companies. Nevertheless, due to the lack of studies on TCM outside of Japan, there is still a lack of understanding concerning how different are the TCM practices compared to the Japanese TCM theoretical model, why the differences occur, and what enablers positively associated with TCM practices in non-Japanese environment. By using the contingency theory and dynamic capabilities theory as underpinning theories, this study attempts to examine in-depth how different are the TCM practices in non-Japanese environment compared to the Japanese theoretical model, to identify the causes of differences and to determine what enablers have a positive association with the successful implementation of TCM. The research was carried out at Company A, a Malaysian-Japanese joint venture automotive company. It used the single embedded case study method of K. Yin (2003) with multiple sources of data collection by using qualitative and quantitative approach. Based on previous TCM case studies conducted at Japanese automotive companies, a conceptual framework was developed as the case study guidelines. As for TCM enablers that have a positive association with the successful implementation of TCM, a theoretical framework was developed to find the statistical relationships. The findings showed that the basic fundamental concept of TCM in the case company was similar to the practices in Japanese automotive companies. Nevertheless, the case company coordinated

and reconfigured its resources to adapt to the contextual constraints, which caused some differences in the TCM practices. Among nine proposed enablers, only top management support and commitment, training and teamwork were regarded as the key enablers that positively associated with the successful implementation of TCM. This research strengthens the body of knowledge relating to TCM practices in non-Japanese context particularly in terms of in-depth understanding on TCM practice at Malaysia, how TCM practice was adjusted to fit the contextual constraints, and the critical enablers that support the TCM implementation in Malaysia automotive industry context.

ABSTRAK

Banyak kajian menunjukkan syarikat-syarikat besar Jepun menggunakan Target Cost Management (TCM) sebagai alat dalam pengurusan "profit planning" dan alat strategi untuk menetapkan harga produk yang berdaya saing. Walaupun TCM telah terbukti bermanfaat sebagai alat kompetitif, kajian masih menunjukkan bahawa banyak syarikat di negara-negara membangun masih ketinggalan dalam pelaksanaan TCM. Terdapat juga kajian yang menunjukkan perlaksanaan TCM di negara selain Jepun masih di tahap tunggal dan tidak berhubungkait dangan sistem yang lain. Ciri-ciri asas TCM juga didapati tidak sama seperti perlaksanaan di syarikat-syarikat Jepun. Walau bagaimanapun, terdapat kekurangan kajian menjelaskan apakah perbezaan perlaksanaaan TCM di luar Jepun berbanding dengan TCM model di Jepun, kenapa ia berbeza, dan apakah faktor-faktor kritikal yang membantu perlaksanaan TCM di luar Jepun. Berdasarkan "contingency theory" dan "dynamic capabilities theory" sebagai theori asas, kajian ini cuba mengkaji secara mendalam perbezaan perlaksanaan TCM di luar Jepun berbanding dengan model asal TCM di Jepun, mengenalpasti punca berbeza dan, menentukan faktor positif yang membantu perlaksanaan TCM di luar Jepun. Penyelidikan ini telah dijalankan di Syarikat A, syarikat automatif usahasama Malaysia – Jepun dengan menggunakan kes kajian sebagai metodologi. Kes kajian ini berdasarkan kaedah kajian kes K. Yin (2003) yang menggunakan pelbagai sumber pengumpulan data melalui cara kualitatif dan kuantitatif. Sebagai panduan perlaksanan kes kajian, satu model konseptual perlaksanaan TCM dibentuk daripada kes-kes kajian perlaksanaan TCM di syarikat-syarikat automatif Jepun. Untuk faktor- faktor yang membantu perlaksanaan TCM, model theoritikal dibentuk untuk mencari hubungkait statistik. Keputusan kajian menunjukkan bahawa konsep asas TCM di Syarikat A adalah sama dengan konsep TCM di syarikat- syarikat automatif Jepun. Tetapi, kajian ini mendapati terdapat

perbezaaan dalam cara pelaksanaan TCM. Ini disebabkan Syarikat A perlu menyepadukan dan mengkonfigurasi sumber-sumber syarikat untuk mengadaptasi kekangan-kekangan kontek. Dari sembilan faktor yang dicadangkan, hanya sokongan dan komitmen pengurusan atasan, latihan dan budaya kerja berpasukan di anggap sebagai faktor-faktor positif membantu perlaksanaan TCM. Kajian ini menyumbang kepada pemantapan pengetahuan mengenai perlaksanaan TCM di luar Jepun terutamanya memahami secara mendalam perlaksanaan TCM di Malaysia, bagaimana TCM di ubahsuai untuk menyesuaikannya dengan kekangan persekitaran, dan faktor kritikal yang membantu perlaksanaan TCM di dalam automatif industri di Malaysia.

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ACKNOWLEDGEMENT

Alhamdullillah. Thanks to Allah SWT for giving me the opportunity, strength and patience to complete this research. I am deeply and whole heartedly thankful to all those who have made this work possible especially to my supervisor, Prof. Madya Ruzita Jusoh, my parents, Baharudin Arsat and Hajah Maimon Mijan and my mentor, Mr. Ameer Fahim Nakata.

Jazakumullahu khairan kathira. Aameen.

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ABBREVIATIONS

ABC	Activity Based Costing
AFTA	ASEAN Free Trade Area
AMT	Advanced Manufacturing Technology
ASEAN	Association of Southeast Asian Nations
AVE	Average Variance Extracted
CAD	Computer Aided Design
CAE	Computer Aided Engineering
CAM-I	Consortium for Advanced Management – International
CBU	Complete Build Up
CE	Chief Engineer
CFM	Cross-Functional Management
CIM	Computer Integrated Manufacturing
CKD	Completely Knocked Down
CSI	Customer Satisfaction Index
DFMA	Design for Manufacture and Assembly
ECI	Engineering Changes Instruction
FA	Factory Automation
FMS	Flexible Manufacturing Systems
GLC	Government Linked Company
HICOM	Heavy Industry Corporation of Malaysia
ISO	International Organization for Standardization
JIT	Just In Time
JV	Joint Venture

MRP	Material Requirements Planning
MP	Mass Production
NAP	National Automotive Policy
NPD	New Product Development
OA	Office Automation
OJT	On Job Training
PDCA	Plan, Do, Check, Action
Perodua	Perusahaan Otomobil Kedua Sendirian Berhad
Proton	Perusahaan Otomobil Nasional
PLS	Partial Least Squares
QFD	Quality Functional Development
R&D	Research and Development
ROA	Return on Assets
ROS	Return on Sales
SCM	Strategic Cost Management
SEM	Structural Equation Model
SMA	Strategic Management Accounting
TCM	Target Cost Management
TPS	Toyota Production System
TQC	Total Quality Control
TQM	Total Quality Management
UK	United Kingdom
US	United States
VA	Value Analysis

VE	Value Engineering
WTO	World Trade Organization

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CHAPTER 1: INTRODUCTION

1.1 Introduction

The current fast changing markets, tough global business competition, rapid changes in technology and vast information exchange make the business environment highly competitive (Kaplan, 1984). This competitive market has resulted in high performance standards in various aspects including cost, quality, productivity, delivery and process efficiency. Accordingly, competitiveness can be gained by exceeding or at least meeting these high global standards (Hitt, Ireland, & Hoskisson, 2004). Companies are more competitive against their competitors when they manage to sell the right products with the right prices and offer the customers more value at less cost (Cooper & Slagmulder, 1998; Drury & Tales, 1994).

The application of Strategic Management Accounting (SMA) may assist companies in achieving competitiveness against their competitors. This is because SMA is able to provide more timely and relevant information, which is important in setting the right cost and right price (Adler, Everett, & Waldron, 2000). Nevertheless, in order to be competitive, companies not only have to ensure that the selected advanced management accounting methods are useful for product pricing but that they are also capable of assisting in cost reduction through waste elimination (Monden & Hamada, 1991; IFAC, 1998). This is because profit can be gained by selling more or producing at less cost as well as by proactively eliminating the non-productive and non-value added activities (Kaplan, 1984).

Furthermore, the SMA application needs to be applied in the earliest stage of a product's life because as the product is being developed, the ability to change the product decreases, which, in turn, decreases the degree to which the product cost can be reduced (Cooper & Slagmulder, 1999). Many studies (Kato, 1993; Sakurai, 1989; Monden & Hamada, 1991) posit that the most effective stage to control the cost is during the product planning and design stage and not when the product has already been designed and manufactured. This is because the product design stage locks almost 80 per cent of the product cost (Kato, 1993; Hergert, 2002). In the fully automated plants, this percentage can reach up to almost 100 per cent (Sakurai, 1989). In other words, the way the product is planned and designed will determine almost all the costs of later activities including the material, manufacturing, marketing, distribution and after sales cost (Hergert, 2002; Sakurai, 1989).

Studies (Kato, 1993; Tani et al., 1994; Cooper & Slagmulder, 1998; Ansari & Swenson, 2006; Shank & Fisher, 1999) highlight that Target Cost Management (TCM) as a means of SMA that ensures products are sufficiently profitable when launched by managing the cost during the design stage while ensuring the products meet the quality and reliability standards, and other customers' needs (Cooper & Slagmulder, 1998). The market-driven or price-driven costing concept of TCM (Gagne & Discenza, 1995; Ansari, Bell, & Okano, 2007) helps companies to set the right price and right cost, reduces the risk of not making sufficient profit, and makes better and faster product development (Tani et al., 1994; Helms, Ettkin, Baxter, & Gordon, 2005). Thus, by using TCM as a serious competitive tool, companies are able to increase their competitiveness and improve their long-term profitability (Ansari & Swenson, 2006; Cooper & Slagmulder, 1998).

However, despite these noted benefits, many companies still underestimate the power of TCM as a critical competitive tool (Ansari, Bell, & Okano, 2007). This is because even though TCM is seemingly simple, its implementation and execution is difficult (Helms, Ettkin, Baxter, & Gordon, 2005). Furthermore, most TCM studies have been conducted in the Japanese environment and focused on narrow aspects of TCM. The lack of explanation of TCM differences (Tani et al., 1994) has caused a misunderstanding in TCM practices (Feil, Yook, & Kim, 2004). Moreover, this drawback is compounded by the issue of the unknown territory of management accounting practices, especially in developing countries due to a lack of studies (Joshi, 2001). Accordingly, more research from different perspectives is necessary to understand the TCM practices (Tani et al., 1994).

Since globalization creates opportunities and also threats to any company, a better understanding concerning how SMA can assist companies to gain competitiveness is important. This research focuses on TCM as a critical SMA tool to help companies to remain profitable and competitive by examining its implementation process, contextual constraints and the enablers that positively associated with the implementation process in the Malaysian context.

1.2 Problem statement

Despite the potential benefits of SMA, researchers have found that traditional management accounting still popular among companies (Sulaiman, Ahmad, & Alwi, 2004; Sulaiman, Ahmad, & Alwi, 2005; Nishimura, 2005a; Adler, Everett, & Waldron, 2000; Chenhall & Langfield-Smith, 1998a; Joshi, 2001). A study by Sulaiman et al. (2005) cites that standard costing is still being widely used by many companies around the world: 76 per cent of companies in the UK, 73 per cent in New Zealand, 86 per cent in America, 68 per cent in India, 65 per cent in Japan and 56 per cent in Singapore. The survey of Chenhall and Langfield-Smith (1998a) of 78 companies in Australia also found a similar result. The Australian companies widely use traditional management accounting practices compared with SMA practices. By applying the survey method of Chenhall and Langfield-Smith (1998a), a survey of 60 manufacturing companies in India by Joshi (2001) also found that the adoption rate of traditional management accounting practices is higher than for SMA practices. A study by Adler et al. (2002) in 165 New Zealand manufacturers also found that traditional accounting techniques are more popular than SMA techniques. Among these traditional accounting techniques, full costing is the most widely used followed by standard costing.

Likewise, the comparative study by Sulaiman et al. (2004) of management accounting practices in four developing countries –China, Malaysia, India and Singapore – shows that traditional cost management was still widely implemented. Nevertheless, unlike New Zealand (Adler et al., 2002), standard costing is the most popular method followed by full costing in Malaysia. A survey study by Chun et al. (1998) of 92 manufacturing companies in Malaysia also found that among the practices of traditional management accounting, standard costing is highly preferred followed by actual costing. Similarly, the most recent empirical study of management accounting practices by Sulaiman et al.'s (2005) in Malaysia indicates that 70 per cent of local and 70 per cent of Japanese affiliated companies still use standard costing. Nishimura's (2005a) study of Japanese affiliated companies in Singapore, Malaysia and Thailand also found that these companies widely use traditional management accounting, particularly actual costing and standard costing. Since most of Malaysian companies use lack of automation and highly depend on labour for the production, they opt to perform their management control system through financial accounting (Nishimura, 2005a). Recent survey study, (2008) of 30 industrial companies in Malaysia also found high implementation rate of traditional management accounting and high reliance of financial accounting for the management control (Smith, Abdullah & Abdul Razak, 2008).

Many reasons contribute to the high popularity of the traditional management accounting. In general, most of the companies still believe that the traditional management accounting practices have higher benefits than SMA (Joshi, 2001; Chenhall & Langfield-Smith, 1998a; Adler, Everett, & Waldron, 2000; Bright, Davies, Downes, & Sweeting, 1992). A survey study of UK manufacturers by Bright et al. (1992) found that the perceived benefits are outweighed by the costs which make the top management reluctant to implement the SMA techniques. In addition, the companies in New Zealand face human resource constraint issues in terms of cost of changes related to people and time, and a lack of relevant skills as the main barriers that forbid the implementation of SMA practices (Adler, Everett, & Waldron, 2000). Similarly, Malaysian companies are still reluctant to use SMA, mainly due to lack of expertise, costly and time consuming (Smith et al., 2008).

On the other hand, a few scholars (Sakurai, 1989; Kato, Boer, & Chow, 1995; Cooper & Slagmulder, 1999; Swenson, Ansari, Bell, & Kim, 2003; Helms et al., 2005) found that TCM, one form of SMA, was highly implemented by world big companies mainly by automotive companies particularly in Japan, USA and Europe. In Japan, Sakurai (1989) found that some big Japanese companies were already implemented TCM since the late 1970s. In the 1990s, Kato et al. (1995) highlight that 80 to 100 per cent of prominent Japanese assembly manufacturing companies in Japan were implementing TCM. These Japanese companies include Toyota, Nissan, Sony, Matsushita, Daihatsu, Canon, Komatsu, Olympus, Topcon and Isuzu (Cooper & Slagmulder, 1999; Helms et al., 2005). On the other hand, Boeing, Caterpillar, Daimler Chrysler and Continental Texas (automotive brake supplier) are among the non-Japanese companies outside Japan that have managed to implement TCM successfully (Swenson, Ansari, Bell, & Kim, 2003).

In terms of TCM implementation in non- Japanese environment, a survey study in Holland by Dekker et al. (2003) found that almost 60 per cent of 32 Dutch companies are using TCM. They claim that although these companies use different names, such as "pre-calculation", "basic net price" and "manufacturing cost", the practices are similar to the TCM concept. However, they were not able to conclude whether the actual process and methods are exactly the same as the Japanese TCM practices due to the limitations of the study method. Studies (Carr & Ng, 1995; Rattray, Lord, & Shanahan, 2007; Swenson, Buttross, Kim, 2005; Nishimura, 2005a) on TCM practices in other countries outside Japan found that the TCM practices are slightly different compared to prior TCM studies in Japan. For example, the case study of Carr and Ng (1995) on Nissan UK found that the TCM practices in this company have significant differences in two main areas. First, Nissan UK focuses on the operational stage instead of the design and development stage to achieve the target cost. Second, Nissan UK emphasizes on the local supply chain related costs compared to other costs. Similarly, Rattray et al.'s (2007) survey of New Zealand companies found that even though 39 per cent of 31 companies use TCM, these companies focus on existing products instead of new product development, highly involve the manufacturing department instead of design and development department, and have relatively low supplier involvement instead of high supplier involvement. Survey by Consortium for Advance Manufacturing – International (CAM-I) on TCM practices among USA companies found that most of the USA companies do not follow the fundamental TCM concept, and do not use the TCM tools and disciplines as highlighted by the common published literature (Swenson et al., 2005). Furthermore, a study made by Nishimura (2005a) in Japanese affiliated companies in Singapore, Malaysia and Thailand found that the TCM implementation and its definition in these companies are not the same as in Japan. He argues that companies in these three countries merely consider TCM to be a cost or price target calculated to challenge competitors in respect of the market price. He further emphasizes that these companies do not follow the TCM fundamental characteristics as being practiced by the Japanese companies. For example, these affiliated companies strongly link the target cost information with production cost and distribution cost rather than the research and development cost (Nishimura, 2005a). Nishimura (2005a) suggests that this phenomenon might indicate that these affiliated companies still rely on their Japanese headquarters for the fundamental strategy setting for TCM. In fact, this study supports Tani et al. (1994) who claim that for the Japanese subsidiary companies, it is common that the product planning and development are conducted by the headquarters in Japan.

Generally, the "environment, strategy and the organization structure specific to the industry have an impact on the nature of TCM" (Tani et al., 1994, p. 71). However, since most of the TCM studies focus on specific aspects of TCM in the Japanese environment, the differences of TCM practices in other environments have not been explained in a satisfactory manner (Tani et al., 1994; Feil, Yook, & Kim, 2004; Dekker & Smitdt, 2003). Furthermore, as highlighted by Drury and Tales (1995), most of the management accounting research focus on developing sophisticated models in simplified production settings. This causes incomprehension and ignorance in respect of the actual accounting management practices, and, subsequently, creates a gap between the theory and practice (Drury & Tayles, 1995).

With current uncertain global business competition, all companies must proactively find ways to remain profitable. Since TCM is widely used by companies in Japan, US and Europe as competitive tools (Ansari et al., 2007), companies in developing countries should implement TCM to make them competitive particularly in terms of setting the right price and profit, and managing their products' cost. A lack of study of TCM implementation in non-Japanese context might widen the misunderstanding on TCM practices, in which creates hesitation of TCM implementation by the companies in developing countries. This creates more competitiveness gap between companies' in developing countries and companies' in developed countries. Consequently, to the extreme continuum, the economy of the developing countries will never be at par with the developed countries.

Since there are lack of studies conducted in non-Japanese environment particularly in Malaysia context, it is necessary to uncover the technical aspects of TCM practices in non- Japanese environment in terms of how it is conducted, what are the differences compared to Japanese TCM theoretical model, why there are differences, and what are the critical factors associated with the TCM practices in non-Japanese environment. Accordingly, in-depth case study research in a company that has managed to implement TCM is non-Japanese context is necessary.

1.3 Research questions

Given the problem statement described in the previous section, this study attempts to investigate in-depth the TCM implementation in one Malaysian automotive company. Specifically, the research questions are formulated as follows:

(1) How do the TCM practices in a typical Malaysian automotive company differ from the Japanese automotive companies' TCM model?

(2) Why do the differences in TCM occur?

(3) Among these enablers: implementation of Advanced Manufacturing Technology (AMT), confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationship, a teamwork oriented organizational culture, top management support and commitment, and training, which enablers are perceived by the TCM users of a typical Malaysian automotive company as the critical enablers that have a positive association with the successful implementation of TCM?

1.4 Research objectives

The fundamental aim for this study is to develop a better understanding of TCM practices in non-Japanese context specifically in Malaysia. Thus, consistent with the above research questions, the research objectives of the study are:

(1) To examine in-depth the differences of TCM practices in a Malaysian automotive company compared to Japanese TCM theoretical model.

(2) To identify the possible causes of the differences in TCM practices in a Malaysian automotive company.

(3) To determine the critical factors that positively associated with the successful implementation of TCM from the perspective of a Malaysian automotive company's TCM users.

1.5 Scope of the study

In order to understand in-depth the differences of TCM practices, this study investigate the TCM practice in Malaysian automotive company by comparing it to the common TCM practices in the Japanese automotive companies as highlighted by previous scholars. In general, the scope of the study covers the TCM practices in automotive industry context from the viewpoint of the accounting perspective. In this thesis, the automotive industry is confined to final assembly, parts and components manufacturers and supporting industry (suppliers of the parts and components) only (Hasan & Jomo, 2007).

Otley (1980) posits that the contingent factors or specific enablers influence the management accounting system of a particular environment. Likewise, the specific environment of a particular industry influences the structure and process of TCM (Tani et al., 1994; Feil, Yook, & Kim, 2004). Therefore, in order to understand in-depth the TCM practices, this study focuses on one industry, an automotive industry. This industry was selected for three reasons. First, TCM is widely used in the automotive industry (Kato, Boer, & Chow, 1995). A survey made by Kobe University on Japan's major industries found that TCM is adopted 100 per cent by the transportation equipment industry compared to other industries (Kato, Boer, & Chow, 1995). Besides, Monden and Hamada (1991) also claim that TCM function very well in the Japanese automotive companies. In fact, the TCM practices were originated from automotive industry in Japan before it migrated out to other Japanese assembly and process industries (Ansari et al., 2007).

Second, the importance of managing the direct material cost during the design and development stage to the automotive industry. Specifically, the ratio of the variable cost to the total manufacturing cost is up to 90 per cent in automotive companies. With 85 per cent of the total variable cost coming from direct material cost (Monden & Hamada, 1991). This direct material cost mainly comes from the parts purchased from suppliers. Generally, a typical car model has more than 5000 parts (Pierce, 2002) produced by various suppliers, which involves a large supply chain. For example, in Toyota, the purchased parts cover 70 per cent of the total direct material required to produce the cars (Copper & Slagmulder, 1999). Since, the cost of direct material mainly locked and determined during the design and development stage (Kato, 1993; Hergert, 2002), managing the direct material cost during the design and development stage is very important to the automotive companies. Among other cost management tools, TCM is well known as a cost management tool that is applied in the design and development stage (Monden & Hamada, 1991; Ansari et al., 2006). Thus, it is significant to study the TCM implementation in automotive industry compared to other industries.

Third, the automotive industry is among the major industries that impact the country's economic development. For example, in the case of Malaysia, the automotive industry is one of the key industries that has succeeded in enhancing the Malaysian economy under the government's industrialization efforts (Mahidin & Kangeswary, 2004). Furthermore, the domestic demand for vehicles in Malaysia is increasing. Figure 1-1 shows the total industry vehicles (TIVs) in Malaysia from 1980 to 2014 (MAA, 2014). Starting from 2010, the Malaysian Total Industry Vehicles (TIVs) reached 600,000 units; 6 times the increment compared to 1980. The Malaysian Automotive Institute (MAI) forecasts that the Malaysian TIVs will reach one million units by 2020 (Mahalingam, 2011). However, the gap between TIVs and total vehicles produced or assembled has also become wider since 2007. This gap is filled by imported cars. With the AFTA full market liberalization policy, the domestic competition in the Malaysian automotive industry has become more severe. Thus, considering the impact of the automotive industry on the Malaysian economy, it is significant to understand the TCM practices in order to enhance the competitiveness of automotive industry in Malaysia.

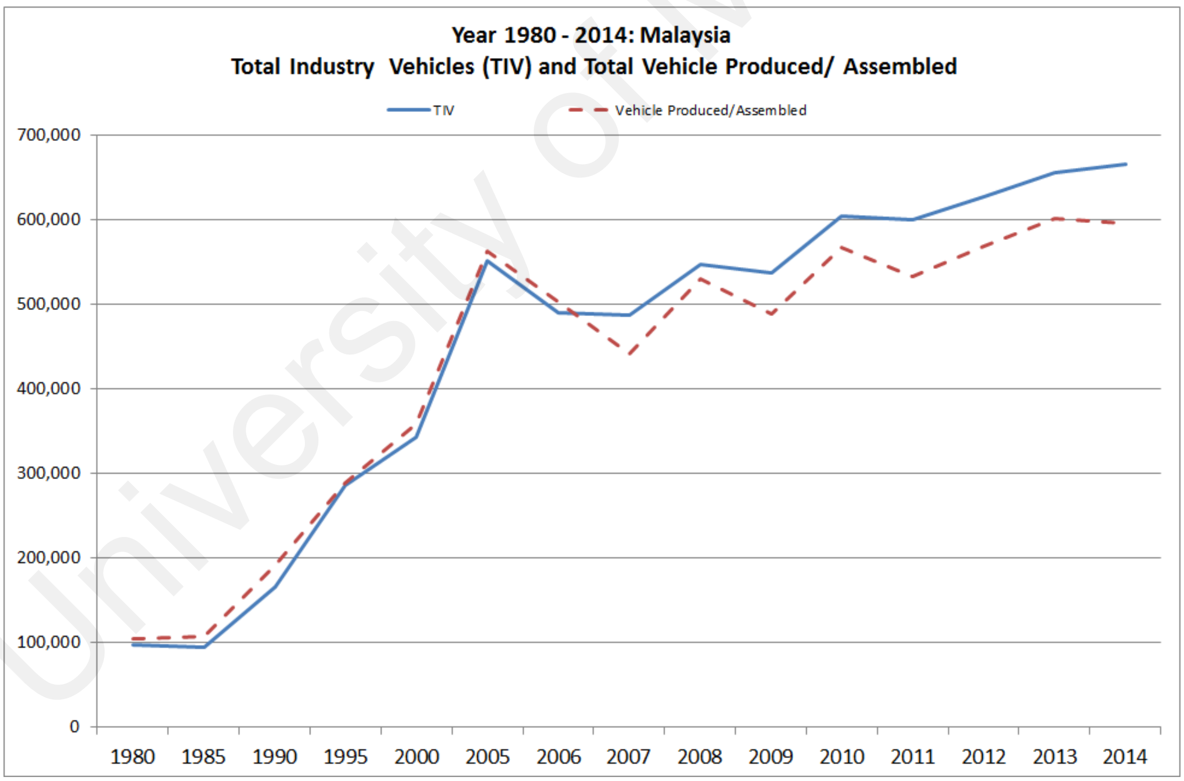

Figure 1-1: Malaysian Total Industry Vehicles (TIVs) and Total Vehicles Produced/Assembled

Source: Malaysian Automotive Association (MAA)

This study compares the TCM practice of a Malaysian automotive company to the TCM practices of the Japanese automotive companies for three reasons. First, TCM is widely implemented in the Japanese automotive companies (Kato et al., 1995). Ansari et al. (2007) literature review of TCM from 1995 to mid-2005 shows that even though the companies in America and Europe have implemented TCM, the implementation is fairly young compared to Japan. Among other countries, the Japanese automotive companies are the most mature, and the longest and most consistent users of TCM (Ansari et al., 2007). Second, many case studies have been conducted on the Japanese automotive companies (Tani et al., 1994; Lee & Monden, 1996; Monden & Hamada, 1991; Cooper & Slagmulder, 1999; Okano, 2005; Kato et al., 1995; Sakurai, 1989; Kato, 1993), which make the TCM model in this industry visible for the purposes of comparison. This vast information allows an in-depth comparison study to understand the differences of TCM practices. Third, Japanese automotive companies have mature and high interaction with Malaysian automotive companies. In fact, both the Malaysian national car manufacturing companies, Proton and Perodua, were established through joint ventures with the Japanese companies (Hasan & Jomo, 2007). Indirectly, this high interaction with Japanese companies makes Malaysian automotive companies familiar with the Japanese management philosophy and Japanese manufacturing methods. For example, Proton even required their staff to be trained according to the Japanese standards and procedures to develop skilled and semi-skilled workers (Mahidin & Kanageswary, 2004).

In summary, TCM is influenced by the industry's specific environment (Tani et al., 1994; Feil, Yook, & Kim, 2004). In this study, the TCM differences in terms of environment can be controlled by focusing on a single industry, i.e. the automotive industry. The automotive industry was selected because of its dynamic competition and its significant contribution to Malaysian economic. Accordingly, by comparing companies of a similar nature, it can reduce the environmental variables related issues in understanding the differences of TCM practices, the causes of the differences and the enablers that support the successful implementation of TCM practices.

1.6 Significance of the study

This study is significant because of three reasons. First, it contributes to the body of knowledge by investigating in-depth the TCM practices and the differences of TCM practices in a non-Japanese environment compared to the theoretical TCM model. Table 1-1 summarizes previous empirical studies made on TCM. Most of the studies have been conducted in developed countries- Japan, USA and Europe- found that the TCM practices in other countries are different from the Japanese companies' practices. On the other hand, as highlighted by Sulaiman et al. (2005), most of Malaysian companies still opt to use traditional MA mainly due to lack of know-how on SMA. Nevertheless, SMA practices, particularly TCM, still remain comparatively unknown in Malaysia because no in-depth empirical case study has been made to investigate it. Furthermore, there is no study made intensively to investigate the differences of TCM implementation between Japanese and Malaysian companies. Thus, by understanding the level of TCM implementation in Malaysia, what are the differences, what causes the differences and what enablers that have a positive association with the successful implementation of TCM, this research expects to improve the understanding of the TCM practices in non-Japanese context specifically in developing countries like Malaysia.

Table 1-1: Summary of TCM studies

Study	Country	Methodology	Objective
Dekker & Smidt (2003)	Dutch	Survey (32 manufacturing companies)	To examine the TCM adoption in Dutch companies
Filomena, Neto, & Duffey (2009)	Brazil	Case study (1 Brazilian manufacturing company)	To operationalize the TCM model by breaking down the target costs into product parts, features and common elements.
Yazdifar & Askarany (2012)	UK, Australia New Zealand	Survey (584 manufacturing and service companies)	To investigate the level of TCM implementation and factors that influence TCM adoption.
Rattray, Lord, & Shanahan (2007)	New Zealand	Survey (12 manufacturing companies)	To examine the TCM practices in New Zealand companies
Shank & Fisher (1999)	USA	Case study (A paper mill process company)	To examine the relevance of TCM in a process industry company
Ellram (2002), Ellram (2000)	USA	Case studies (11 companies)	To investigate the supply management and purchasing role in TCM process
Ellram (2006)	USA	Case studies (11 companies)	To explore the TCM practices in the USA and to explore the differences with the existing popular theoretical model of TCM.
Hibbets, Albright & Funk (2003)	USA and German	Case studies with survey (9 USA companies, 3 German companies)	To investigate the relationship of competitive environment and company strategy of TCM companies
Monden & Hamada (1991)	Japan	Case studies (Automotive companies)	To examine the features of the total cost management system in Japanese automotive companies
Tani et al.,(1994)	Japan	Survey (180 manufacturing companies)	To investigate the TCM design and practices.
Tani (1995)	Japan	Survey (180 manufacturing companies)	To investigate TCM practices and to develop theory explaining TCM
Kato, Boer, & Chow (1995)	Japan	Case studies (Daihatsu Motor Corp., Matsuhita Electric Works)	To examine the TCM process and effect on the Japanese companies.
Lee & Monden (1996)	Japan	Case study (Daihatsu Motor Corp.)	To compare the Activity Based Costing (ABC) with TCM and Kaizen Costing in terms of its merits in strategic cost management, and operation management and control.

Table 1-1, continued

Study	Country	Methodology	Objective
Cooper & Slagmulder (1999)	Japan	Case studies (Isuzu Motors Ltd., Toyota Motor Corp., Nissan Motor Corp., Komatsu Limited, Sony Corp., Topcon Corp, Olympus Optical Company Ltd.)	To examine the generic approach of TCM
Okano (2005)	Japan	Case studies (Toyota Motor, Matsushita Electrical Industrial, Nissan Motor Co., Ltd.)	To explore the direction of TCM in the Japanese management system
Huh, Yook, & Kim (2008)	Japan	Survey (162 companies)	To examine the TCM success factors and performance of TCM
Gandhinathan, Raviswaran, & Sutrakar (2004)	India	Case study (Automotive product manufacturer)	To investigate the effect of Quality Functional Deployment (QFD) and Value Engineering (VE) on TCM
Ax, Greve, & Nilsson (2008)	Sweden	Survey (57 manufacturing companies)	To investigate the impact of competition and uncertainty on TCM adoption.

Second, this research is expected to link TCM with the contingency theory and dynamic capabilities theory in explaining the differences and the possible causes of the differences in TCM practices. It also link the contingency theory in explaining the critical factors that positively associated with the successful implementation of TCM. Contingency theory posits that the situational factors influence the design of management accounting system (Fisher, 1998). On the other hand, dynamic capabilities theory posits that companies have the ability to integrate, reconfigure and modify its internal and external competence to cater the dynamic market (Teece, 1997). As posited by scholars (Tani et al., 1994; Feil, Yook, & Kim, 2004), TCM is environment specific. In the case study conducted by Cooper and Slagmulder (1999), they also conclude that the practice of TCM differs from company to company. However, there is lack of empirical studies that explain in-depth the differences in terms of TCM implementation process, the possible causes of the differences and the critical enablers that positively associated with the successful implementation of TCM in non-Japanese environment context. Thus, by linking the contingency theory and dynamic capabilities, it is expected that this research is able to explain the contextual constraints of TCM practices in non-Japanese environment and how the company utilized its dynamic capabilities by integrating, reconfiguring and modifying the TCM practice in order to adapt with the contextual constraints for successful implementation of TCM.

Third, this research is expected to close the gap between the theory and practice of TCM. Generally, many non-Japanese companies have failed to duplicate the Japanese management method because they have overlooked the underlying processes that support its adoption (Kato et al., 1995). On the other hand, like other MA practices, TCM practices are also environment specific (Feil et al., 2004). By focusing on the one industry i.e. automotive industry, this study investigates in-depth the TCM practice in a Malaysian automotive company and compares the empirical findings with the Japanese TCM theoretical model. The details comparison of TCM practices help to understand in–depth the underlying processes that facilitate and impede the implementation in Japanese and non-Japanese contexts. Accordingly, this study shows the dynamic of TCM practices in terms of adapting with its environmental context. By understanding how TCM practices can be suited in non-Japanese context and the critical enablers that support the TCM practices, the potential TCM companies in non-Japanese environment can equip themselves for risk mitigation and prioritize the strategies planning before shifting to TCM practices for pricing their products and managing the product costs. Furthermore, by understanding the actual TCM practices in non-Japanese context, the potential TCM companies in non-Japanese context could prepare for the necessary pre-caution steps to mitigate the problems that normally occur during the implementation.

In a nutshell, it is expected that this study contributes to the body of knowledge on TCM practices, linking the TCM practices with contingency theory and dynamic capabilities theory, and reducing the gap between the theory and practice of TCM for practical implementation.

1.7 Research approach

This research used the case study method, specifically, a single embedded case study method, as suggested by Yin (2003). There are three reasons why this methodology is used in this study. First, a case study approach is a suitable research method when “how” and “why” questions are imposed (Yin, 2003). Hence, inasmuch as the aim of this research is to examine the differences of TCM practice in a Malaysian automotive company compared to the Japanese automotive companies’ TCM practices, identify the causes of differences, and determine the factors that positively associated with the successful implementation of TCM in non-Japanese environment, the case study approach is the most appropriate research methodology to answer these research questions.

Second, as the TCM is quite new outside of Japan (Ansari & Okano, 2007; Sulaiman, Ahmad, & Alwi, 2004; Tho, Isa, & Ng, 1998), the case study method is able to provide a valuable insight into the body of knowledge, which is not possible to provide by the traditional empirical and modelling approach (Yin, 2003; Ellram, 2006). Accordingly, many scholars suggest that the case study research is the best methodology to investigate and to analyse the differences of TCM implementation process (Tani et al., 1994; Sulaiman, Ahmad, & Alwi, 2004; Dekker & Smitdt, 2003).

Third, the case study method helps the researchers to understand "the mish-mash of inter-related influences that shape management accounting practices", which involve organizational trend, and the economic and social aspects (Scapens, 2006, p. 10). Accordingly, instead of solely examining the differences of the TCM practices from the survey study, a single organization was selected for in-depth study. The case study method helps the researcher to explain in-depth the differences of TCM practices in specific contexts and to identify the causes that shape the differences. The survey within the case company's employees helps to determine the employees' perception on the factors that positively associated with the successful implementation of TCM in the case company. Accordingly, this research intends to explain how a company comes to have the TCM practices they have, how different they are from the original theoretical model, why the differences happen and what factors support the implementation.

1.7.1 The case company

There are three reasons as to why the Company A (pseudonym) was selected as the case company in this study. First, Company A best fits the study as it has designed, documented and reflected the TCM concept based on the researcher's judgment from the preliminary studies of TCM practices in the several automotive companies. Nevertheless, the research admits that there is no guarantee that Company A represents the best TCM practices in the automotive industry.

Second, Company A is widely exposed to the Japanese manufacturing methods. Company A was established through a joint venture project between Malaysian and Japanese partners with the majority of equity owned by the Malaysian government through holding corporations (Source: Company A's website). The cooperation with the prominent Japanese automotive company, Company M (pseudonym), as its joint venture partner makes Company A familiar with the Japanese manufacturing methods, including TCM.

Third, Company A was selected as the research location because of its significance in the Malaysia automotive industry in terms of domestic market share and organizational size. Company A has manufactured passenger cars since the 1990s. Since its establishment, this case company has sold more than 2 million units of various vehicle models inclusive of export markets and has been the market share leader for several consecutive years. Company A is also a big organization with more than 10,000 employees (Source: Company A's website).

Hence, as the research location must strongly reflect the research topic (Boeije, 2010), Company A was selected for this study research. Chapter 4 will provide a more detailed justification for selecting this company as the case company.

1.7.2 Confidentiality issue

As Company A has adopted an open concept, it has cooperated with many researchers who have conducted research at its premises. Through the literature review, the researcher found several studies conducted by other researchers on Company A. With the assistance of a few personal contacts, the researcher managed to obtain approval from Company A's Human Resources to conduct an in-depth case study at Company A.

However, since TCM research might relate with the company's cost and profit matters, which is very confidential and potentially sensitive, Company A's management strictly required that no cost and profit figures be exposed. Furthermore, in order to comply with Company A's confidential requirements and the strict ethical guidelines of the university concerning confidentiality, a pseudonym is used to disguise the identity of the company, the product name and also the respondents.

1.7.3 Research steps

This research was conducted using case study method by collecting multi-sources of data collection, as suggested by Yin (2003). The case study method should not limit to direct and detailed observations as a source of evidence, instead it "can be based on any mix of quantitative and qualitative evidence" (Yin, 2003, p. 15).

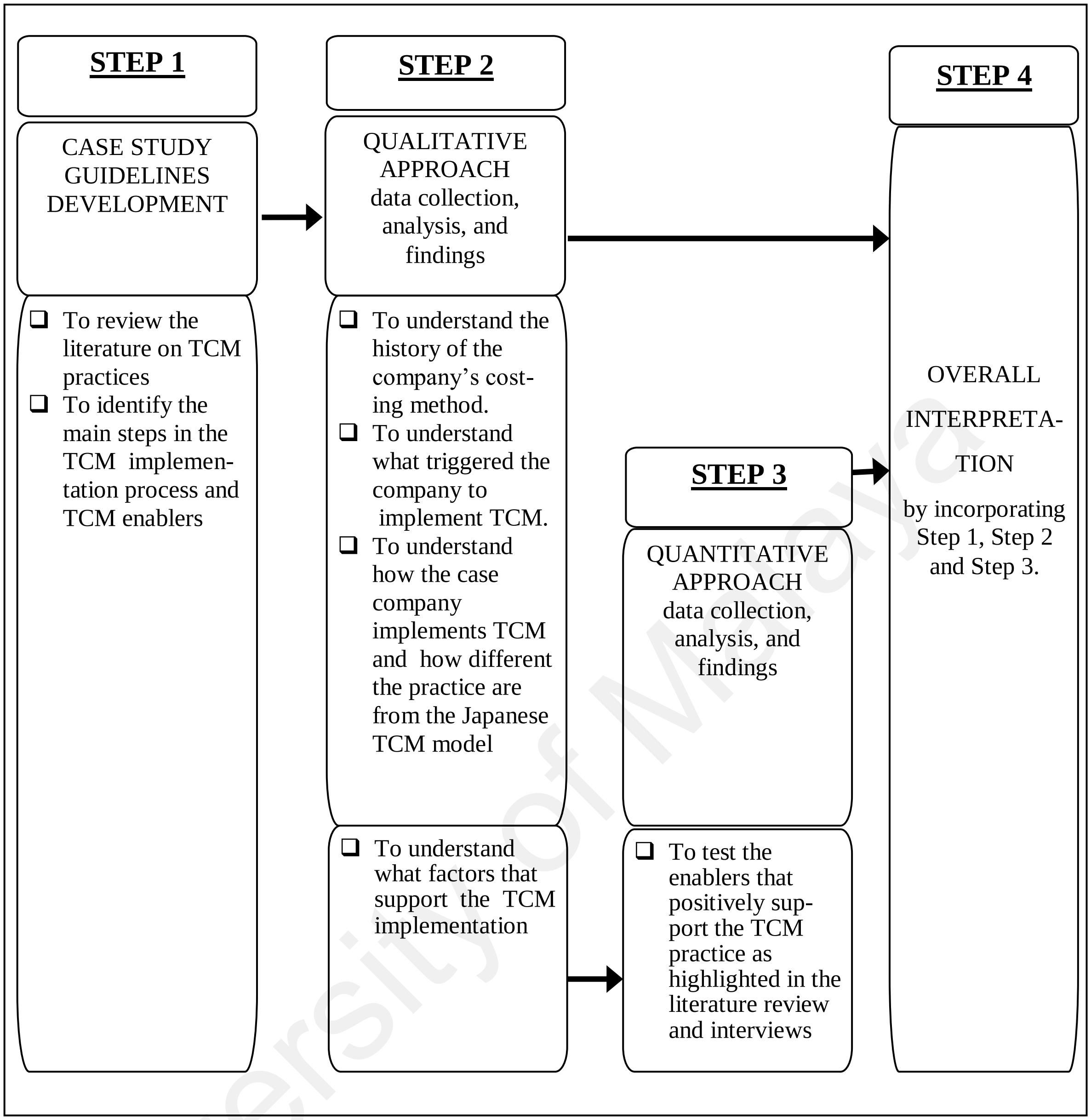

Figure 1-2: Research steps

This research was conducted in four main steps. Figure 1-2 illustrates the steps taken in this research. In the first step, the case study guidelines were developed by analysing all the related literature on TCM, specifically the case studies of TCM practices in Japan automotive companies. From the literature review, the main steps of the TCM implementation process and potential TCM enablers are identified. This step is important in order to develop the conceptual framework of the TCM implementation process based on Japanese companies' practices and theoretical framework of enablers for the successful implementation of TCM. Then, in the second step, qualitative data are collected to obtain a wide perspective and in-depth understanding concerning the TCM implementation process and the factors that support the TCM practice. In this stage, multi-sources of data collection through interviews, direct observation and documents review are collected to understand the TCM practice and why the case company practices are the way they are. Then, in the third step, the quantitative data are collected by distributing surveys to the case company's TCM users to confirm the critical factors that positively associated with the successful implementation of TCM. In the last step, based on the perspectives of the contingency theory and dynamic capabilities theory, the qualitative and quantitative result triangulation is made to understand the differences of TCM implementation process, and to justify the possible causes of the differences and the enablers that positively associated with the successful implementation of TCM.

In order to study in-depth the TCM practice at Company A, this research focused on the TCM implementation process of Model X1 (pseudonym). This model is a full model change of the most saleable passenger car. Generally, the case company takes almost three years for the new model development. In order to understand the TCM process implementation, this data was collected based on the development stages of Model X1. This period was divided into three – Period 1, Period 2 and Period 3– which started from August 2008 and finished in June 2012. However, the data collected from August 2008 until July 2010 was based on the company's historical internal documents only such as proposal papers, meeting minutes, presentation materials and et cetera. Started from August 2010, the researcher collected field data from interviews, observation such as factory visits, documentations through involvement in TCM related meetings, and surveys. The data collection stages were segregated through the TCM process activities, which will be explained in detail in the methodology chapter. Table 1-2 summarizes the stages of TCM activities and data collection method conducted during each period.

Table 1-2: TCM activities of Model X1 at Company A

Period 1	Period 2	Period 3
• 10 months • August 2008 until May 2009 • Product Planning stage • TCM activities cover: i. Target-selling price setting ii. Target Profit setting iii. Target Cost setting iv. Initial Profitability Feasibility Study • Data collection method: Documentations	• 23 months • June 2009 until April 2011 • Product Design and development stage • TCM activities covering: i. Achieving target cost ii. Monitoring target cost result • Data collection method: Documentation, Observation, Interview	• 14 months • May 2011 until June 2012 • After product launching and under Mass Production. • TCM activities cover: i. Actual result monitoring ii. Cost improvement activities • Data collection method: Documentation, Observation, Survey, Interview

Period 1 represents the 10-month period from August 2008 until May 2009. This period covered the TCM planning stage of Model X1, which included the target-selling price setting, target profit setting, target cost setting and initial profitability feasibility study. In this period, Model X1 was in the product planning stage. Period 2 represents the 23-month period from June 2009 until April 2011. In period 2, Model X1 was under product design and development stage. Period 2 covered the TCM target cost achievement and monitoring activities of Model X1 until the mass production stage. Period 3 represents the 14-month period from May 2011 until June 2012. This covered the TCM actual result monitoring and cost improvement activities of Model X1. During this time, Model X1 was already launched to the market and under the Mass Production (MP) stage.

Originally, the researcher intended to end the research 6 months after the mass production stage of Model X1, which was in November 2011. However, the researcher discovered that Company A started to implement cost reduction activities to Model X1 even though the mass production stage started just two months before. A new product code, Model X2 (pseudonym), was created for this special cost reduction project. This was considered a new approach and had never been conducted before on previous products of Company A. Due to the occurrence of this unexpected phenomenon of TCM activities, the researcher decided to extend another 7 months to strengthen and support the previous findings. This is because most of the research highlighted that, as a rule of thumb, management will drop the project if it were found to be unprofitable during the development stage (Cooper & Slagmulder, 1998). Thus, logically, had the Model X1 project been determined to be unprofitable during the development stage, it would be dropped or the mass production would be extended. Hence, there would be no necessity to conduct the Model X2 project after the launching of Model X1. However, if Model X1 had been found to be profitable, Model X2 would be considered by Company A as an extra effort made to reduce the cost further. For either reason, the researcher suspected that the Model X2 project would be able to strengthen the findings on the TCM practice at Company A.

1.8 Organization of the thesis

This thesis is presented in seven chapters. Chapter 2 presents the related literature on the development of Malaysia's automotive industry, as well as its management accounting development and TCM. First, it highlights the history and development of the automotive industry in Malaysia and its significance to the Malaysian economy. This is followed by the challenges of liberalization faced by the automotive industry. Next, it reviews the literature on the development of management accounting, which resulted in the development of TCM. Finally, this chapter explains the previous studies done on TCM by categorizing them into history, concept, definitions, and characteristics, implementation process, tools, enablers and objectives.

Chapter 3 focuses on the theory used in this study, and the development of the conceptual and theoretical framework used in the study. The first part of this section explains the fundamental view of the contingency theory and dynamic capabilities theory, which will be used to explain the research findings. Next, it explains the development of the TCM conceptual framework. The TCM conceptual framework is explained in the Plan-Do-Check-Action (PDCA) stages and seven major steps. This conceptual framework is used as a guideline to conduct the case study research and as a base to compare the differences in the TCM practices. Then, based on the literature review and initial qualitative findings, this chapter proposes nine propositions as enablers that positively associated with the successful implementation of TCM: Advanced Manufacturing Technologies (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training. Finally, this chapter explains the dimensions for the successful implementation of TCM, which are cost reduction, efficiency and marketability.

Chapter 4 outlines the methodological approach used in the research. The objectives of this chapter are (1) to justify the appropriateness of using a single embedded case study methodology, (2) to justify the selection of Company A as the case company, and (3) to explain how this research addresses the issue of validity and reliability. As this case study uses multi-sources for the data collection method, this chapter categorizes the explanation of the methodology into the qualitative and quantitative approach. The instrument development, data collection procedures and data analysis method are explained in both approaches. The chapter ends with an explanation of the reliability and validity in terms of issues and the approaches used to address them.

Chapter 5 discusses the qualitative finding of the research. The focus of this chapter is to answer the research questions by synthesizing the qualitative data collected from the interviews, documents and observations. First, the chapter explains the development of TCM at Company A. Then, it assesses the implementation process of TCM at Company A under the PDCA stages and seven steps by comparing it with the TCM conceptual framework. This is followed by the identification and assessment of proposed enablers: Advanced Manufacturing Technologies (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training, in supporting the successful implementation of TCM practice at Company A.

Chapter 6 discusses the quantitative findings of the research. The main objective of this chapter is to answer the third research question by determining the critical factors that have a positive association with the successful implementation of TCM by using statistical analysis. In the first section, it explains the statistical results for the respondents' profile using Statistical Package for Social Sciences (SPSS) analysis. This is followed by the statistical results for TCM enablers and an explanation using Partial Least Squares (PLS) analysis. The PLS results will be explained in two stages, the measurement model and the structural model.

Chapter 7 discusses the findings and concludes the research from the perspective of the contingency and dynamic capabilities theory. This chapter starts with a summary of the findings of the differences in the TCM implementation process compared to previous studies. Next, this chapter summarizes the possible reasons that might have caused the differences in TCM practices. This is followed by the new proposed conceptual framework for the TCM implementation process. Then, it summarizes and justifies the relationship of each of the proposed enablers with the successful implementation of TCM. Subsequently, this chapter discusses the theoretical contributions and practical implications for academicians and practitioners, respectively. Finally, it highlights the research limitations and recommends some topics for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature by previous scholars related to the history and challenges of the Malaysian automotive industry, and the development of management accounting and TCM. The first section of this chapter discusses the historical development of the automotive industry in Malaysia and its importance to the Malaysia economy. It also explains about the competitive challenges of the Malaysian automotive industry under liberalization. The second section reviews the literature concerning key issues of the traditional management in terms of product costing, which led to the development of strategic management accounting, i.e. TCM. Finally, this chapter reviews the literature on TCM by categorizing it into history, concept, definitions, objectives, characteristics, implementation process, engineering tools and its enablers. In terms of the enablers, this research further categorizes and discusses the detail background of the most comment TCM enablers: Advanced Manufacturing Technologies (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training. However, the detail linkage and proposition of each enabler with TCM will be explained in Chapter 3.4.

2.2 Background of automotive industry

The automotive industry is one of the main catalysts for the development of the Malaysian manufacturing sector (Mahidin & Kanageswary, 2004). As a prime producer of passenger cars with the largest passenger car market in ASEAN (MIDA, 2010), the automotive industry has a major impact on the development of Malaysia's economy by generating exports, tax revenue and employment (Wad & Govindaraju, 2011). As of year 2010, this industry had created employment for more than 300,000 employees (MAI, 2010).

2.2.1 History of Malaysian automotive industry

Historically, before the 1960s, most of the automobiles were imported Completely Built up (CBU) from Europe. However, after the 1960s, the Malaysian government started to introduce policies to develop local assembly production (Hasan & Jomo, 2007). Since then, the Malaysian government has played an active role in promoting the development of the automotive industry (Nor & Sumormo, 2005). The development of government policy towards the automotive industry after the 1960s can be divided into two phases – first phase and second phase.

The first phase was from 1963 to 1982 with the main objective being to enhance local assembly and local content (Hasan & Jomo, 2007). In 1963, the Malaysian government introduced a policy to encourage the integration of the Malaysian automotive industry. The policy objectives were: (1) to promote import substitutes, (2) to save foreign currency exchange, (3) to create employment, and (4) to develop the auto components manufacturing industry that would enhance the automotive industry through the multiplier effect. In order to encourage vehicles to be assembled locally, the Malaysian government started to adopt policies, such as requiring vehicles to have a certain percentage of locally manufactured parts and components, mandatory deletion of Component Knocked Down (CKD), tariff protection for parts manufacturers, duty exemption, imposing import taxes and putting a tariff on CBU imports. However, these efforts were not very successful as the cost of locally assembled vehicles was still high (Jayasankaran, 1993). The reasons being: (1) there were many vehicle models, which caused the local demand for the particular parts and components to be very little, and, hence, unable to achieve economy of scale, (2) high price of locally made parts and components, (3) the Japanese assemblers refused to reduce the price of the imported CKD parts to the same level as the price charged by the substitute local parts producers (Nor & Sumormo, 2005; Jayasankaran, 1993).

The second phase of development of government policy towards the automotive industry started after 1983. This phase was initiated to counter the first phase issues and to strengthen the automotive industry with the establishment of the National Car Project under the Heavy Industrial Policy (Hasan & Jomo, 2007). The objectives of the National Car Project were (1) to develop the local automotive industry, (2) to enhance the industry through technical spin-offs and a value chain effect, and (3) to increase Bumiputra participation in the industry (Tham, 2004). In 1985, Perusahaan Otomobil Nasional (Proton) was established under the National Car Project. Proton was a joint venture project between the Malaysia - Heavy Industry Corporation of Malaysia (HICOM), and Japan -Mitsubishi Motors Corporation and Mitsubishi Corporation of Japan. Subsequently, the second national car project, Perusahaan Otomobil Kedua Sdn. Bhd. (POSB), also known as Perodua, was established in 1992. Perodua was established through joint cooperation among UMW Corporation Sdn. Bhd., Daihatsu Motor Corporation Ltd. of Japan, PNB Equity Resources Corporation Sdn. Bhd., Med-Bumikar Mara Sdn. Bhd., Daihatsu (Malaysia) Sdn. Bhd., Mitsui & Co. Ltd. of Japan. The main objectives of the second national car project were to expand the automotive product range and to boost the demand for domestic parts and components (Nor & Sumormo, 2005). With the establishment of Proton and Perodua, Malaysia had transformed itself from a mere vehicle assembler into a vehicle manufacturer (MIDA, 2010). Besides Proton and Perodua, Industri Otomotif Komersial (M) Sdn. Bhd. (Inokom) and the Malaysian Truck and Bus Sdn. Bhd. (MTB) were also granted the status of national carmaker by the Malaysian government. The national car status was only granted to the automotive companies that were initiated by the Malaysian government under the Heavy Industrial Policy. Even though these national automotive companies were established through foreign company joint ventures, the majority of their shares belonged to the locals, particularly the government through government linked companies (Rosli & Kari, 2008).

2.2.2 Issues in the Malaysian automotive industry

All Malaysian national cars have overseas joint venture partners. However, most of the national car manufacturers only focus on the domestic market. Due to the small domestic market size, the per unit amortization amount of indirect expenses of the national car manufacturers is higher than that of global car manufacturers. Accordingly, the national car manufacturers have higher cost per unit car, which causes cost disadvantages compared to global car manufacturers. In order to counter this, the Malaysian government gives protection and incentives to enable the national cars to capture the domestic market and to protect it from competition from imports (Tham, 2004; Sadoi, 1998). Bumiputra parts and component manufacturers also receive preferential treatment from the government under the special supplier development programme in terms of technical, financial and other supports (Hasan & Jomo, 2007).

Generally, active government measures and the establishment of national car projects had a positive impact on the development of the Malaysian automotive industry. It helped to increase the economies of scale of parts and components manufacturing, local content ratio and the number of local automotive component companies including joint ventures with foreign firms. It also enhanced the research and development, and human resources development. However, in spite of these results, the Malaysian automotive industry has still not reached a global competitive level (Hasan & Jomo, 2007). For example, in 2003, Malaysia only captured 31.3 per cent of the ASEAN motor vehicle market compared with Thailand, which netted 41.3 per cent of the ASEAN market. This was mainly due to issues pertaining to the product features and price competitiveness (Mahidin & Kanageswary, 2004).

Accordingly, Hasan and Jomo (2007) conclude that the main competitive challenges of Malaysia's national automotive industry are that (1) the industry has still not achieved the economies of scales to be competitively profitable, (2) most of the local suppliers are incompetent, and (3) the industry players are still heavily dependent on the government's tariff and non-tariff trade barriers. In addition, regarding the price competitiveness issue, in a press conference in June 2013, the minister from the Ministry of International Trade and Industry (MITI) argued that among four price factors – high profit margin, high manufacturing cost, excise duty and sales tax – that contribute to the expense, the main reason for higher national car prices was due to the high profit margin. In order to counter this issue, the Malaysian government imposed a new policy to pressure the market by encouraging the introduction of new car brands from overseas into the market. Furthermore, the Malaysian government planned to reduce the car prices gradually by 20 per cent to 30 per cent until 2017 (Chua, 2013), which would exert more pressure on the automotive industry players.

2.2.3 Liberalization of the automotive industry

Even though Malaysia imposes protectionism and subsidies for national car manufacturers, the market liberalization under the ASEAN Free Trade Area (AFTA) has increased the pressure from competition on the Malaysian automotive industry (Tham, 2004). AFTA was established in 1992 by the Association of Southeast Asian Nations (ASEAN) to create a free trade area among ASEAN countries – Malaysia, Brunei, Indonesia, Philippines, Singapore, Thailand, Cambodia, Laos, Myanmar and Vietnam. Through AFTA, ASEAN aims to become a completely free trade area by 2015 (MITI, 2011). Generally, AFTA means tariff liberalization through trade collaboration among the ASEAN countries. The liberalization of trade in the region through the elimination of both intra-regional tariffs and non-tariff barriers helps the manufacturing sector in ASEAN to be more efficient and competitive in the global market. The reduction and elimination of the tariffs allow producers or manufacturers to buy raw materials at a cheaper price and better quality from ASEAN countries. With lower costs and larger scale of production, the price of products will be cheaper. This allows the producers or manufacturers to compete globally and access a broader market (MITI, 2011).

Accordingly, Tham (2004) argues that the future of the national car manufacturers depends on their capability to reduce production costs. The liberalization of the Malaysian automotive industry creates more competitive pressure on the national car manufacturers (Nor & Sumormo, 2005). This is because, eventually, the market liberalization under AFTA is intended to force inefficient firms to exit while allowing efficient ones to gain economies of scale in the ASEAN market (Tham, 2004). In order to deal with the competitive global environment and pressure from liberalization, in March 2006, the Malaysian government introduced the National Automotive Policy (NAP) to facilitate the transformation, and to integrate the local automotive industry into regional and global industry networks. Subsequently, in October 2009, the NAP was reviewed to nurture a more competitive automotive market for local and international companies. This new review of NAP also aimed to benefit the consumers in terms of environmental protection and safety (MITI, 2010).

The automotive industry in Malaysia is very competitive and dynamic. Since the price and cost are among the factors that determine the competitiveness of vehicles, managing the cost and remain profitable are important for Malaysian automotive companies. The Japanese automotive companies use TCM, one of SMA method, as serious competitive tool to remain competitive and profitable (Kato et al., 1995). Considering the importance of the automotive industry to the Malaysia economy, it is important to understand the TCM practices in the context of Malaysian automotive industry to make it more competitive.

2.3 Development of management accounting

Management accounting identifies, collects, measures and reports financial and non-financial information that is useful to the business in its planning, evaluating, controlling and decision-making to achieve the organizational goals (Bhimani, Horngren, Datar, & Foster, 2008). According to International Federation of Accountants (IFAC) the evolution of management accounting from traditional to advance management accounting can be categorized into four stages. However, these stages are not mutually exclusive and each consecutive stage includes previous stage with a new set of conditions in management environment (IFAC, 1998). In other words, the traditional and advance management accounting tend to complement each other (Chenhall & Langfield- Smith, 1998b).

The first stage is cost determination and financial control which occurred before 1950s. In this stage, the management accounting is viewed as a technical activity which is important to achieve organizational objectives. The focus of management accounting practices is to determine the product cost. Since, the production is based on labour oriented with simple technology and low competition environment, there is a little innovation in the products and production processes. Therefore, even though financial statement analysis, ratio analysis, and budgeting are already established, the cost information is not fully used for management decision-making (IFAC, 1998).

The second stage is information and management planning and control which occurred between 1950s and 1960s. In this stage, the management accounting is viewed as a management activity in which the management accountants provide the information to support the line management. The focus of management accounting practices is to provide information for planning, control and decision-making. Standard costing, Cost-Volume- Profit analysis, and responsibility accounting are the examples of management accounting method introduced in this stage. However, these management accounting methods are reactive because problem identifications and actions are taken after the problems occurred.

The third stage is reduction of resources waste in the business processes which started after 1965. The high global competition, rapid technologies and introduction of new management and production techniques have enforced to eliminate the non-value added through process analysis and cost management methods such as Activity Based Costing (ABC). The focus of the management accounting is managing resources and information to enhance profit and eliminate waste. Accordingly, employee empowerment for decision making and management information are necessary to achieve the organizational objectives. However, the major challenge of management accountants is to provide appropriate information for all managers and employees.

The fourth stage is creation of value through effective use of resources. Since 1985, the business global competition becomes more severe due to the advance manufacturing and information-processing technologies. As a consequence, the real time information becomes available directly to the management and lack of distinction between management accountants and line management. In this stage, the focus of management accounting is generating or creating value through effective use of resources, especially information, to drive customer value, innovation and shareholder value. The use of resources to create value makes the management accounting becomes an integral part of management process. Among the popular management accounting methods are TCM, Benchmarking and Industry analysis (IFAC, 1998).

Based on IFAC (1998), most of the companies in the developed countries already shifted to the stage four of management accounting evolution since 1990s. Nevertheless, a survey study by Mahfar and Omar (2004) in 156 Malaysian selected companies found these companies still dominantly apply stage one and stage two of management accounting evolution and only a few companies managed to evolve into the third and fourth stage.

According Ansari et al. (2007), any new management practice will have five stages of life cycle: (1) development and advocacy, (2) technical refinement, (3) organizational context of the practice, (4) linkage with other tools and processes, and (5) institutionalization and diffusion. When a new management practice succeeds, it will be further developed, advocated and passed on to other companies. Then, the technique will be further refined to fit particular circumstances in different companies. As more companies implement the practice, the focus shifts from technical refinement to cultural and behavioural implications in the organizational context. After the practice matures, the focus is to link it with other organizational tools and processes. When it reaches the saturation stage, the practice is already embedded in the organization and starts to diffuse as it spreads across industries and the nation (Ansari et al., 2007).

In summary, management accounting provides critical information to the business for its planning, evaluating, controlling and decision-making. In general the management accounting can be divided into two categories, traditional management accounting - such as variance analysis, standard costing and traditional budgeting - and strategic management accounting (SMA) -such as TCM, ABC and benchmarking (Kaplan, 1983; Sulaiman et al., 2004). Nevertheless, any management accounting practice will go through five stages of the life cycles until it fully institutionalized. Below sub-sections below explain the issues of traditional management accounting and the development SMA.

2.3.1 Traditional management accounting

The relevance of the traditional management accounting practices in current contemporary business environment is debated due the following reasons (Johnson & Kaplan, 1987). First, the traditional management accounting relies on financial accounting which makes the systems and costing techniques are financially focused (Johnson and Kaplan, 1987). In today's competitive environment, non- financial data is important for the effective and efficient operation (Kaplan, 1984). Second, the traditional management accounting does not link with the companies' strategies and external business context environment. The cost and decision analysis tools mostly concentrate on the short run operation decisions instead of the long run strategic decisions. They ignore the strategic elements of business decisions, such as market share, brand image, competitor's strategies, and competitive cost structure (Wickramasinghe & Alawattage, 2007). Third, the traditional management accounting information is based on historical information and an "after the fact responses" (Nishimura, 2005). Thus it could not provide timely information for strategic and operational control to the managers (Johnson & Kaplan, 1987). Forth, since it focuses on computational aspects accounting, it overlooks the human-relation elements, such as attitude, perceptions, motivation and moral (Hoque, 2003).

Due to the above issues, traditional accounting systems are inadequate to assist managers in planning, pricing, control decisions and maintaining company survival in current competitive business environment.

2.3.1.1 Traditional costing methods

The traditional cost accounting models were developed based on the mass production of mature, standard and a narrow range of products with the direct labour and material costs as the dominant factory costs, and less technology oriented business environment. In this environment, the overhead costs are low and do not have a significant allocation distortion impact on the business (Kaplan, 1983). Job order costing, process costing, actual costing, standard costing, full costing and variable costing are among the examples of traditional costing methods (Drury, 2004). The traditional cost systems are mainly used to value inventory and allocate overheads for financial reporting purposes (Kaplan, 1983).

Among all, actual costing and standard costing are the most common methods used by the Malaysian companies (Chun, Kasim, & Minai, 1998; Tho, Isa, & Thye, 1998; Nishimura, 2005; Sulaiman, Ahmad, & Alwi, 2005). In spite of its popularity, many scholars (Drury & Tales, 1994; Monden & Hamada, 1991) claim that the traditional cost accounting methods, such as actual costing and standard costing, are inadequate, too complicated and out-dated for assisting the company in planning, controlling and decision-making in today's highly competitive market.

For example, in terms of actual costing, the unit cost is measured based on the actual cost of the direct material, the direct labour and the overheads incurred in producing the product. The calculation of the direct material and direct labour cost per unit can be calculated by the amount of units produced. However, with an increasing mix of products and technology-oriented business, the overhead cost per unit fluctuates from one period to another. This is because the overhead cost, such as utilities, is not incurred uniformly throughout the year. In addition, the allocated overhead method does not reflect the actual resource consumption by each product (Kaplan, 1984). As a result, even though the production volume and the production process are the same, the product cost per unit fluctuates from month to month (Guan et al., 2009). Thus, the actual costing method is unable to provide accurate unit cost information on a timely basis (Guan et al., 2009).

On the other hand, in the standard costing system, the standard price and quantity for direct material and overheads are set in advance. These standards can be set by using historical experience, historical accounting statements or engineering studies. The standard cost per unit is set by multiplying the standard price by the standard quantity to represent an amount or units consumed for each unit of production. Besides facilitating the product costing, the standard costing system also helps to improve planning and controlling. This is because the standard cost can be used as a benchmark and compared against the actual production cost to analyse the variances in the price and quantity. From the results of the analysis of these variances, the management can take the necessary actions for the corrective measures (Guan, Hansen, & Mowen, 2009). However, Shank and Fisher (1999) argue that the use of standard costing is a short-term measure that focuses on cost control to avoid unfavourable variances. It encourages companies to accept existing rules and the existing value chain, without an incentive to improve them. In addition, the cost variances derived only focus on the financial information resulting from past decisions, and, hence, are not actionable. It is based on historical information and an "after the fact responses", which are unable to contribute to the cost savings for the company and are unable to assist the managers in increasing operational efficiency (Nishimura, 2005).

In summary, with an increasing product mix and technology oriented business environment, the traditional cost management systems are inadequate to assist company in terms of planning, pricing, controlling and decision making to be more competitive.

2.3.1.2 Pricing under traditional management accounting

Under traditional management accounting, the product pricing concept is based on the cost plus formula (Hergert, 2002). The product selling price is determined by adding up all the costs, based on the allocated manufacturing costs or standard costs, with the profit margin (Shank & Fisher, 1999). The formula below simplifies the pricing concept under traditional management accounting:

Cost + profit margin = Selling price (Pierce, 2002)

This pricing method ignores the price and demand relationship, profit planning and customer needs during the planning stage (Albright & Lam, 2006; Drury, 2004; Helms, Ettkin, Baxter, & Gordon, 2005). This is because the price is solely dependent on the cost and the cost is measured after the product has been produced. If the cost is not proactively managed, the product is likely to be over engineered and sell at an unnecessarily high selling price. Consequently, the market is likely to reject or not accept the product after it has been introduced in the market (Helms, Ettkin, Baxter, & Gordon, 2005). In order to meet the market price, the product will be redesigned or the specifications will be reduced. However, once the design and manufacturing has been set, any changes are very expensive not only in terms of money but also in time and effort. Any redesign after mass production to reduce the cost is ineffective inasmuch as almost 80 per cent of the cost is locked at the design stage (Kato, 1993; Hergert, 2002).

Besides, using traditional cost management in pricing might cause the products to be under-priced. If the products are under-priced, the companies are unable to recover their forgone profit easily. This is because, once the product has been launched on the market, it is almost impossible for the companies to raise the price of the product. Eventually, the profit depends on the balance of the product price after deducting the total product costs. Thus, pricing under traditional costing does not guarantee that the companies can achieve their desired profit margin (Albright & Lam, 2006).

In a nutshell, pricing the product by using cost-plus formula creates over-pricing and under-pricing issues. This increases the risk of the company to achieve its desired profit margin.

2.3.2 Strategic management accounting (SMA)

Generally, there is no agreed conceptual framework of SMA since it is still not widely understood. Thus, there are various definitions of SMA (Roslender & Hart, 2003). Nevertheless, the scholars believe that SMA will be adopted widely in the future by the industries and will be a major force that shapes the modern management accounting (Langfield-Smith, 2007).

For example, Hoque (2003) defines SMA as an accounting system for managing an organization's strategies and competitive advantages. On the other hand, Roslender and Hart (2003) specifically define SMA as a generic approach that makes management accounting more strategic by integrating it with marketing management. Subsequently, Wickramasinghe and Alawattage (2007) define SMA as the intersection of management accounting with other functional disciplines, such as strategic management, marketing and operation management. The integration and coordination across different functions under SMA, allows companies to create an integrated value chain and deliver superior value to the customers (Wijewardena & Zoysa, 1999).

SMA term is usually used by academics and practitioners in the Australia, New Zealand and UK (Langfield-Smith, 2007). While, in the USA the Strategic Cost Management (SCM) term is commonly used in the literature. Even though some scholars define SCM similar with SMA, others view SCM as sub system of SMA (Langfield-Smith, 2007). For example, Shank (1989) specifically defines SCM as a system that explicitly directs the managerial use of cost information at one or more of the following stages: formulation of strategies, communication of these strategies throughout the organization, implementation of the strategies, and implementation of control system to monitor the result. Through the SCM system, managers formulate and communicate the company's long-term focus strategies, and carry out tactics and control methods to achieve those strategies (Hoque, 2003).

Since SMA has wide definition, Simon (2007) categories the SMA into five broad categories: (1) Costing, (2) Planning, control and performance management, (3) Strategic decision- making, (4) Competitor accounting, and (5) Customer accounting. The SMA techniques under Costing category are TCM, life-cycle costing, attribute costing, quality costing, and value-chain costing. Among the techniques, TCM is the popular technique used by the Japanese and world leading companies (Ansari et al., 2007). Since TCM also exhibit strong emphasis on market and competitor (Sakurai, 1989), it is also known as target pricing, a price management tool (Newman & Mc Keller, 1995; Omar, 1997).

In conclusion, there is no solid definition of SMA. Nevertheless, it is believed that the strategic elements in SMA help the companies to gain competitive advantage. TCM is one of the SMA that commonly used by the Japanese companies as a competitive tool.

2.3.2.1 Benefits of Strategic Management Accounting techniques

In the current business environment, the company's competitiveness no longer depends on the price or the performance attributes of existing products. Instead, it depends on the company's ability to produce a quality product at lower cost and more timely than its competitors (Hiromoto, 1991). The application of SMA helps to increase a company's ability to meet its strategic objectives and compete globally by providing financial and non-financial information that are actionable and future oriented. This information assists managers to manage the changes within its external and internal business environment, make strategic decisions, integrate and control risks and profits together, which are important in order to gain competitive advantage (Nishimura, 2005; Hoque, 2003).

Hiromoto (1991) posits that the goals of SMA are to support continuous innovations and create future competitiveness by promoting strategic management and motivating employees to act strategically. In order to achieve these objectives, the design of the SMA should have four elements: (1) focus on behavioural influence approach that influences employees to do the desired things instead of providing information for the decision-making approach that recommends the optimal decisions for managers; (2) a market driven management by giving priority to market trends and customers' requirements instead of technology driven management that focuses on current technology limitations; (3) applying a dynamic approach instead of a static approach in terms of management accounting application, performance evaluation, and et cetera; and (4) promoting a team oriented approach instead of a baton passing or sequential approach in the production process or product development. In his case studies at Japanese manufacturing companies, he found that the top Japanese companies integrate these elements in designing their SMA, such as TCM, to support the company strategies for continuous innovation. Furthermore, these companies also modified their cost allocation systems and redesigned their management accounting system to make it function better (Hiromoto, 1991).

In addition, according to Okano and Suzuki (2007), the Japanese companies proactively apply "Koto mae management" (before thing happens or causal management) in their management accounting practices instead of solely relying on the accounting result. This concept means that the Japanese companies do not limit their quality and cost focus to the production stage but also include the upstream process, the design and development stage. The fundamental stance is "quality and cost are built in on the site" with the "quality and cost determined prior to the design stage". Accordingly, the top Japanese companies manage to build in the quality and reliability within the allowable cost prior to the design and development stage. TCM is a popular Japanese style of SMA that applies this concept (Okano & Suzuki, 2007). The detail of TCM will be explained in the next section.

In summary, the management accounting has been developed before 1950s. In spite of the weaknesses of the traditional management accounting, many companies still prefer to use it. On the other hand, even though SMA has not been widely understood and adopted, scholars believe that SMA will be adopted widely in the future. TCM is one of the promising SMA that provides the companies with financial and non-financial information and emphasis on customer, market and competitors simultaneously.

2.4 Target cost management (TCM)

Generally, TCM is considered as a technique associated with SMA (Langfield-Smith, 2007). Tani (1995) specifically categorizes TCM as a key sub-system for strategic cost management. Nevertheless, Japanese scholars (Kato, 1993; Monden & Hamada, 1991; Sakurai, 1989; Tani et al., 1994) emphasize that the TCM is neither costing nor accounting but constitutes an interactive act and strategy that enable comprehensive planning and management.

There are many viewpoints concerning the TCM definitions, objectives, characteristics, processes, tools and enablers were highlighted in the literature (Sakurai, 1989; Ansari et al., 2006; Everaete et al., 2006; Monden & Hamada, 1991; Kato, Boer, & Chow, 1995; Tani et al., 1994; Feil, Yook, & Kim, 2004). The following sub-sections elaborate on the TCM literature concerning its concept, development history, definitions, objectives, characteristics, engineering tools, implementation process, and enablers by previous scholars.

2.4.1 Concept of TCM

Sheldon (1923) under his philosophy of management highlighted that:

> *Industry exists to provide the commodities and services which are necessary for the good life of the community, in whatever volume they are required. These commodities and services must be furnished at the lowest prices compatible with an adequate standard of quality, and distributed in such a way as directly or indirectly to promote the highest ends of the community (Sheldon, 1923, p.285)*

Sheldon (1923) argues that companies should provide the customer with the lowest price without sacrificing quality. On the other hand, according to economic theory, the objective of business is to maximize profit by consuming the most efficient combination of resources to produce the most profitable products (Schiller, 1980; Steiner & Steiner, 2006; Koch, 2010). Thus, the challenges for any company are to fulfil the customer requirements by producing high quality product with low price, and to maximize profit simultaneously.

The TCM concept helps the companies to respond to these challenges. In general, the TCM concept is based on this formula:

Target Cost= Target-selling price - target profit (Ansari et al., 2007)

In TCM, the target cost is set based on the target-selling price minus the target profit margin (Ansari et al., 2007). This is based on the price led approach or backwards approach where the target-selling price is set by the market before the product is being designed (Helms et al., 2005). The target-selling price is defined as "the estimated price of a product (or services) that potential customer will be willing to pay" (Horngren et al., 2008, p. 384). As the target-selling price of the product with certain specifications is already set by the market and the companies already fix their target profit, the companies are bound by the target cost in producing the new product. Thus, the companies must reconcile their costs to meet the target-selling price by improving the production costs or other related costs. This is because the companies are only able to gain their target profit by achieving the target cost (Howard & Herbig, 1996; Ellram, 2000). Eventually, this helps the companies to produce competitive products and reduce the risk of not making sufficient profit (Monden & Lee, 1993; Helms et al., 2005; Kato et al., 1995).

2.4.2 TCM development history

Historically, the backward approach in determining the product costs was used at Ford in the US and Volkswagen in Germany in the 1930s. However, this approach only started being widely used after World War 2 due to the scarcity of resources. It began with the establishment of the Value Engineering (VE) concept by the Americans to maximize the desirable product attributes while minimizing the product costs. Later, due to the stiff domestic competition in Japan, the Japanese companies started to adopt the VE and integrate it into their products to reduce the product cost at the design and development stages (Feil, Yook, & Kim, 2004).

Although TCM has been utilized by Toyota in Japan since 1965, it only became widely known to the world in the past 20 years ago. Among the reasons for the late acknowledgment were that Just in Time (JIT) dominated the popular Japanese management techniques and TCM was related to the secrecy surrounding a company's new products (Kato, 1993). Nevertheless, the Japanese companies did not develop TCM in one shot but in gradual stages. TCM started with the cost reduction of individual parts of existing products before it was integrated with the profit management system and applied to the entire organization (Kato et al., 1995). Toyota, Japan's largest automotive company, was the first company to initiate the integration of the diverse elements of TCM and promote it from a simple cost reduction practice to a strategic profit planning model (Ansari et al., 2007). A survey study made by Kato et al. (1995) revealed that in the early 1990s, 100% of the transportation equipment industry already implemented TCM in Japan. Among the Japanese auto companies that have successfully implemented TCM are Toyota, Nissan, Daihatsu, Komatsu, and Isuzu (Cooper & Slagmulder, 1999; Sakurai, 1989; Kato et al., 1995). From the auto industry, TCM started to spread to other assembly and process industries in Japan (Ansari et al., 2007).

2.4.3 TCM definition

Studies (Sakurai, 1989; Feil, Yook, & Kim, 2004; Everaete et al., 2006) found various terms and definitions of TCM. TCM is known as "*Genka kikaku*" or "*Mokuhyou genka*" in Japanese of which the direct translation means "Cost Planning" or "Target Costing". Sometimes, it is also called "Cost Projection". Among all, "Target Costing" is the most common term used by the english literature to translate "*Genka kikaku*" (Sakurai, 1989; Monden & Hamada, 1991). Generally, the Japanese scholars agree that "*Genka kikaku*" or "Target Costing" is neither a costing system nor a system to set the target cost (Tani, 1995). Nevertheless, the Japanese scholars do not have a consensus on the exact definition of "*Genka kikaku*" (Feil, Yook, & Kim, 2004). Sakurai (1989) highlights that even though there are no universally accepted definitions of "Target Costing" in Japan, it can be defined as a cost management tool for reducing the overall cost of a product over its entire life cycle with the help of the production, engineering, R&D, marketing and accounting departments. While, Monden and Hamada (1991) define "Target Costing" as "the system to support the cost reduction process in the developing and designing phase of an entirely new product, a full model change or a minor model change" (Monden & Hamada, 1991, p.17).

As TCM developed, the perspective of TCM shifted from a cost reduction tool to a profit management tool (Feil, Yook, & Kim, 2004), which led to the TCM definition evolving. Kato (1993) highlights that "Target Costing" as a translation of "*Genka kikaku*" is incorrect and misleading. This is because "Target Costing" is not a form of costing but a "comprehensive programme to reduce costs, which begins even before there are any plans for new products" (Kato, 1993, p. 36). Then, he further defines "Target Costing" as part of a comprehensive strategic profit management system, which focuses on the life cycle cost of the new products while improving the quality and reliability by studying all possible cost reduction opportunities upstream of production and in the early production stage (Kato, 1993; Kato et al., 1995). In order to deliver the true meaning of "*Genka kikaku*", in a Japanese Cost Society meeting, the term of "Target Costing" was officially changed to Target Cost Management (TCM) (Feil, Yook, & Kim, 2004). Accordingly, this resulted in a comprehensive and integrated definition of TCM. The Japanese Accounting System (1996) defines TCM as:

> *An overall profit management process by which quality, price, reliability, delivery term and other targets are set at the time of the product planning and development at the levels that meet the perceived customer needs. Achievement of these targets is simultaneously attempted in all areas from the upstream to downstream processes (Huh et al., 2008, p. 91).*

From this definition, it can be concluded that TCM is "a profit management process" with specific targets in "quality, prices, reliability, delivery date and other targets", which is set in the "product planning and development" stage with an objective to conform to "the perceived customers' needs", and needs to be achieved from the "upstream to the downstream" of the value chain. The examples of the upstream of the value chain are design, research and development, and product planning. Whereas, examples of the downstream of the value chain are logistics, sales and customer services (Kato, 1993). However, between the two, the Japanese companies have a greater tendency to focus on the upstream to achieve their targets (Kato, 1993).

On the other hand, non-Japanese scholars also claim that many names are used for TCM such as "basis net price", "manufacturing cost reduction", "pre-calculation", "direct cost feasibility study" and "design to cost" in other countries (Everaert et al., 2006). In fact, the non-Japanese scholars also have various definitions for TCM. Kaplan and Atkinson (1998) define TCM as a cost control method that is used during the product design stage. Cooper and Slagmulder (1999) define TCM as a strategic technique to manage a company's future profits. This is because TCM achieves its objectives by determining its life cycle cost at which the companies must produce the proposed products with a particular quality and functionality, and sell it at its anticipated selling price to achieve its profit (Cooper & Slagmulder, 1999). Creese (2000) defines TCM as "a systematic approach to product cost planning in which the cost of a proposed product with specific functionality, specific quality, and at a specified production quantity is determined to give a certain level of profits at its anticipated selling price" (Creese, 2000, p. 4). Drury (2004) defines TCM as a technique that focuses on managing costs during the product planning and design stage. Ansari et al. (2006) cited that the Consortium for Advance Management-International (CAM-I) define TCM as "a profit planning and cost management system that is price led, customer focused, design centred, and cross-functional" (Ansari et al., 2006, p. 1). Everaert et al. (2006) define TCM more extensively as "Target costing is the process of determining the target cost for products early in the New Product Development (NPD) process and of supporting the attainment of this target cost during this NPD process, by providing target costing information to motivate the NPD team to realize downstream cost management of new products in order to ensure product profitability when launched" (Everaert et al., 2006, p. 238).

Due to various definitions of TCM, some studies conclude that there are gaps between the actual TCM practices and the scholars' definition of TCM (Everaert et al., 2006). On the other hand, it has also been concluded that the diversity of definitions indicate that TCM did not develop wholly from an established theory but gradually from practical applications. This indicates the broadness of the TCM concept (Feil, Yook, & Kim, 2004).

In summary, there are various definitions of TCM by the scholars and a wide range of names and descriptions given by the respondents for the practices they employ. However, even though there is a lack of identical definition of TCM, in general, all the definitions given by the scholars have the same fundamental philosophy of TCM – the market price becomes the determinant of the cost rather than the cost determining the market price.

2.4.4 TCM objectives

The objectives of the implementation of TCM are different from company to company (Sakurai, 1989; Tani et al., 1994). Among the objectives of TCM implementation are cost reduction, development and design efficiency, marketability quality, satisfying customers' needs, timely introduction of new products, and long-term profitability improvement (Tani et al., 1994; Huh et al., 2008; Ansari & Swenson, 2006 ; Cooper & Slagmulder, 1999). Generally, two main objectives of TCM implementation are to reduce cost and to remain profitable.

TCM is used as a cost reduction tool to reduce the costs at the planning and design stage of the product life cycle (Sakurai, 1990). This is because the most effective stage to control the cost is during the product planning and design stage and not when the product and process has already been designed and is being manufactured (Kaplan & Atkinson, 1998). With 70 to 80 per cent of the product cost being locked in during the product design stage, the design stage mostly fixes the cost of later activities including manufacturing and after sales cost (Sakurai, 1989; Kato, 1993; Hergert, 2002). Accordingly, the key to cost reduction is not to make the manufacturing more efficient but to make the design more effective (Kato et al., 1995). The target cost in TCM helps the engineer teams to focus their intention on the cost implications during the design stage, which, subsequently, reduces the cost of later stages (Kato, 1993; Hibbets et al., 2003).

Bayou and Reinstein (1998) argue that there are three methods to achieve cost reduction under TCM – cost improvement, cost cutting, and cost shifting. Cost improvement is defined as cost development by using a structure that involves cost and non-cost elements that integrate the costing, pricing, market share, profit margin and long-term investment. However, even though cost reduction can be achieved by cost improvement, not all cost improvements result in cost reduction. Cost cutting is defined as reducing the unavoidable inefficiency by redesigning the product or restructuring the manufacturing process. The cost reduction is met through a reduction in non-productive areas. Cost shifting is defined as reducing the cost by changing the type or quality of resources in the manufacturing process. These three methods have distinct tendencies: cost improvement has a suggestive tendency, cost cutting has an assertive tendency and cost shifting has an evasive tendency. Cost improvement has a suggestive tendency because the cost improvement activities involve a large scale of expertise with the study output being suggested to the top management. Cost cutting has an assertive tendency because the decisions are made by top management to increase profit or to reduce loss. Cost shifting has an evasive tendency because it switches to the lower cost line by degrading the quality. Both cost cutting and cost shifting are conducted without implementing a strategic improvement programme. The authors further advocate that TCM managers must consider the pitfalls before selecting any of these methods (Bayou & Reinstein, 1998).

Another main objective of TCM implementation is to remain profitable. Since the target-selling price is determined by the market, the product can be sold at the right price. Therefore, by managing the cost within the target cost, TCM implementation helps the company to ensure its profitability (Cooper & Slagmulder, 1998; Kato et al., 1995). Furthermore, as TCM started to become integrated with other business elements (Ansari et al., 2007), the TCM objective also gradually shifted from a cost reduction tool to a profit management tool (Feil, Yook, & Kim, 2004). For example, the Japanese companies link the target profit setting in TCM with their companies' midterm profit planning. This allows the Japanese companies to integrate the TCM with their profit management system and apply it as companywide activities (Kato et al., 1995)

In a nutshell, the main objectives of TCM implementation are to reduce cost and to remain profitable. However, as the TCM developed, the TCM is used as a profit management tool rather than a cost reduction tool.

2.4.5 Characteristics of TCM

This section highlights the related literature on TCM characteristics. Various TCM characteristics have been highlighted by previous studies from many perspectives (Sakurai, 1989; Ansari et al., 2006; Everaete et al., 2006; Monden & Hamada, 1991; Kato, Boer, & Chow, 1995; Tani et al., 1994; Feil, Yook, & Kim, 2004). For example, Sakurai (1989) outlines four characteristic of TCM: (1) it is mainly used in the planning and design stage; (2) it is a tool for cost planning or cost reduction not cost control; (3) it is mostly implemented in assembly oriented industries with a variety of products; and (4) it is a tool for controlling the design specifications and production technique decisions, which makes it focus more on management and engineering rather than accounting. On the other hand, Monden and Hamada (1991) highlight five characteristics of TCM: (1) TCM is applied in the developing and designing stage; (2) TCM is not a management method for cost control but one of the tools to reduce costs; (3) TCM uses many management science methods including engineering techniques; (4) TCM requires cooperation from many departments; and (5) TCM is suitable for multi-products with a small production volume rather than a few products with a large production volume.

However, Western scholars outline the TCM characteristics from different points of view. Ansari et al. (2006) cite that the Consortium for Advanced Management-International (CAM-I) summarises six characteristics of TCM: (1) price led costing, (2) focus on the customer, (3) focus on design, (4) cross-functional teams, (5) value chain involvement, and (6) life cycle cost reduction (Ansari et al., 2006). Everaete et al. (2006) based on the findings of their case studies at three manufacturing companies outline eight characteristics of TCM. These comprise (1) the target-selling price is set during product planning, in a market-oriented way; (2) the target profit margin is determined during product planning, based on the strategic profit plan; (3) the target cost is set before the NPD process starts in which the target cost is determined based on the subtraction method or the addition method; (4) the target cost is subdivided into target costs for components, functions, cost items, designers or suppliers; (5) attainment of the target cost requires a cross-functional team; (6) detailed cost information is provided during NPD to support cost reduction; (7) the cost level of the future product is compared with its target cost at different points during NPD; and (8) a general rule is established that "the target cost can never be exceeded".

Due to the wide scope of TCM characteristics, this research summarizes the common characteristics of TCM as follows:

a) TCM starts in the upstream of production stage.

Most of the scholars highlight that TCM starts in the upstream of the production stage, which is the design and development stage (Sakurai, 1989; Monden & Hamada, 1991). However, Tani et al. (1994), in their survey of Japanese companies in 1991 found that these companies already started to implement TCM earlier, which is in the product conceptual and planning stage. Similarly, Kato et al. (1995), in their case study of Daihatsu, Japan, found that the case company already starts TCM in the product conceptual stage.

b) TCM is suitable in a competitive business environment.

TCM is suitable in a competitive business environment with customers who are very sensitive to price and where the market is under high competition and high productivity (Hibbets et al., 2003; Dekker & Smidt, 2003). Historically, the tough competition in the Japanese market forced the Japanese companies to integrate the VE into their product design and develop TCM gradually from a cost reduction tool to a profit management tool (Feil, Yook, & Kim, 2004). Due to the stiff market competition, it is very hard to increase the price once the product has been launched. The implementation of TCM helps Japanese companies to set the right price from the initial stage by using the right selling price, which is determined by the market. This helps the Japanese companies to manage their strategies and operate speedily at a profitable margin (Howard & Herbig, 1996).

c) TCM is motivated by external forces

TCM is motivated by external forces to achieve the target cost. These external forces come from markets and competitor analysis. On the other hand, traditional costing is motivated by internal forces, which are set by the industrial engineers and production managers through the concept of efficiency. Thus, unlike the traditional costing, the external forces element of TCM helps the companies to respond to market demand and competitive trends rather than merely focus on internal performance (Guan, Hansen, & Mowen, 2009).

d) TCM is a multiple feed forward system

A feed forward system is a control system that is based on planned data, which aims to control the future by planning (Wickramasinghe & Alawattage, 2007). Compared with other SMA techniques, TCM has a built-in multiple loop feed forward system (Nishimura, 2005). From the information received, such as market trend, the built-in system in TCM allows companies to simulate the future business environment and link it with the companies' multidimensional planned values. Furthermore, by linking it with long-term strategic plan and short-term competitive plans, the companies are able to take proactive action in achieving their targets (Nishimura, 2005).

e) TCM is part of life costing cost management

TCM emphasizes recognizing, identifying and exploiting the external and internal linkages to achieve cost reduction. These characteristics also exist in life cycle cost management. Thus, TCM is regarded as a part of life cycle cost management (Guan, Hansen, & Mowen, 2009). In TCM, the target profit is also set to cover the life cycle costs of the products such as purchased parts cost, operating cost, and repair and maintenance cost (Cooper & Slagmulder, 1999). In addition, TCM is also regarded as a part of the total cost management in the Japanese companies (Monden & Hamada, 1991).

f) TCM is more suitable for mass production manufacturers

TCM is more suitable for manufacturers in assembly-oriented industries than process-oriented industries (Sakurai, 1989). Especially for mass production companies that produce multiple products in small to medium volume, make-to-stock items and high-technology (Helms et al., 2005; Sakurai, 1990).

g) TCM must achieve the target cost without sacrificing the quality or functionality.

The rule of thumb for TCM implementation is that the target cost must never be exceeded (Kato et al., 1995; Cooper & Slagmulder, 1999). In the Japanese companies, achieving the target cost is a must because it leads to achieving the target profit and become profitable (Kato et al., 1995). Thus, once the target cost has been set, any cost increment due to design must have offsetting savings somewhere else in the design. Engineering tools, such as Value Engineering (VE), are applied to achieve the target cost without sacrificing the quality and functionality of the product (Cooper & Slagmulder, 1999; Tani et al., 1995). However, if the companies decide to produce the product for strategic reasons, for example, to complete the product line, or to launch the product on time, the product will be produced even if the target cost is not met. After the product launching, an intense cost reduction will be conducted immediately to meet the target cost (Cooper & Slagmulder, 1999). Alternatively, a systematic approach can also be taken by reviewing back the target cost or target profit by increasing the target cost and reducing the profit margin, reviewing the manufacturing process for possible modification or lessening the product functionality requirements to meet the target cost (Helms et al., 2005).

h) TCM execution requires cooperation from many parties.

Although, the product designers and plant engineers play important roles in TCM (Horngren & Foster, 1987), TCM implementation requires cooperation from many departments and divisions including from the business value chain, such as suppliers (Monden & Hamada; 1991; Okano, 2005). Additionally, many studies (Ansari et al., 2006; Everaete et al., 2006; Swenson et al., 2003; Huh et al., 2008) highlight that a cross-functional team is one of the characteristics of TCM. A cross-functional team is a group of employees from different functions who are permanently assigned to work full-time in a team and report to the leader of the team (George & Jones, 2005).

In conclusion, there are various TCM characteristics highlighted by the previous studies. Among the main characteristics of TCM are it starts in the upstream of production stage, it provides financial and non-financial information to the companies to be proactively compete in the market, and it requires team work efforts to achieve the targets which are set by the markets.

2.4.6 TCM Engineering Tools

TCM focuses on achieving the target cost, planning, development and design of the new product simultaneously by using engineering tools (Tani et al., 1995; Pierce, 2002). There are many engineering tools used in TCM. Among the common engineering tools are Value Engineering (VE) and reverse engineering (Cooper & Slagmulder, 1999; Pierce, 2002).

a) Value Engineering (VE)

VE is a systematic activity to evaluate the product's design and cost by identifying ways to improve the product's value and maximize customer value from all aspects of the value chain business functions (Horngren et al., 2008; Hergert, 2002; Kaplan & Atkinson, 1998). It reduces cost by simultaneously considering product reliability and increasing the product value without degrading the product quality (Sakurai, 1989; Creese, 2000). Accordingly, VE is different from cost reduction techniques in two aspects. First, cost reduction is likely to lead to quality issues or cost increment elsewhere from the company wide viewpoint. Second, cost-down techniques have limited areas of application.

VE uses two key concepts, which are "cost incurrence" and "locked in cost" in managing the non-value added and value added cost. "Cost incurrence" is the cost incurred when the resources are used up. While "locked in cost', also known as "design in cost", is the cost that is not yet incurred but will be incurred in the future based on the decisions that are made during the design stage. For example, the scrap cost that is incurred during the manufacturing stage might be due to the bad design during the design stage (Horngren et al., 2008).

Generally, VE mainly involves designing a product from different angles at lower cost by considering the functions needed by the customers (Sakurai, 1989). Thus, the main focus of VE is to make innovations and modify the design during the product design stage and implement it during the prototype stage (Creese, 2000). In fact, VE starts as early as in the product conceptual development stage in Japanese companies (Monden & Hamada, 1991). Accordingly, VE can be categorized into three types based on its implementation timing: "Zero-Look VE", "First Look VE" and "Second-Look VE". "Zero-Look VE" is implemented in the product planning stage, "First-Look VE" is implemented in the design stage and "Second-Look VE" is implemented in the production stage (Wickramasinghe & Alawattage, 2007).

Through VE, the gap between the target cost and the actual production cost can be eliminated by increasing operational efficiency, simplifying, redesigning, removing non-value added features or adding value added features to fit the customers' needs without compromising quality (Cooper et al., 1998). For example, by standardizing the parts with other models or products, the dies and moulds can be shared, which helps to increase the volume of particular parts and eventually reduce the cost of the parts (Kato et al., 1995; Lee & Monden, 1996). Additionally, standardizing the parts helps to reduce the cost in terms of storage, handling of materials, assembly processes and after sales maintenance (Pierce, 2002).

Cost tables are one of the tools that support VE. With cost tables, the TCM members are able to get cost information, estimate the target cost and reduce the possibility of supplier opportunistic transactions, which are non-value added to the customer. Nevertheless, the cost table is difficult and expensive to update. The usefulness decreases if they are not updated frequently (Tani et al., 1994).

b) Reverse engineering

Reverse engineering is also known as tear down analysis. By tearing down the competitor's products, a company can gather information and the technologies used by the competitors and identify the cost reduction ideas for their products (Kato et al., 1995). In this process, the competitors' products are dis-assembled and analysed piece by piece to identify the opportunities for functionality, design and process improvement (Kaplan & Atkinson, 1998). From the tear down activities, the Japanese companies adopt the lowest cost among the competitors' products as the target cost for their similar products (Howard & Herbig, 1996).

In brief, TCM uses many engineering tools mainly VE and reverse engineering. VE is a systematic activity or process conducted to achieve the target cost. The reverse engineering is used to find the possible ideas for cost reduction.

2.4.7 TCM Implementation Process

Many studies highlight the process of TCM. Even though the basis of the concepts is similar, the details of the processes or the stages that are described by the scholars vary (Ansari et al., 2006; Drury 2006; Kaplan et al., 1998; Sakurai, 1989). Most of the non-Japanese scholars describe the TCM process in a simple way. In general, TCM starts with a market survey to get information concerning the anticipated selling price. Then, the target cost is set by subtracting the target profit from the target-selling price. After that, the target cost is decomposed into sub-assemblies and the individual component parts (Ansari et al., 2006).

Drury (2004) goes into further detail by breaking down the process of TCM into four stages. The first stage is to determine the target-selling price that the customers are willing to pay. Here, market research is required to identify the customer perceived value of the product with the given features and functions. The second stage is to deduct the target profit from the target-selling price to derive the target cost. This target profit depends on the company's overall planned return on investment and profit as a percentage of sales. The third stage is to estimate the cost of the product. This estimation is a product estimated or predetermined actual cost. In the final stage, if the estimated actual cost exceeds the target cost, thorough efforts are made to reduce the actual cost and to close the gap.

Kaplan et al. (1998) categorize TCM into four different level processes with different tools and objectives – Market Driven Costing, Product Level Target Costing, Component Level Target Costing and Chained Target Costing. The Market Level Costing is the level in which the market requirements are integrated into the product and the companies start to set the target-selling price, target profit, and target cost or allowable cost. The Product Level Target Costing is the level in which the designers work out how to satisfy the customers within the allowable cost through engineering tools such as Value Engineering (VE). In the Component Level Target Costing, the component level target cost is set and cooperation with suppliers is necessary to omit the non-value added cost. This integrated process is able to ensure that only profitable products are launched. While, in the Chained

Target Costing Level, TCM is integrated into its supply chain. Here, the component level target cost set by the buyers becomes the selling price of its suppliers. At this level, the buyers can transmit down the competitive pressure to its supply chain, which generates intense cost reductions in the whole supply chain.

Based on case study conducted at Brazilian manufacturing company, Filomena et al. (2009) proposed TCM operationalization model to operationalize the TCM in the emerging market. In this model the TCM is operationalized by categorizing it into four stages: (1) define the product parts, features and common elements, (2) define the target cost per unit to develop the product, (3) calculate the overall target cost per unit of the product, and (4) define the insertion target cost by subtracting the target cost to develop the product from overall product target cost, then breakdown the insertion target cost to parts and features elements. They propose that this model help to integrate the TCM with other cost control tools and enable more accurate cost control (Filomena, Neto, Duffey, 2009).

Japanese scholars describe the TCM process in more detail. Sakurai (1989) summarizes that, typically, there are three fundamental steps in TCM process. The first step is planning and designing the product quality that best meets the customers' needs. Through the market research, the customers' needs and preferences are defined. The target-selling price is estimated by considering the product concept, product attributes and the anticipated sales quantity and competitors' reaction. The target profit is set based on the company's strategic plan. The second step is to set the target cost of the products and then realize the target by applying Value Engineering (VE). By deducting the target profit from the target-selling price, an allowable cost is derived. In other words, the allowable cost represents the cost at which the product must be manufactured to gain the target profit margin when sold at its target-selling price. However, Sakurai (1989) further highlights that this allowable cost is very tight but desired by the top management. Thus, it usually cannot be achieved in the short-term and normally is used as the long-term cost objective. The third step is to achieve the target cost in the production stage by using standard costing (Sakurai, 1990). The Japanese companies link back the TCM to standard costing by using the target cost as the cost base of the standard costing system to achieve the target cost in the production stage. Nevertheless, if the companies do not have the standard costing system, the target cost is used as the budget. Then, the historical cost result is used to compare against this budget for the purpose of evaluating the cost achievement (Sakurai, 1989).

In summary, there are various types of TCM implementation process highlighted by the scholars. Nevertheless, the processes highlighted by the Japanese scholars are more details and comprehensive compared to the western scholars. Chapter 3 will detail up the TCM implementation process explanation in four major stages and seven steps.

2.4.8 TCM enablers

Previous scholars have highlighted many different enablers that influence the successful implementation of TCM (Helms et al., 2005; Swenson et al., 2003; Feil, Yook, & Kim, 2004; Huh et al., 2008; Kato 1993; Tani et al., 1994; Sakurai 1989; Ansari et al., 2006; Ellram, 2006; Lee & Monden, 1996; Cooper & Slagmulder, 1999).

Some literature oversimplified and concluded that the Japanese social and cultural factors made the Japanese management accounting successful (Nishimura, 1995; Feil, Yook, & Kim, 2004; Stainer, 1995). For example, Nishimura (1995) concludes that Japanese management is highly influenced by the Japanese culture of collectivism. The combination of teamwork based horizontal organization and multi-skill specialties enable the integration of a high quality and low cost strategy. Similarly, Feil et al. (2004) argue that the implementation of TCM in Japan is successful because of the Japanese business and cultural factors. They highlight that top management leadership, team orientation, commitment to work, mutual trust, management accounting, employee education and training level, "Keiretsu" (strategic network), and information network are the factors that contribute to the successful implementation. In addition, Stainer (1995) concludes that the Japanese manage to gain high productivity because they give attention to detail, commitment and mutual respect and co-operative spirit, discipline, and understand and appreciate the close link between quality and productivity. Nevertheless, Okano and Suzuki (2007) emphasize that giving credit to Japanese social and cultural factors as contributing to the success of TCM is misleading and a superficial conclusion. This is because as the social and cultural factors are external and unmanageable factors, other researchers might predict that it will be very difficult for overseas companies to implement Japanese management accounting. Eventually there will be no more further effort to explore the manageable factors in which it will lead to the end of the TCM research and practices in non-Japanese context (Okano & Suzuki, 2007).

On the other hand, Tani et al. (1994), based on their survey study of manufacturing companies in Japan, conclude that cross-functional teams, which create simultaneous engineering or "rugby" style product development, is the key concept for the successful implementation of TCM. Huh et al. (2008) argue that the Japanese companies managed to implement TCM successfully because they have dynamic capabilities that consist of architectural and process capabilities. The architectural capabilities element consists of top management support, empowered project manager, concurrent engineering, cross-functional team and linkage to profit planning. The process capabilities element consists of cooperation with other departments, information sharing, transfer of experience, employee empowerment and delegation of authority. The existences of architectural and process capabilities improve the performance of TCM in terms of marketability, efficiency and cost reduction. Accordingly, these dynamic capabilities allow the Japanese companies to have a competitive advantage over Western companies (Huh, Yook, & Kim, 2008).

While, Helms et al. (2005) suggest that internal coordination and involvement of accounting and financial professionals, and the close monitoring of marketing and quality control throughout the entire process is necessary for the successful implementation of TCM. The case study research of Swenson et al. (2003) of American companies found that the TCM companies use a cross-functional structure and listen to the voice of the customers. Besides that, these companies also emphasize on cost reduction during the design stage and remove unnecessary cost throughout the supply chain with supplier involvement. Ellram (2006) in her case studies of 11 companies in the USA posits that supply chain management or purchasing function play an important role in the successful implementation of TCM. Similarly, Cooper and Slagmulder (1999) also highlight that the TCM practices in manufacturing companies in Japan highly involve the cooperation of suppliers in achieving the target cost. However, regarding the high involvement of the supply chain, the study findings of Rattray et al. (2007) in New Zealand were different. The survey results of Rattray et al. (2007) for 31 New Zealand manufacturing companies show that the involvement of suppliers in TCM is relatively low.

Whereas, Sakurai (1989) suggests that the successful implementation of TCM requires the implementation of cost engineering tools, such as Just In Time (JIT), Value Engineering (VE) and Total Quality Control (TQC). Likewise, Kato (1993) identifies a few common features of the successful Japanese companies that implement TCM. First, these companies implement both cost leader and differentiator strategies. Second, VE is widely used as a tool to achieve the target cost. Third, they implement information systems as a tool to support the TCM practices. Sales pricing support systems, target profit computation support systems, cost database management systems, and research and development support systems, such as Computer Aided System (CAD), Computer Aided Engineering (CAE) and Project management system are examples of information systems that support TCM. The author further emphasizes that the essence of Japanese management is the combination of technology for effectiveness and efficiency with human wisdom. Hence, he states that "TCM is a subtle combination of the use of human intelligence for creativity and the leading edge technologies of target costing support systems" (Kato, 1993, p. 43).

Ansari et al. (2006) conclude that the well-executed implementation process of TCM is not enough. Instead, TCM should be institutionalized into the daily work routine of the company to make it successful. Accordingly, he listed six common characteristics of institutional processes that are embedded in successful TCM companies: (1) TCM is a standard process in product development and one of the company's competitive strategies, (2) the existence of formal policies and procedures of TCM, (3) a formal department anchoring TCM activities, (4) TCM is included as one of the performance measures, (5) a rewards and compensation system for TCM members, and (6) TCM processes are integrated within the company routine and culture. Table 2-1 summarizes some of the enablers advocated by the previous studies.

Table 2-1: Summary of literature on TCM enablers

Articles	Method	TCM enablers
Sakurai (1989)	Conceptual paper	· Lean manufacturing implementation (cost engineering tools) · AMT implementation · Standard costing or budgeting system support
Kato (1993)	Conceptual paper	· Implement cost leader and differentiator strategy simultaneously · VE implementation · Information system through AMT implementation · Combination of technology with human wisdom
Feil et al. (2004)	Conceptual paper	· Top management support · Team orientation · Management accounting involvement · Workers attitude · Mutual trust · Employee education/training · Strategic network · Information network
Helms et al. (2005)	Conceptual paper	· Close monitoring of marketing and quality control · Coordination and involvement of accounting & finance professionals
Ansari et al. (2006)	Conceptual paper	· TCM as one of company's competitive strategies and a standard process of product development · Anchoring department · Policy procedures · Use as employee performance measure · Link with reward · Company routine and culture
Tani et al. (1994)	Survey	· Cross-functional team
Huh et al. (2008)	Survey	· Cross-functional organization · Top management support · Team orientation (cooperation with other depts.) · Employee education/training · Information network · Employee empowerment · Delegation of authority · Profit management linkage · Concurrent/simultaneous engineering

Table 2-1, continued

Articles	Method	TCM enablers
Lee & Monden (1996)	Case study research	· VE as cost reduction tool · Team orientation (cooperation with other department)
Cooper & Slagmulder (1999)	Case study research	· Supplier involvement
Ellram (2000)	Case study research	· Supply chain management (Purchasing function) involvement · Supplier early involvement · Cross-functional team
Swenson et al. (2003)	Case study research	· Cross-functional organization · Listen to the customer · Cost reduction activities (starts from the design stage) · Lean manufacturing implementation · Supply chain involvement
Cooper & Slagmulder (1999)	Case study	· Supply chain involvement/ supply chain management

Although there are numerous perspectives of the TCM enablers, there are a few enablers that are frequently highlighted in the literature. This research focuses on the most common enablers and categorizes it into nine major enablers: Advanced Manufacturing Technologies (AMT) implementation, company strategy, a customer orientation, an information sharing, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training. The following sections discuss the literature related to the background of these enablers. The detailed proposition of these enablers with TCM will be explained in Chapter 3.

2.4.8.1 Advanced manufacturing technologies (AMT) implementation

Advanced manufacturing technologies (AMT) relate to technologies and computer applications. A few similar or alternative terms are used to represent AMT, such as "automation", "factory automation" and "manufacturing techniques" (Kaplan & Atkinson, 1998; Sakurai, 1990; Hoque, 2003; Perera, Harrison & Poole, 1997). Kaplan and Atkinson (1998) define automation as the firm's use of computerized manufacturing processes throughout the factory, from design to manufacturing, and are linked together under the digital control. On the other hand, Factory Automation (FA) is a popular term used in Japan to represent the automation of a factory through the usage of a Computer Aided Design (CAD) or Computer Added Manufacturing (CAM), Flexible Manufacturing System (FMS) and Office Automation (OA) (Sakurai, 1990). FMS is the core of AMT, which integrates the numerical control machines, industrial robots and automated material handling systems (Sakurai, 1990). Among AMT, Computer Integrated Manufacturing (CIM) is the most advanced level where all the information and operations from all sections, such as design and development, inventory control, engineering, manufacturing, marketing, and after sales, are centralised and fully automated (Kaplan & Atkinson, 1998).

A greater use of technologies improves long-term competitiveness by increasing speed, flexibility and quality (Drury & Tayles, 1995). AMT implementation also helps the companies to achieve manufacturing excellence, which results in producing the best product at the lowest price (Mcnair & Mosconi, 1987). Mcnair and Mosconi (1987) suggest that companies must proactively and wisely incorporate AMT and performance measuring system changes into their strategic plan to achieve manufacturing excellence.

World-class manufacturers invest in AMT to improve their production process, product quality and manufacturing flexibility (Hoque, 2003). However, the adoption of AMT involves huge capital investment with a high degree of uncertainty involved in these investments. Usually, ample time is acquired to gain the potential benefits of an AMT investment. This is because the employees need trainings and experience to master the new technologies. As the technologies get more complicated, more time is required in which eventually delay the performance gains (Saberi, Mohd. Yusuff, Zulkifli & Megat Ahmad, 2010). Thus, before embarking on this investment, the company needs to thoroughly review its objectives, strengths and weaknesses.

A study by Isa and Foong (2005) on AMT adoption and costing relationship in Malaysian manufacturing companies argues that companies with a high level of AMT adoption tend to practice more new costing methods, such as TCM. Furthermore, Sakurai (1989) posits that an assembly oriented company with AMT adoption is the best candidate for the implementation of TCM. Kato (1993) highlights that Japanese companies use information systems extensively to support their TCM activities. For example, in terms of target profit setting, Nissan Japan uses a computer simulation system to find the historical relationship between the actual profit and selling price. The new product target profit is set based on this historical relationship (Cooper & Slagmulder, 1999). Daihatsu Japan also created a computer database system to record all the problems and countermeasures taken from the value engineering and value analysis activities. This database works as an important reference to avoid future product design related problems (Kato et al., 1995).

Accordingly, this research proposes that AMT implementation is one of the enablers for the successful implementation of TCM.

2.4.8.2 Company strategy

Porter's Five Forces Model suggests that the competitiveness of any industry can be viewed as a combination of five forces – the rivalry among existing competitors, the entry of new competitors, the threat of substitute products, the bargaining power of suppliers and the bargaining power of customers. These forces influence the price and costs including the investment, which determines the company's profitability (Porter, 1985). In a highly competitive environment, the competition among sellers is the major driving force (Hibbets, Albright, & Funk, 2003).

In order to counter these forces, a business strategy is necessary. The business strategy is a company management's action plan for managing the business and running the operations. A winning strategy must match with the company's external and internal environment, improve the company's performance and build competitive advantages. Basically, two types of company performance improvement result from good strategies. These are (1) improvements in the financial strength and profitability and (2) improvement in the company's market share standing and competitive strength (Thompson et al., 2010). Nevertheless, by performing activities differently or performing different activities from its rivals, a company is able to establish its unique position against its rival and gain a competitive advantage (Hitt et al., 2004).

Porter (1985) outlines two basic types of competitive advantage, which are low cost or differentiation. The type of competitive advantage the company possesses is the result of the company's ability to cope with the five forces better than its competitors. However, in order to perform above average in their industry, companies have to gain sustainable competitive advantages. Subsequently, Porter (1985) combined the competitive strategy with the scope of activities to develop three sustainable competitive advantages – cost leadership, differentiation and focus strategy. The cost leadership strategy is to produce the product at an acceptable level of quality and functionality at a lower cost than its competitors. The sources of cost advantage are various, such as high market share, low cost, standardization of parts, learning curve effects, economies of scales and tight cost control. The differentiation strategy is the companies' capability of producing and marketing the unique and superior products that are widely valued by customers in terms of quality and functionality. In this strategy, companies focus on product uniqueness instead of cost or price through brand loyalty, brand quality, emphasis on marketing, research and after sales service. Whereas, in the focus strategy, companies focus on a specific segment or group of segments in the industry and customize their strategy to serve the target segments. In the cost focus strategy, companies focus on the cost advantage of their target market segment. While in the differentiation focus strategy, companies focus on differentiation of their target market segment (Porter, 1985). Porter (1985) argues that in order to gain a sustainable competitive advantage, a company "must make a choice about the type of competitive advantage it seeks to attain and the scope within which it will attain it. Being "all things to all people" is a recipe for strategic mediocrity and below average performance" (Porter, 1985, p. 12).

On the other hand, Creese (2000) highlights that a sustainable competitive advantage is unable to be developed under a highly competitive environment, also known as a confrontational environment, by choosing the differentiation or cost leadership strategy alone. This is because all competitors offer their product with high quality, high functionality and low cost. Similarly, according to Kato (1993), Japanese companies neither believe that cost leadership alone nor the differentiation strategy alone is an effective strategy. Instead, the Japanese companies implement both cost leadership and the differentiation strategy simultaneously (Kato, 1993).

Copper (1995) poses the term “Confrontational strategy” to represent a combination of the differentiation and low cost leadership strategy. This strategy focuses on producing a high quality product at the lowest possible cost (Hibbets et al., 2003). Cooper (1996) further elaborates that the confrontational strategy is a strategy that survives based on the management of the survival triplet, which consists of cost, functionality and quality. Cost is the value of the resources consumed until the product is delivered to the customer, such as production costs, investment costs, marketing and selling costs. Functionality is the specification and multidimensional characteristics of the product, which meet the customers' requirements, while quality is the conformance and performance of the product within its specification. In order to gain sustainable competitive advantage, a company needs to compete in all aspects of the survival triplet within its minimum and maximum range (Cooper, 1996).

Among the main characteristics of the TCM is that the target cost must be achieved (Kato et al., 1995) without sacrificing the quality and functionality of the product (Cooper & Slagmulder, 1999; Tani et al., 1995). Accordingly, this research proposes that a company strategy that focuses simultaneously on cost leadership and differentiation, i.e. confrontational strategy, is one of the enablers for the successful implementation of TCM.

2.4.8.3 Customer orientation

A company can create sustainable competitive advantage by creating sustainable superior value to the customers. This can be achieved by offering the products that exceed the customers' expectations of any alternative products (Narver & Slater, 1990). Narver and Slater (1990) argue that market orientation consists of customer orientation, competitor orientation and inter-functional coordination. It creates superior value to the customer, which results in superior performance to the business. Narver and Slater (1990), in their study of 140 business units in Western countries, found that market orientation has a positive effect on profitability. In addition, in a field study by Kohli and Jaworski (1990) in four US cities, profitability was found to be a consequence of the market orientation. Kohli and Jaworski (1990) also posit that the inter-departmental connectedness promotes better market orientation. This is because the direct and indirect contacts among employees across departments facilitate the information sharing of market intelligence i.e. market requirements.

Customer orientation is the central element in the market orientation (Kohli & Jaworski, 1990). Customer orientation is defined as sufficient understanding of one's target customers to be able to continuously create superior value for them. Value can be created in two ways: (1) increasing benefits to customers in relation to the customers' cost and (2) decreasing the customers' cost in relation to the customers' benefits (Narver & Slater, 1990). In order to create superior value, the companies must be able to identify and understand the needs of their target customers. Customers perceive value can be examined through market value analysis.

Nevertheless, due to the dynamic changes of internal and external market, customer values are dynamic and evolving. Therefore, the companies must also identify their future customers and what those customers will perceive in the future (Narver & Slater, 1990). Frequent and close interactions with current and potential customers help the companies to identify and anticipate the customers' needs. If not, they might lose their customers to their rivals who are offering better value in terms of product functionalities and features (Hitt et al., 2004). Pinto and Slevin (1989) posit that frequent consultation and communication with customers in the early stage of development, and staying well connected to the customers in order to understand and verify their needs are among the pre-requisites for critical success factors for project implementation.

Customer orientation helps the companies to compete competitively in the current market by focusing on customer satisfaction as the company priority. The key success factors of customer satisfaction are cost efficiency, time, quality and innovation. The companies must concentrate and influence these key success factors to deliver customer satisfaction (Drury, 2004). Customer satisfaction can be measured by the customer response card, questionnaire surveys, examining letters of complaint, feedback from sales representatives, et cetera (Drury, 2004).

In TCM implementation, market and customer input is essential in setting the target-selling price, target profit and deciding the product features and functionality (Feil, Yook, & Kim, 2004). An intensive market research is conducted before the development of new products to understand the customers' requirements (Cooper & Slagmulder, 1999; Lee & Monden, 1996). Then, all the customers' requirements in terms of cost, quality and time are simultaneously integrated into the product and process decision (Swenson et al., 2003). As a rule of thumb, the customer perceived value must be higher than the product innovation cost for the functionalities and features. If the cost is lower than the customer perceived value, innovative ideas need to be added. However, if the cost is higher than the customer perceived value, the innovative ideas need to be omitted. Accordingly, this helps the companies to make the right decision by considering the trade-off between customer value and cost (Swenson et al., 2003).

Considering the importance of customer orientation in the TCM practices, this research proposes that the customer orientation is one of the enablers for the successful implementation of TCM.

2.4.8.4 Organizational information-sharing network

Accounting system is the main source or product cost information for the management. Other sources of information includes personal observation and non-financial performance measures such as schedule attainment, setup time, number of defects and production lead time (Horngren & Foster, 1987). In JIT plants, there are an increasing role of personal observation and non-financial measures, and a declining role of financial measures (Horngren & Foster, 1987).

TCM implementation requires a wide range of information (Kato et al., 1995). This is because new product development needs to be developed quickly and the products need to be introduced to the market quickly before the customers' needs and tastes change (Ansari et al., 2006). With smooth information flows from downstream to upstream, a company can speed up the information flow, increase the effectiveness and efficiency and respond to the customer quickly (Li & Lin, 2006). Thus, a joint effort through the entire value chain is necessary (Helms et al., 2005). For example, Japanese companies have outstanding information networks with customers and suppliers. This allows intensive backflow of formal and informal information to the companies concerning the customers' perceptions regarding the existing products on the market (Feil, Yook, & Kim, 2004). Besides that, the Japanese companies apply the *3-Gens* principles: *Genba* (actual shop floor), *Genbutsu* (actual items or things) and *Genjitsu* (actual reality) in managing their cost. Generally, these principles make the Japanese companies' management to look at the point of production rather than rely on historical accounting information. This allows proactive and fast action in cost reduction activities through direct communication with the suppliers, production and sales fields during the planning, designing and production stages (Okano & Suzuki, 2007).

Information sharing is a pre-requisite for any integration and collaboration between two companies (Yigibasioglu, 2010). In fact, cost information sharing between a company and its suppliers helps to enhance inter-organizational cost management for TCM practices (Creese, 2000). This is because a high degree of accuracy and transparency of information is necessary for the designer to estimate the cost (Helms et al., 2005) and to design the part according to the target cost (Monden et al., 1991). By sharing the cost information, the same understanding of cost level can be attained between a company and its suppliers (Creese, 2000). Furthermore, the pressure of reaching the target can be communicated and well understood by each member of the value chain (Helms et al., 2005). Kato (1993) also suggests that in TCM implementation, the use of information systems, such as Computer

Aided Design (CAD), Computer Aided Engineering (CAE) should be networked among the members in the value chain so that they can share the same information.

Nevertheless, the study of Li and Lin (2006) of 196 US companies found that information sharing is influenced by trust, and a shared vision between the supply chain partners and the top management support. Additionally, the case study of Kulmala et al. (2002) on cost information management in a Finnish equipment company and its seven suppliers, found that there was a wide gap between the supplier side quality of cost information and the customer side expectation. They also argued that a solid networking relationship and a supply relation between the companies in a network required three important elements in cost management. First, a company should know its operation cost clearly. Second, a company should share the cost information with its business partners. Finally, part of the information flow should be open to the companies in the network for all the related parties to understand the current situation. With these three elements, the opportunities for cost reduction and the consequences of the actions to the profit are clear to all parties. However, this win-win relationship requires an open-book management and common accepted cost management practices among the related parties.

In TCM, achievement of the targets needs to be simultaneously attempted in all areas from the upstream to downstream processes (Huh et al., 2008). This requires wide range of information through information sharing. Accordingly, this research proposes that the organizational information-sharing network is one of the enablers for the successful implementation of TCM.

2.4.8.5 Lean manufacturing implementation

Generally, lean manufacturing focuses on the efficient use of capital and operation assets. The term "lean" is used to represent the system because it accomplishes more output with less input (Albright & Lam, 2006). Lean manufacturing is also known as the Toyota Production System (TPS) , a production system that eliminates waste in all activities that do not create value added but consume resources (Albright & Lam, 2006). In addition, the application of soft technologies (Burgess & Gules, 1998), business techniques and Advance Management Practices (AMP) (Perera, Harrison, & Poole, 1997) are also used to represent lean manufacturing. JIT, Total Quality Management (TQM), VE and TQC are among the examples of lean manufacturing techniques (Creese, 2000; Gagne et al., 1995).

Lean manufacturing implementation leads to continuous improvement or "*kaizen*" in productivity and quality (Krajewski & Ritzman, 2005). The key concept behind continuous improvement is to understand that the excess inventory and capacity hides the underlying problems in the process. Thus, lean manufacturing is also known as a tool for management to expose the problems by systematically lowering inventories and capacities until the problems are visible (Krajewski & Ritzman, 2005).

JIT is the most popular method of lean manufacturing and is closely related to TCM. As large inventories and waste are costly, JIT helps to increase the effectiveness of TCM in terms of producing product at low cost and high quality through its small lot production concept (Nishimura, 1995, Creese, 2000). In general, JIT has two subsystems – visible management and new production system. The visible management, also known as the Kanban system, is to detect and correct the problems quickly; while the new production system is designed to solve the problems discovered in the process of visible management. Small lots, zero inventory, multi-skill, horizontal managers and workers' relationship and short lead-time are examples of the new production system (Nishimura, 1995). Besides JIT, VE is another lean manufacturing technique that is commonly used in TCM as a tool to achieve the target cost (Creese, 2000; Gandhinathan et al., 2004). According to Ibusuki and Kaminski (2007), VE and TCM are complementary processes. VE allows the identification of where the cost reduction could be achieved. Whereas, TCM shows the target cost level to be achieved to guarantee the long-term profitability of the company.

In summary, lean manufacturing implementation helps the company to proactively eliminate the non-productive and non-value added activities that result in cost reduction and profit increment. Accordingly, this research proposes that the implementation of lean manufacturing is one of the enablers for the successful implementation of TCM.

2.4.8.6 Supplier relationship

The total cost of the final product can be reduced if each party in the value chain cooperates to improve its own operation costs. This small accumulated cost reduction in each area eventually creates a major cost reduction impact on the final products (Helms et al., 2005). Since the majority of the part cost comes from the purchased material and components, supplier involvement is important in the implementation of TCM (Swenson et al., 2003; Cooper & Slagmulder, 1999; Kato, 1993). With supplier involvement, the companies can achieve the target cost by eliminating the waste, excess and uneven job loads along the value chain (Helms et al., 2005), which helps the company to gain cost competitiveness against its competitors (Kato, 1993).

Accordingly, selecting the right supplier is a prerequisite for achieving the target cost. A bad supplier can have a negative impact while a good supplier can be an asset to the company (Helms et al., 2005; Cooper & Slagmulder, 1999). Besides cost, other decision factors, such as suppliers' reliability, cooperation, ability to produce quality parts, human resource capability and reputation, need to be examined thoroughly in choosing the suppliers (Cooper & Slagmulder, 1999).

One of the essential elements of the TCM is integrating the suppliers in the product development process (Feil, Yook, & Kim, 2004). Creese (2000) highlights that joint research and development is important to enhance inter-organizational cost management between a company and its suppliers. With joint research, technology sharing helps to stimulate design innovation, which can lead to cost reduction and enhance the functionality and quality of the products. The companies are also able to evaluate the overall cost impact of the product design over the product's life cycle and take necessary prior action to reduce costs (Guan et al., 2009). Furthermore, by collaborating with suppliers during the design stage, companies can obtain their suppliers' expertise. Suppliers' knowhow can be incorporated to reduce the product's cost without sacrificing the product functionality, such as by using the standard parts instead of customized parts, improving the design and process, or using cheaper alternative parts or components (Kaplan & Atkinson, 1998).

Nevertheless, the transfer of innovation power from the company to its suppliers is unable to be utilized efficiently without a reliable relationship (Kulmala et al., 2002). Additionally, it is hard to achieve cost reduction objectives without the suppliers' willingness to share initial cost and production data (Helms et al., 2005). An asymmetric power between a company and its suppliers can cause opportunism behaviour, which increases the behaviour uncertainty. High supply power due to relying on one supplier and time constraints to find alternative sources of supply increase the possibility of this opportunistic behaviour (Nor & Sumormo, 2005). Eventually, this might create a higher cost to the product.

Compared with other countries, Japanese companies have a close relationship with their supply chain partners. This unique relationship creates strong trust between the suppliers and manufacturers, which has made TCM feasible in Japan (Albright et al., 2006; Newman & Mckeller, 1995; Kato et al., 1995; Cooper & Slagmulder, 1997; Okano, 2005). For example, from the product development process, the engineers in the Japanese suppliers study and work together with the manufacturers' engineers, in which enables them to share the same "design to cost" awareness and improvement activities. Moreover, the Japanese suppliers are even capable of doing major design and proactively approaching the manufacturers for approval. Thus, even though the manufacturers do not have the suppliers cost data, the manufacturers can enjoy cost reductions proposed by the suppliers (Okano, 2005). At the same time, Japanese companies even suggest the cost reduction ideas to their suppliers and act as a consultant to their suppliers rather than treat them as business rivals (Kato et al., 1995).

The interactive relationship with suppliers is very important for the implementation of TCM. Accordingly, this research proposes that the supplier relationship is one of the enablers for the successful implementation of TCM.

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2.4.8.7 Organization culture

According to Hostede (1984), culture is “collective programming of the mind which distinguishes the members of one category of people from those of another” (Hofstede, 1984, p. 389). Organizational culture is a pattern of shared beliefs and value systems that assist employees to understand the organization’s role, which eventually shapes their working behaviour (Despande & Webster, 1989). Unlike the national level culture, which is very unlikely and slow to change, the organizational culture is likely to change consciously (Hostede, 1993). Barney (1986) suggests that organizational culture is shaped over time and affects the types and variance of organizational processes and behaviours. It can be a source of competitive advantage if it rare, valuable and inimitable (Barney, 1986)

Hostede (1984) suggests four cultural dimensions – power distance, individualism, masculinity and uncertainty avoidance. These cultural dimensions reflect the characteristics of the society in terms of the organization and the national culture. Power distance and uncertainty avoidance represent the organizational culture that relates to the functioning of the organization within a nation. For example, Asian countries have high power distance with only a few top managers having strong decision-making at all levels of management. On the other hand, Western countries with low power distance have diversified and decentralized decision-making. Individualism and masculinity represent the national culture, which is relatively independent of the functioning of the company but related to the functioning of individuals within the company. For example, in an individualistic society, the society clearly separates the family and the company. However, in a collectivist society, such as the Asian society, the society does not separate the family and the company (Hostede, 1984).

Accordingly, the interaction between the national and organizational culture differentiate the cultural features of management accounting in each country (Nishimura, 1995). For example, a society with high power distance naturally accepts the power inequalities, the powerful people have the right or responsibility to command, and the status quo of powerful peoples' privileges. A society with less individualism is tightly integrated and has a high tendency to give priority to the group rather than their own personal goal. A society with low masculinity gives high value to personal relationships, supportiveness, modesty in achievement and non-material values such as quality of life. On the other hand, a society with strong uncertainty avoidance is aggressive, active, security seeking emotionality, and intolerance (Hosfstede, 1984). For example, according to Hostede's cultural index, Japan belongs to the low individualism dimension, which reflects a collectivist society (Hostede, 1986). Accordingly, Okano and Suzuki (2007) advocate that the collectivism in Japan generates the collective objective and actions in the development of the Japanese management accounting. The objective of the management accounting development is for larger groups of companies, industries and Japanese society as a whole and not for the individual companies. These collective actions involve public learning, industry associations, companies and the Japanese government.

In TCM practices, it is not possible to achieve a rigorous cost reduction without full cooperation from the related departments (Feil, Yook, & Kim, 2004). Thus, multidisciplinary cooperation is essential to stimulate multidisciplinary ideas resulting from the different working backgrounds, knowledge and experience of individuals. With multidisciplinary cooperation, a holistic approach to the cost reduction process can be conducted (Helms et al., 2005; Cooper & Slagmulder, 1999). Cross-functional is an example of multidisciplinary cooperation.

Most of the companies in the Japanese automotive industry practice cross-functional team with the TCM office consisting of team members from all the related departments mainly from development, design, production technology and purchasing (Tani et al., 1994). Thus, scholars posit that cross-functional team is one of the key principles of TCM implementation (Swenson et al., 2003; Huh et al., 2008). In Japan, Cross Functional Management (CFM) is widely implemented to enhance the vertical and horizontal relationships and to counter the communication barriers due to sectionalism. The word "function" in CFM does not mean "department" but it covers the critical factors in management like cost, quality, reliability, delivery and overseas. It promotes the important factors in the management of the company like quality function, cost function and overseas function by cross-sectional coordination within the organization. CFM involves setting up cross-functional committees relating to functional issues to control and improve these functions within each department. The objective is to address problems that are related to the horizontal organization that cannot be solved by single departments within a vertical organization (Okano, 2005). Furthermore, horizontal and vertical interactions create interactive control, which helps the simultaneous engineering effectiveness at Japanese companies (Tani, 1995). Additionally, the cross-functional discipline helps to control the group from imposing functional preferences, which have no value added to the customer but yet increase the cost (Drury, 2004). Cross-functional teams also help to integrate the information from across the organization and encourage information and value sharing among managers. This improves the organization's functions of information acquisition, distribution and interpretation, which, eventually, promote and facilitate effective organizational learning (Choe, 2002).

In summary, TCM implementation requires the total involvement and cooperation of all employees throughout the organization (Monden & Hamada, 1991; Sakurai, 1989). Multidisciplinary cooperation generates holistic ideas for waste elimination along the value chain. This eventually helps to the company to meet its target cost. Thus, this research proposes a teamwork orientation culture is one of the enablers for the successful implementation of TCM.

2.4.8.8 Top management support and commitment

A study made by the Malaysian Institute of Management (MIM) on Malaysian Managerial Values, Expectation and Practices in 1991 showed that the 10 strongest values of Malaysian managers are (1) Malaysians prefer working with leaders who have clear goals; (2) cooperation among colleagues contributes to a better quality of life; (3) Malaysian managers value decisiveness, (4) Malaysian managers value commitment from their subordinates; (5) Malaysian managers value high achievers; (6) managers need to be accountable for their actions; (7) effective managers share wisdom and experience; (8) rewards based performance is valued rather than seniority; (9) managers must make continuous improvement; and (10) meeting deadlines is important (Abdullah et al., 1999). The above result shows that Malaysians highly value leaders with clear direction. This might be related to the nature of Malaysian society itself. According to Hostede's cultural index, Malaysia belongs to the high power distance dimension (Hostede, 1986). High power distance societies naturally accept the right or responsibility of powerful people to command

(Hostede, 1984). Thus, top management plays a significant role in pulling the Malaysian workforce in the company's direction.

In successful TCM companies, the top management play an important role in the implementation of TCM. Among the roles of the top management in TCM implementation are: (1) aligning the mindset of the employees towards the company direction for the successful implementation of TCM, (2) creating awareness of TCM, (3) fostering the team-orientation in TCM implementation, and (4) supporting the necessary resources for the TCM team to achieve the goals (Feil, Yook, & Kim, 2004). Additionally, Yamashita (2000) argues that cultural change within an organization initiated by the top management can create an environment for accepting changes and making continuous improvement. For example, regarding cultivating a VE culture, Daihatsu's management play a significant role in establishing the "Cost reduction formal suggestion system". Through this system, employees are encouraged to give ideas for reducing the standard cost and improving the operation methods by submitting their VE ideas for official implementation (Lee & Monden, 1996).

Based on the above arguments, this research proposes that top management support and commitment is one of the enablers for the successful implementation of TCM.

2.4.8.9 Training

Human capital development is the most important factor to develop a nation. Malaysia recognizes that human capital development is the most vital factor for Malaysia to become a fully industrialised nation by 2020 (Sadoi, 1998). In order to develop competent workers, the companies must train their employees (Mathis & Jackson, 2004). There are two types of training – internal training and external training. Internal training is conducted within companies' premises, and relates to the specific aspects of the job, such as technical training and skill based related training. There are three common types of internal training – formal training programmes, informal training and On Job Training (OJT). Unlike formal training, which is formal and organized, the informal training occurs through spontaneous, informal feedback and interaction among employees. Many employees learn their jobs informally by asking and getting advice from their colleagues and superiors rather than through formal training programmes. Among all the internal training types, OJT is the most common training because it is less spontaneous, flexible and relates to the employees' tasks. On the other hand, external training is conducted outside the company's premises. Among the reasons as to why companies choose external training is that the cost is less expensive compared to conducting internal training, the time constraints in developing internal training modules and lack of internal expertise (Mathis & Jackson, 2004).

Studies suggest that the best TCM team members are those who have been rotated through several departments and have broad experience in the companies' operation. With broad experience, TCM team members are capable of spotting and implementing ways to reduce costs (Helms et al., 2005; Cooper & Slagmulder, 1999; Gagne, 1995). Accordingly, Ansari et al. (2006) contend that for companies that have recently adopted TCM, the training programmes should focus on helping building awareness and acceptance of the TCM, facilitate communication about TCM and increase the capability of its members. Such training should involve the senior management who lead the TCM, the product teams who are responsible for implementing TCM, the functional teams who support the product teams with data and analysis, and the main suppliers who are brought in as product team members.

In summary, training helps to increase the know-how of TCM practices among employees. As the knowledge increases, the capability to implement TCM also increases. Accordingly, this research proposes that training is one of the important enablers for successful implementation of TCM.

2.5 Summary

This chapter discussed the significant and dynamic background of the automotive industry in Malaysia. It also discussed the development of the management accounting, which leads to TCM. Then, it further discussed in detail what had been debated in the literature concerning the TCM concept, development history, definitions, objectives, characteristics, engineering tools and process. Finally, the chapter highlighted the background literature of the proposed enablers that are necessary for the successful implementation of TCM. The detailed propositions of these enablers will be explained in Chapter 3.

The TCM related literature can be summarized under five main points. First, the key difference between the traditional costing method and TCM is the timing and price-setting sources of information. In the traditional costing method, the price is only set after the product has been designed and the product has been manufactured based on the total incurred cost and desired profit. While TCM is price led, in which the price is set by the market before the product is designed (Helms et al., 2005). Second, the traditional cost management techniques are not suitable for the current business environment. Problems, such as financial information focus, short-term focus, and out dated data, are likely to mislead the management into making wrong decisions in pricing their products. TCM, one of SMA methods, is able to counter these problems by providing timely, relevant, financial and non-financial information related to the markets and the competitors (Drury & Tales, 1994; Kaplan 1983; Gopalakrisnan et al., 2007; Wickramasinghe & Alawattage, 2007). Third, although the literature has demonstrated the benefits and importance of TCM, many countries are still lagging behind in its implementation (Nishimura, 2005a; Nishimura, 2005b). Fourth, there are varieties of definitions, characteristics, objectives, processes and enablers of TCM highlighted by previous studies. The broadness of perspectives shows that TCM is not developed from established theory but gradually from practical applications (Feil, Yook, & Kim, 2004). Fifth, there are many enablers necessary for the TCM practices that have been highlighted by previous literature. However, most of the enablers are not empirically proven.

Therefore, this research focuses on providing evidence concerning the TCM practices in a Malaysia, how different it is from the original Japanese theoretical model, what causes the differences and what enablers positively associated with the successful implementation of TCM implementation in the context of a typical Malaysian automotive company. The application of these approaches will be discussed further in Chapter 4 to Chapter 7.

The following chapter explains the development of the conceptual and theoretical frameworks used in this research. The conceptual framework will be used to guide the qualitative data collection for the TCM implementation process. The theoretical framework will be used to guide the quantitative data collection for the TCM enablers.

CHAPTER 3: CONCEPTUAL AND THEORETICAL FRAMEWORKS

3.1 Introduction

This chapter discusses the theories, and the development of the conceptual and theoretical frameworks used in this case study research. This research uses the case study method because it is the most appropriate method to answer how TCM is implemented, why there are differences in TCM practices and what are key enablers that positively associated with the successful implementation of TCM in a typical Malaysian automotive company context (Yin, 2003). To answer the research questions, two frameworks are developed which are the conceptual framework and the theoretical framework. The conceptual framework is used as a guideline for examining for relevant evidence and reflecting important issues concerning the implementation process of TCM (Yin, 2003), while the theoretical framework is used as a guideline for looking for evidence concerning the key enablers that have positive association with the successful implementation of TCM (Yin, 2003).

The first section of this chapter discusses two fundamental theories used in this research, which are the contingency (Otley, 1980) and dynamic capabilities theories (Eisenhardt & Martin, 2000; Teece et al., 1997). By using these theories, the researcher aims to develop a comprehensive understanding of differences in the TCM implementation process and how a company adapts the contextual constraints by utilizing the available resources. The following section discusses the development of the conceptual framework for the TCM implementation process. The conceptual framework is based on several case studies on a few Japanese automotive companies in Japan made by previous scholars. It is used as a guideline to understand the TCM implementation process in the case company. Subsequently, the third section of this chapter proposes the theoretical framework for TCM enablers. Based on the literature analysis, this section justifies the propositions used in this research. Here, nine enablers: Advanced Manufacturing Technology (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training are proposed as the enablers that have a positive association with the successful implementation of TCM. This section also discusses the dimensions of the successful implementation of TCM used in this study, which are cost reduction, design efficiency and marketability.

3.2 Theories

Generally, there is a lack of research dealing with the theoretical aspects of TCM (Huh et al., 2008). This study attempts to link the conceptual foundation of TCM with the contingency theory and dynamic capabilities theory. Specifically, the contingency theory is used to support the whole study in terms of assuming that there are differences of TCM practice in the case company compared with the Japanese TCM theoretical model. Contingency theory is also used to explain the key enablers that positively associated with the successful implementation of TCM. On the other hand, the dynamic capabilities theory is used to explain that despite of internal and external enabling and inhibiting factors, the organization has the capabilities to adapt, integrate, reconfiguring its resources to meet the company objectives.

3.2.1 Contingency theory

Contingency theory suggests there is no one universal best design of management accounting systems that is applicable to all companies in all situations, and that it all depends on the specific situational factors of that particular company itself (Otley, 1980; Gordon & Miller, 1976; Fisher, 1998). The situational factors must fit together if the organization is to perform well (Drazin & Van de Van, 1985). Accordingly, Otley (1980) posits that the "contingency theory must *identify specific aspects* of an accounting system which are associated with certain *defined circumstances* and demonstrate an *appropriate matching*" (Otley, 1980, p. 413). Fisher (1998) posits that the contingency theory approach is situated between the two extremes of the universal control approach and the situation specific approach. The universal control approach is based on specific management principles that suggest that in order to maximize efficiency, there is only one best way to design the operational processes. Whereas, the situation specific approach implies that general rules and modes cannot be applied because the factors that affect each control system are unique (Fisher, 1998).

According to the contingency theory, the contingent factors, also known as situational factors, influence the design of management accounting information systems. Contingency theorists claim that the main contingent factors are the environment, technology, size and structure. The environment consists of the market and its related factors, such as product, price and competition. Technology means the production method adopted by the company. Size refers to the size of the company in terms of the number of employees and the total value of assets. Structure refers to the formation of certain associations between people and specific objectives and tasks. Besides these main contingent factors, scholars also highlight strategy, ownership, power and age as important contingent factors (Wickramasinghe & Alawattage, 2007). Because of the wide range of contingent factors, Fisher (1998) summarizes the contingent factors into five categories: (1) contingent factors that are related to uncertainty, such as task and external environment; (2) contingent factors that are related to firm technology and interdependence among a company's subunits; (3) contingent factors that are related to industry, firm and business unit variables; (4) contingent factors that are related to a company's competitive strategy and mission; and (5) contingent factors that are related to observability factors that are observable by the evaluator in terms of the behaviour or action of the employee or the outcome of those actions. Additionally, Drury and Tayles (1995) posit there are four factors that may influence the sophistication of the product costing design: (1) the degree of the competition faced by the company, (2) the diversity of the product produced by the company, (3) the number of the product manufactured by the company, and (4) the proportion of the overhead cost that cannot be allocated directly to the products (Drury & Tayles, 1995).

Since the contingent factors or specific enablers influence the management accounting system, the suitability of contingent factors and the management accounting system affect the organizational performance (Drury, 2004; Drazin & Van de Van, 1985). Drury (2004, p. 696) emphasizes that, "The organizations that achieve a fit between the contingent variables of the management accounting information system design achieve enhanced performance". The contingency theory posits that all elements in the organization must "fit" well with one another for it to perform optimally. Hence, as the political, economic, social and cultural environments are different for companies that operate in different settings, the accounting information system should be designed in a flexible manner. Accordingly, it is inappropriate to simply apply any new management accounting system to the foreign setting without an adaptive framework (Drury, 2004).

As a rule of thumb of contingency theory, a sophisticated SMA system is not automatically associated with the superior performance rather superior performance is a product of an appropriate fit between the identified contingent factors and a management accounting system (Simon, 2007). In addition, Kaplan (1984) posits that the management accounting must serve the strategic goals of the organization. It cannot be applied universally to all companies without considering the underlying values, goals and strategies of particular companies. In terms of TCM adoption, Kato et al. (1995) also posit that a company cannot simply "plug in" the TCM into its system but that it requires the company to have a holistic understanding of its business process before adopting TCM.

In summary, the contingency theory posits three important elements. First, the design of the management accounting system depends on the specific situational factors of that particular company itself. Second, the situational factors influence the design of management accounting information systems. Third, the suitability of situational factors and the management accounting system affect the organizational performance. Accordingly, in this study, the contingency theory is used as the main theory to explain there are differences of TCM practices between the case company and the Japanese companies, the situational factors influence the TCM practices at the case company, and there are specific situational factors that influence the successful implementation of TCM at the case company.

3.2.2 Dynamic capabilities theory

In the current rapidly changing environment, companies must possess competitive advantage (Porter, 1985). The sources of competitive advantage can be categorized into three main paradigms – competitive forces approach, strategic conflict approach and efficiency based approach. The competitive forces approach focuses on the actions a company can take to create defensible positions against its competitive forces to gain competitive advantage. The strategic conflict approach focuses on the effectiveness of the companies to keep their competitors off balance through pricing strategies and control of information and et cetera. Generally, the competitive forces and strategic conflict approaches focus on the product market position as the source of competitive advantage. On the other hand, the efficiency based approach focuses on the company level efficiency and effectiveness as a source of competitive advantage (Teese et al., 1997). The resource-based theory, one component of the efficiency approach, suggests that sustainable competitive advantage can be gained if the companies have valuable, rare, inimitable and non-substitutable resources. Resources are assets or inputs to production, whether tangible or intangible, that are difficult to imitate that the company owns, controls and has access to (Teece et al., 1997; Helfat & Peteraf, 2003). However, the resource-based theory is inadequate for explaining what resources contribute to competitive advantage, and how and why a particular company is able to achieve and sustain competitive advantage in the fast changing market (Eisenhardt & Martin, 2000; Teese et al., 1997).

Dynamic capabilities theory is an extension of the resource-based theory (Eisenhardt & Martin, 2000). It supports the resource based theory in explaining how valuable, rare, inimitable and non-substitutable resources can be created and how the current pattern of activities of valuable resources in the companies can be changed over time in changing environments (Ambrosini & Bowman, 2009). Teece et al., (1997) define dynamic capabilities as " the capacity to renew competences so as to achieve congruence with the changing business environment" by " adapting, integrating, and reconfiguring internal and external organization skills, resources, and functional competences" (Teece et al., 1997, p. 516). Generally, the dynamic capabilities perspective focuses on the capacity of an organization in a dynamic market to develop its external and internal competence through creating new resources, and renewing or altering its resource mix as a source of competitive advantage with the top management team and the evolution of organizational support (Teece et al., 1997; Ambrosini & Bowman, 2009). In other words, the role of dynamic capabilities is to influence the company's existing resource base and transform it to new resources so that that company can enhance or sustain its competitive advantage (Ambrosini & Bowman, 2009)

Eisenhardt and Martin (2000) argue that even though the dynamic capabilities can be duplicated by other firms, the value of competitive advantage lies in the resource configurations that managers build using the dynamic capabilities, and not the capabilities themselves. This is because the dynamic capabilities are unique and distinctive processes that develop from the path-dependent histories of individual companies. Hence, they must be built. Any partial replication or imitation of a successful model may result in zero benefits (Teece et al., 1997).

Dynamic capabilities cover specific strategies and organizational processes, such as product development that create value for the company under a dynamic market by exploiting resources into value-creating strategies (Eisenhardt & Martin, 2000). The value creation exists when the company exceeds its competitors' ability in fulfilling the customer needs while maintaining or improving their profit value. This value creation can be optimized by synchronizing the processes in and between each resource management component. Accordingly, the amount of value the companies create and maintain depend on how the resources are managed effectively and efficiently within the company's environmental context (Sirmon, Hitt, & Ireland, 2007).

Teese et al. (1997) suggest that the competitive advantage of the companies lies with its managerial and organizational processes which are shaped by the companies' paths and positions. Company's managerial and organizational processes refer to the way things are conducted in the company, also known as routines, such as systems integration. Positions can be classified into two types: internal and external position. The internal position refers company's assets such as company's technology, intellectual property and financial. The external position refers to company relation with its markets and institutional environment such as supplier relations. Paths are the strategic alternatives available to the companies in which the company's past and present guide and limit its future. Accordingly, paths and positions are the forces that enabling and constraining the dynamic capabilities (Teese et al., 1997; Ambrosini & Bowman, 2008).

Similarly, Zollo and Winter (2002) posit that the dynamic capabilities represent the company's systematic methods for generating and adapting operating routines. Operating routines are organizational activities geared towards the operational function of the company. They posit that the dynamic capabilities are shaped by the coevolution of three mechanisms: (1) tacit accumulation of past experience, (2) explicit knowledge articulation, and (3) knowledge codification processes. Tacit accumulation of past experience refers to the central learning process by which operating routines have been thought to develop. Explicit knowledge articulation refers to organization members' collective effort to share and exchange knowledge in which resulted better understanding of causals mechanisms intervening between actions and performance outcomes. Knowledge codification processes refers to organization members codify their understandings of the performance implication of internal routines in written tools, such as spreadsheets, manuals, and et cetera, for future tasks guidelines.

In terms of the relationship between organizational processes and capability, Day (1994) posits that they are closely related intertwined because it is capability that makes the business processes to be conducted. Capabilities are defined as bundles of routines or pattern of activities, skills and accumulated knowledge (Peng et al., 2008; Day, 1994). There are three categories of capabilities: (1) inside-out, (2) outside-in, and (3) spanning capabilities. Inside-out capabilities are the capabilities that deployed from the inside out and activated by competitive challenges, external opportunities and market requirements such as cost control and financial management. Outside-in capabilities are exclusively focus outside the organization. They connect the organizational processes to external environment by anticipating customer requirements and creating strong value chain relationships. Spanning capabilities are the capabilities that integrate the inside-out and outside-in capabilities such as new product development capabilities and pricing activities (Day, 1994). Day (1994) posits that management systems and culture unifies the organizational capabilities into a cohesive whole.

A survey study conducted by Peng et al. (2008) of 189 manufacturing companies in six countries found that in terms of plant level capabilities, innovation and improvement capabilities are the most critical source of operational capabilities. Improvement capabilities consist of continuous improvement, process management and leadership involvement routines. Innovation capabilities consist of new technology, processes and equipment development and cross-functional product development routines. These capabilities consist of distinctive yet interrelated sets of routines, which are significantly related to the operational performance (Peng, Schroeder, & Shah, 2008).

On the other hand, a survey study on the relationship between TCM success factors and performance by Huh et al. (2008) in 880 companies at Japan found that the Japanese companies manage to implement TCM successfully because they have dynamic capabilities such as architectural and process capabilities. These capabilities allow them to have a competitive advantage over Western companies. Architectural capabilities consist of top management support, empowered project manager, concurrent engineering, cross-functional team and linkage to profit planning. Process capabilities consist of cooperation with other departments, information sharing, transfer of experience, employee empowerment and delegation or authority. On the other hand, Huh et al. (2008) also found that even though local capabilities are necessary, these capabilities are not regarded as the success factor of TCM practices by the Japanese companies. Local capabilities consist of tools and information system, knowledge about cost, new technology and material from R&D, technology in production and quality, cost estimation capability and functional knowledge of team members. Accordingly, Huh et al. (2008) conclude that the software of TCM, such as dynamic capabilities, is more important than the hardware of TCM, such as tools and techniques, for success implementation of TCM (Huh, Yook, & Kim, 2008).

In summary, the dynamic capabilities theory explains that the companies have the ability to adapt, integrate and reconfigure its resources to achieve competitiveness. Nevertheless, the competitive advantages of the companies depend on the routines which are shaped by the companies' paths and positions. Since TCM activities involve companywide, require various types of information from all levels of organization including suppliers, and integrate all systems, TCM can be considered as bundle of routines or capabilities (Day, 1994; Teese et al., 1997). Thus, it is expected that the factors related to paths and the positions of the company shape the TCM practices. In addition, in terms of TCM implementation, one can expect that even though there are enabling and inhibiting factors outside and inside the companies, the companies have the capabilities to adapt, integrate and reconfigure it resources to achieve the companies' objectives. By adapting, integrating and reconfigure the companies' resources, the companies can fit together their resources with their contextual environment for the organization to perform well. Accordingly, in this study, the dynamic capabilities theory will be used as the underpinning theory explaining how the case company come to have the TCM practice it has and the possible causes of the TCM differences.

3.3 Target Cost Management (TCM)

According to contingency theory perspective, the implementation of any new management accounting system needs to adapt with its environment. This adaptation makes any management accounting different from companies to companies (Drury, 2004). Nevertheless, Cooper and Slagmulder (1999), in their study of TCM practices in seven Japanese companies, conclude that even though each company has different practices, the common characteristics of TCM implementation process are the same. Accordingly, this research assumes that the TCM case studies conducted in Japanese companies in Japan should have similar characteristics of TCM implementation process. Based on the case studies of Japanese automotive companies in Japan: Lee and Monden (1996) in Daihatsu; Okano (2005) in two automotive Japanese companies – Toyota, Nissan, and one electronic company-Mastushita; Monden and Hamada (1991) in several anonymous Japanese automotive companies; Cooper and Slagmulder (1999) in seven Japanese companies including four automotive companies – Toyota, Isuzu, Nissan, Komatsu; and Kato et al. (1995) in Daihatsu, the conceptual framework is developed as the case study guidelines.

In this research, the TCM implementation process explanation is classified into four major stages - Plan, Do, Check, Action (PDCA). The objective is to make the explanation more understandable to the readers. This PDCA is based on the International Organization for Standardization (ISO) 9001: Quality Management Standard. The definition of each PDCA cycle stage under ISO 9001 is: (1) Plan is to establish the objectives and processes necessary to deliver results in accordance with customer requirements and the company's policies, (2) Do is to implement the process, (3) Check is to monitor and measure processes and products against policies, objectives and requirements for the product, and report the results, and (4) Act is to take the actions to continually improve the process (Gupta, 2006). The PDCA cycle is used to categorize the TCM implementation process because it is a world quality standard requirement and widely known by all industries. Historically, the PDCA cycle concept was originated by Walter A. Shewhart, known as the Shewhart cycle. Then, it was further developed and enhanced by W. Edwards Deming and Kaoru Ishikawa, which was popularly known as the Deming PDCA Cycle (Moen & Norman, 2010). Finally, this cycle was modified and used as the basis of the ISO 9001 requirement (Gupta, 2006).

Table 3-1 summarizes the previous case studies findings on the TCM implementation process under each PDCA stage. There are four main TCM steps under the Plan stage: (1) target-selling price setting, (2) target profit setting, (3) target cost setting, and (4) profitability feasibility study making. The TCM step under the Do stage is achieving the target cost. The TCM step under the Check stage is monitoring and reporting the achievement status. Finally, the TCM step under the Act stage is cost improvement implementation. For each item, the number in brackets indicates the source of the findings of the previous case studies. The following sub-sections will explain each stage and step of the TCM implementation process in detail.

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Table 3-1: Summary of the TCM implementation process conceptual framework

PDCA stage	Step	Conceptual framework
PLAN	**STEP 1: Setting the Target-selling Price**	• Set selling price [1][5] • Consider perceived value, companies' internal and external factors [1][4][5] • Overall business plan as a guideline for new model introduction timing [1] • Thorough market research [1][4]
	STEP 2: Setting the Target Profit	• Set realistic desired profit margin by considering external and internal factors [5] • Various methods exist from simple to advance methods [1] [2][4][5]
	STEP 3: Setting the Target Cost	• Allowable cost= Selling price - target profit [2][3][4] • Target cost setting is based on adjustment between allowable cost and estimated cost. [3][5] • Distinguish the target cost and allowable cost [3][4] • Cost estimation involves many departments [1] [4] • Calculation is made to estimate the product cost [2][3][4][5] • Cost estimation based on assumption setting [2][3][4][5] • Use differential cost estimation method if the part has predecessor part and time limitation exists [3][5] • Target cost set with some adjustment.[3] • Rely on supplier estimation [4] • Target cost breakdown to functions/ groups/parts [2][3][4] [5]
	STEP 4: Making the Profitability Feasibility	• Profitability Feasibility Study compiles all the cost elements including reserve budget to assess the overall profitability [1][2][4] • Decision tool to decide whether to drop or proceed with the project [3] • Calculated by Cost Management department [3] • Use project Cost estimation based on assumption setting [2][3][4][5]
DO	**STEP 5: Achieving the target cost**	• Conduct cost reduction through engineering tools especially VE[1][3][5] • Information from previous VE database, cost table, tier down [4][5] • Teamwork in achieving the target cost [3] • Involvement of suppliers cooperation [4] • Fine tune the functionality and quality from continuous market feedback [4]
CHECK	**STEP 6: Monitoring and reporting the cost achievement status**	• Monitor the results and report the achievement continuously until mass production through periodic meetings [5] • Focus on specific variant as model representative[2][4] • Cost finalization[3]
ACT	**STEP 7: Cost improvement**	• Analyse the actual profit and cost [1][5] • Use the lowest cost (actual cost vs. target cost) as new standard cost [5] • Continuous Cost Improvement & conduct Kaizen costing. Use this cost info for future new product base cost [1][3][5].

Adopted from:[1] Lee and Monden (1996), [2] Okano (2005), [3] Monden and Hamada (1991), [4] Cooper and Slagmulder (1999), [5] Kato et al. (1995)

3.3.1 Plan stage

There are four TCM steps under the Plan stage, which are: (1) target-selling price setting, (2) target profit setting, (3) target cost setting, and (4) profitability feasibility study. These steps mainly focus on establishing the TCM targets.

3.3.1.1 Step 1: Setting the target-selling price

The introduction of the new product development is based on the overall corporate planning, which indicates when and how often the new products would be developed and when the products would be changed and modified (Lee & Monden, 1996). However, before any new product development starts, Japanese companies conduct a thorough market research (Lee & Monden, 1996). This is to grasp "what the customer wants and what price they are prepared to pay" (Cooper & Slagmulder, 1999, p.24). From this market research, the Japanese companies identify the types of new product to be developed and the contents of model changes. Then, a product-planning proposal is presented to the top management to get approval to proceed with the basic product planning of the new product (Cooper & Slagmulder, 1999).

Japanese companies consider the companies' internal and external factors in order to set a realistic target-selling price. Among the internal and external factors are product matrix, top management strategy and profitability objectives, corporate image, product attributes and functionality, product concept, product life cycle, expected sales quantity, forecast market share, price of competitors' products, and competitors' reaction (Cooper & Slagmulder, 1999; Kato et al., 1995). Nevertheless, Copper and Slagmulder (1999) highlight that the price setting process in Japanese companies is based on the concept of perceived value. Japanese companies add the additional functions from the previous model to increase the perceived value. If the product has a predecessor, the selling price is higher if only the perceived value is higher (Cooper & Slagmulder, 1999). For example, at Daihatsu, the target-selling price is set by the product planning office based on market research methods using functional basis pricing (Kato et al., 1995).

3.3.1.2 Step 2: Setting the target profit

The target profit is set prior to the target cost setting (Kato et al., 1995). In setting the target profit, the Japanese companies consider two important elements, which are the target profit must be realistic and the target profit must be able to offset the product life cycle cost (Cooper & Slagmulder, 1999).

Studies (Lee & Monden, 1996; Cooper & Slagmulder, 1999; Kato et al., 1995; Okano, 2005) show that there are many ways, both simple and advance, to set the target profit. According to Cooper and Slagmulder (1999), the Japanese companies set the target profit by referring to the actual profit margin of the predecessor product and make some adjustment to cater to the market condition changes. For example, Nissan uses this approach and uses the computer simulation to find the relationship between the profit and selling price (Cooper & Slagmulder, 1999). However, some studies (Kato et al., 1995; Monden & Hamada, 1991; Lee & Monden, 1996; Okano, 2005) highlight more complex methods for target profit setting. Okano (2005) claims that Toyota sets its new product target profit setting based on the vehicle type target profit guidelines. These target profit guidelines are based on the company's mid-term and long-term target profit goal. Additionally, current relevant products' operating profit and marginal profit are also considered in setting the new product target profit (Okano, 2005).

On the other hand, Kato et al. (1995) highlights that Daihatsu sets its new product target profit based on the target profit for the total product portfolio. This total target profit is derived from the mid-term and long-term profit planning, which reflect a three to five-year period of the company's business strategies. From here, the total target profit is decomposed into business product portfolios, which will be introduced in a particular period. This profit allocation process consumes many hours of discussion before being finalized by the top management. Once approved, Daihatsu will not reduce the target profit even in the event of the introduction of unexpected competitors' products during the product development, which requires additional specification to counter the market. Instead, Daihatsu will increase the sales price or sales volume, or reduce other costs to ensure the target profit is achievable (Kato et al., 1995). This method of target profit setting helps to integrate the company's profit plan and product planning (Kato et al., 1995; Lee & Monden, 1996; Monden & Hamada, 1991). This is because, in Japanese companies, the mid-term plan is considered as an agreed commitment, which all the employees have to commit to achieve (Kato et al., 1995). Furthermore, the linkage of the product target profit with the company profit planning helps to make the employees understand that the final objective of TCM is to achieve the company profit (Monden & Hamada, 1991).

3.3.1.3 Step 3: Setting the target cost

i) Setting the target cost

In general, the total target cost can be derived by subtracting the target profit from the target-selling price (Ansari, Bell, & Swenson, 2006; Ansari, Bell, & Okano, 2007). Regarding the target cost setting, studies found three common methods – top-down method, bottom-up method and a combination of both (Sakurai, 1989). In the top-down method, the target cost is set by deducting the target profit margin from the target-selling price. This method is also known as the deductive method. The target is imposed on the TCM team without any input from the lower management level. In the bottom-up method, the target cost is set by the TCM members. In this method, the engineers estimate the target cost based on their experience, skill and available production facilities. This method is also known as the "adding up method" (Sakurai, 1989). The estimation of each part, component and activity starts from the current cost level by considering all possible cost reductions (Kato, 1993). The target cost is calculated by adding up all the estimated costs. Whereas, the combination method is the target cost setting which is conducted by combining the top-down method and the bottom-up method. Generally, although the target cost is set by the top management, engineers are consulted in the target cost setting process. There is a consensus between the top management and employees in setting the target cost (Sakurai, 1989). Regarding these target cost setting methods, Kato (1993) argues that the top-down method is able to link the TCM with the company profit planning and business plans. On the other hand, it is hard to link TCM with the companies' profit planning and business plans by using the bottom-up method. Furthermore, it is also hard to generate innovative VE ideas through the bottom-up method. However, Sakurai (1989) highlights that most TCM experts believe that a combination of the top-down and bottom-up methods is the best method. He further explains that the combination method allows top management to guard the target profit, and, at the same time, encourage the employees to give their full commitment.

Most of the case studies in Japanese companies found that these companies differentiate the target cost and allowable cost (Cooper & Slagmulder, 1999; Monden & Hamada, 1991). The allowable cost is calculated by subtracting the target profit from the target-selling price (Monden & Hamada, 1991; Sakurai, 1989). The allowable cost is a cost at which the product must be manufactured to gain the target profit margin when sold at its target-selling price. Basically, the allowable cost is the top management's target, which is very tough to attain in the short-term (Lee & Monden, 1996). Due to its tightness, there is no guarantee that it can be achieved. In order to make it more attainable and achievable, the "target cost" is set and applied to motivate the employees (Monden & Hamada, 1991; Cooper & Slagmulder, 1999). The target cost is set after some adjustment is made to the allowable cost to make it more attainable (Monden & Hamada, 1991; Sakurai, 1989). If the target cost is too high, the actual cost never meets the target cost and demoralizes the employees. However, if the target cost is too low, the company will lose its competitiveness (Cooper & Slagmulder, 1988). Accordingly, the target cost is set somewhere between the estimated cost and the allowable cost. It has to be approved by the management (Sakurai, 1989). Usually, Japanese companies make an adjustment between the allowable cost and the product estimated cost to derive the target cost (Tani et al., 1994, Lee & Monden, 1996). However, according to Cooper and Slagmulder (1999), in the companies with sound TCM, the gap between the allowable cost and the target cost is either non-existent or very small.

ii) Calculate the estimated cost

The project assumption plays an important role in calculating the product estimated cost (Monden & Hamada, 1991). The project assumptions are set from the project planning stage and must be agreed by the related departments (Okano, 2005). Among the assumptions that are considered by the Japanese companies are monthly production volume, predecessor product cost timing, depreciation conditions, product life cycle, production plant location, foreign exchange rates, make or buy criteria for the parts and components, investment in plant and equipment, and production plant and numbers or process (Kato et al., 1995; Okano, 1995). Nevertheless, in setting the assumption, such as the volume assumption, only a realistic and achievable plan is considered (Cooper & Slagmulder, 1999). For example, Toyota considers its past sales trend, market trend and competitors' product offering to set a realistic project volume assumption (Cooper & Slagmulder, 1999).

Based on the approved project assumptions, the part and component costs of the product are estimated (Kato et al., 1995). The part estimated cost is also known as the "as if cost" or "drifting cost" (Kato et al., 1995). The "drifting cost" is an estimated cost based on the existing part cost or "ongoing cost" by considering the cost-decreasing and cost-increasing factors (Sakurai, 1989). It is known as the "drifting cost" because it drifts towards the target cost continuously during the NPD process (Ansari & Bell, 1997). Cooper and Slagmulder (1999) in their case study research found that, in Japan, the purchased parts estimation depended heavily on the suppliers' estimation. Furthermore, the interactive relation with suppliers allows the Japanese companies to receive early information of the parts' estimation price after cost reduction and alternative cost reduction ideas from their suppliers (Cooper & Slagmulder, 1999).

There are two methods of part and component estimation, which are the differential cost estimation system and the absolute cost estimation system. Under the differential cost estimation system, only the cost changes of the engineering design changes between the current and the new product model are estimated. This method limits the number of items to be managed, which eventually decreases the number of the activities and time required for making the estimation. This method is normally practiced when the predecessor parts exist (Kato et al., 1995; Monden & Hamada, 1991). On the other hand, the absolute cost estimation is a total cost estimation, which considers all the cost elements to derive the total "estimated cost" (Monden & Hamada, 1991).

iii) Allocate the target cost

After the target cost has been set, the target cost is broken into each cost item and major function. Cost items include material costs, direct labour costs, purchased part costs and depreciation part costs. The major functions are engine, transmission, cooling system, and audio system, et cetera (Okano, 2005; Cooper & Slagmulder, 1999; Monden & Hamada, 1991). A survey by Tani et al. (1995) of Japanese companies found that these companies set the target cost for direct material cost, purchased parts cost, direct variable cost, overheads, development cost depreciation of new investment, development cost, trial production cost and logistic cost. However, among these cost items, most of the Japanese companies focus on the direct costs, such as direct material costs, purchased parts cost and direct variable cost.

There are two approaches for allocating the target cost by major function: (1) by the historical cost reduction rates approach or (2) by the market analysis approach. Normally, the market analysis approach is used when new functionality is introduced in the market. For example, Isuzu uses the market analysis approach by setting the monetary values or ratio of each major part function and studies how much customers are willing to pay for that function. Then, the adjustment of the target cost is made to match the technical, legal and safety requirements (Cooper & Slagmulder, 1999). After allocating the target cost by the major function groups, the cost engineers for each design group or function group de-compose the target cost to the group component and parts level (Okano, 2005; Monden & Hamada, 1991; Copper & Slagmulder, 1999; Kato et al., 1995). The purpose is to set the purchase parts price (Cooper & Slagmulder, 1999). The task of breaking down the target cost involves many departments (Lee & Monden, 1996; Cooper & Slagmulder, 1999). However, since the Chief Engineer (CE) is the project leader who sets the theme of the product and its functionality, he can make any adjustment to the target cost allocation of any function group to meet the functionality objectives (Cooper & Slagmulder, 1999). Tani et al. (1994) in their survey of Japanese companies found that all automotive companies break down their target cost to each part. Kato et al. (1995) also highlight that Daihatsu also break down the target cost and delegate the components' target cost to departments and managers.

3.3.1.4 Step 4: Making profitability feasibility study

The objective of a profitability feasibility study is to ensure that the product is able to earn an adequate profit margin over its life cycle. This process starts at the initial product planning stage. Generally, at the Japanese companies, the Cost Management Department calculates the profitability to check whether the project can achieve its target profit. If the project appears unprofitable, it will be eliminated or modified. However, if the project appears profitable, it will be adopted (Monden & Hamada, 1991).

In their case findings, Cooper and Slagmulder (1999) highlight that Nissan estimates the overall profitability of the new product model by using the rough estimated sales volume and all the costs related to the development of the new product. In terms of exclusive investment cost, some automotive companies use payback period method in assessing their investment (Monden & Hamada, 1991). The Japanese companies usually consider a reserve budget to cater for design related problems that might occur during the production process in their overall profitability. This reserve budget is set by the Chief Engineer (CE) based on past experience of similar product development. Normally, the budget is between 5 to 10 per cent of the product level target cost (Cooper & Slagmuder, 1999).

3.3.2 Do stage

The TCM step under the Do stage is to implement the cost reduction to achieve the target cost.

3.3.2.1 Step 5: Achieving the target cost

In this stage, the trial drawings of the products are developed based on the approved target cost (Monden & Hamada, 1991). Usually, as the total estimated cost does not achieve the target cost, further cost reduction by using engineering tools is required to reduce the cost to the target cost level (Kato et al., 1995). Based on the results, the trial drawings are adjusted accordingly. This cost reduction process is a continuous activity until it meets the target cost (Monden & Hamada, 1991). Cost reduction ideas can be identified through past VE experience, tear down activities and assessing suppliers' quotations by using a cost table (Kato et al., 1995). In Daihatsu, VE is the main activity conducted to close the gap between the target cost and the estimated cost (Lee & Monden, 1996).

Cooper and Slagmulder (1999) highlight that the Japanese companies usually conduct two types of cost reduction. First is the cost reduction to close the gap between the estimated cost and the target cost. If the sum of the accumulated estimated cost is higher than the target cost, further cost reduction will be imposed until the total target cost of the representative variant is achieved. Second is the cost reduction to close the gap between the target cost and the suppliers' quoted price. If the initial quoted price is higher than the target cost, the company will have a series of negotiations with its suppliers until they reach consensus. Furthermore, in order to ensure the design changes meet the target-selling price, the Japanese companies fine-tune the product functionality and quality by getting occasional market feedback during the development stage (Cooper & Slagmulder, 1999). For example, at Daihatsu, when the company has to change a design to cater to market changes, such as a new product introduction by a competitor, the cost increment is offset by increasing the sales volume or sales price, or decreasing other costs to keep the target profit achievable (Kato et al., 1995).

Generally, each design group is responsible for achieving the respective cost reduction target (Cooper & Slagmulder, 1999; Kato at el., 1995). However, they cooperate with one another to identify cost effective VE that meet the customers' demands (Monden & Hamada, 1991). Japanese suppliers proactively participate to achieve the target cost by suggesting alternative design prospects (Cooper & Slagmulder, 1999). For example, Nissan only submits the components or parts description and forecast production volume to their suppliers. Its suppliers submit the price and forecast delivery timing based on this information (Cooper & Slagmulder, 1999).

3.3.3 Check stage

TCM activities under the Check stage are to monitor and evaluate the TCM results against its targets, and to report the achievement of the results.

3.3.3.1 Step 6: Monitoring and reporting cost achievement status

In this stage, continuous monitoring and reporting are conducted to ensure that the corrective actions could be taken before the actual cost exceeds the target cost. If the design changes cause an increase in cost, the company has to find alternative ways by offsetting it with savings from somewhere else (Cooper & Slagmulder, 1999). For example, Daihatsu conducts periodic cost meetings starting from the target cost approval timing until the mass production timing to monitor the target cost achievement status (Kato et al., 1995).

Monden and Hamada (1991) highlight that once the final drawings have been finalized and production equipment conditions have been prepared, the final cost is estimated by the Cost Management Department. The Purchasing Department also starts to negotiate with suppliers to finalize the purchased parts. The Production Engineering Department establishes the standard values, such as material consumption and labour hours, which will be used later as a cost database for financial accounting and material requirement planning (Monden & Hamada, 1991).

3.3.4 Act stage

The TCM activity under the Act stage is to evaluate the target cost achievement result and take the necessary countermeasures to close the gap.

3.3.4.1 Step 7: Cost improvement

In this stage, the overall TCM results are evaluated against the original targets. The objective is to evaluate the degree of target cost achievement status. If the target cost is not achieved, the detail analysis and study will be conducted to find the causes, where the gap occurs and the departments responsible (Monden & Hamada, 1991; Lee & Monden, 1996). This stage starts after the first three months of mass production because this timing is considered stable from any abnormal values (Kato et al., 1995; Monden & Hamada, 1991).

Sakurai (1989) posits that the target cost cannot be implemented without the support from standard costing or budgeting. In the case study of Kato et al. (1995) it was found that, at Daihatsu, after three months mass production of the new product, if the target cost is met, the actual standard cost of the production is used as a standard cost for the future operation. However, if the actual standard cost is higher than the target cost, the target cost is used as the standard cost. Accordingly, the production managers have to find ways to reduce the current production cost to meet the target cost. However, a study by Lee and Monden (1996) found that Daihatsu did not use the standard cost as the base of the new product's production cost for three main reasons. First, the standard cost uses static manufacturing conditions assumption, i.e. manufacturing methods and operating standards, which are unrealistic and incompatible for use in the design and development stage in today's dynamic market. Second, it is very difficult to translate the standard cost variances with the tasks of new product development and design. Third, the standard cost does not have a direct connection with the pricing strategy, cost planning or cost management. For these reasons, Daihatsu only uses the standard cost for financial accounting and does not use it for any managerial decision-making (Lee & Monden, 1996; Monden & Hamada, 1991).

Once the product is in the mass production stage, the Japanese companies continuously strive to do cost reduction (Howard & Herbig, 1996). In the production stage, if the design stage could not achieve the target cost, the TCM activities are followed by Cost Maintenance activities. Nevertheless, the focus of this activity is not to lower the cost but to prevent the cost from going up (Kato et al., 1995). For example, Kato et al. (1995) found that at Daihatsu, a task force is formed to address the specific cost reduction activities in the mass production stage. Japanese companies also continue the cost reduction process by linking it with Kaizen Costing activities. Kaizen Costing is a system to support cost reduction in the mass production stage of the existing products. The objective is to achieve the cost reduction targets through continuous improvement activities of the existing products to meet the target profit (Lee & Monden, 1996; Monden & Hamada, 1991). Monden and Hamada (1991) emphasize that Japanese automotive companies manage to create a total cost management system because they link the TCM with the Kaizen Costing. A loose integration between Kaizen Costing and TCM might have an impact on the result of the implementation of TCM, and, eventually, affect the employee perception of TCM. This is because Kaizen Costing causes an improvement to the existing products. By using the Kaizen Costing data, the most updated data could be used for the new product cost estimation in the TCM process. This creates a cost information cycle between the design and production (Monden & Hamada, 1991).

3.3.5 Conceptual framework for the TCM implementation process

Contingency approach suggests that "the particular features of an appropriate accounting system will depend on upon the specific circumstance in which an organization finds itself" (Otley, 1980, p.413). For the guideline of this case study research, based on the contingency framework, the proposed conceptual framework of the TCM implementation process is tabulated in Figure 3-1. This conceptual framework can provide a guideline for looking at the relevant evidence and reflecting important issues in case study research (Yin, 2003). The conceptual framework for the TCM implementation process is segregated into the PDCA stages and seven TCM steps. The number indicated on the upper left side in Figure 3-1 shows the number of the TCM step.

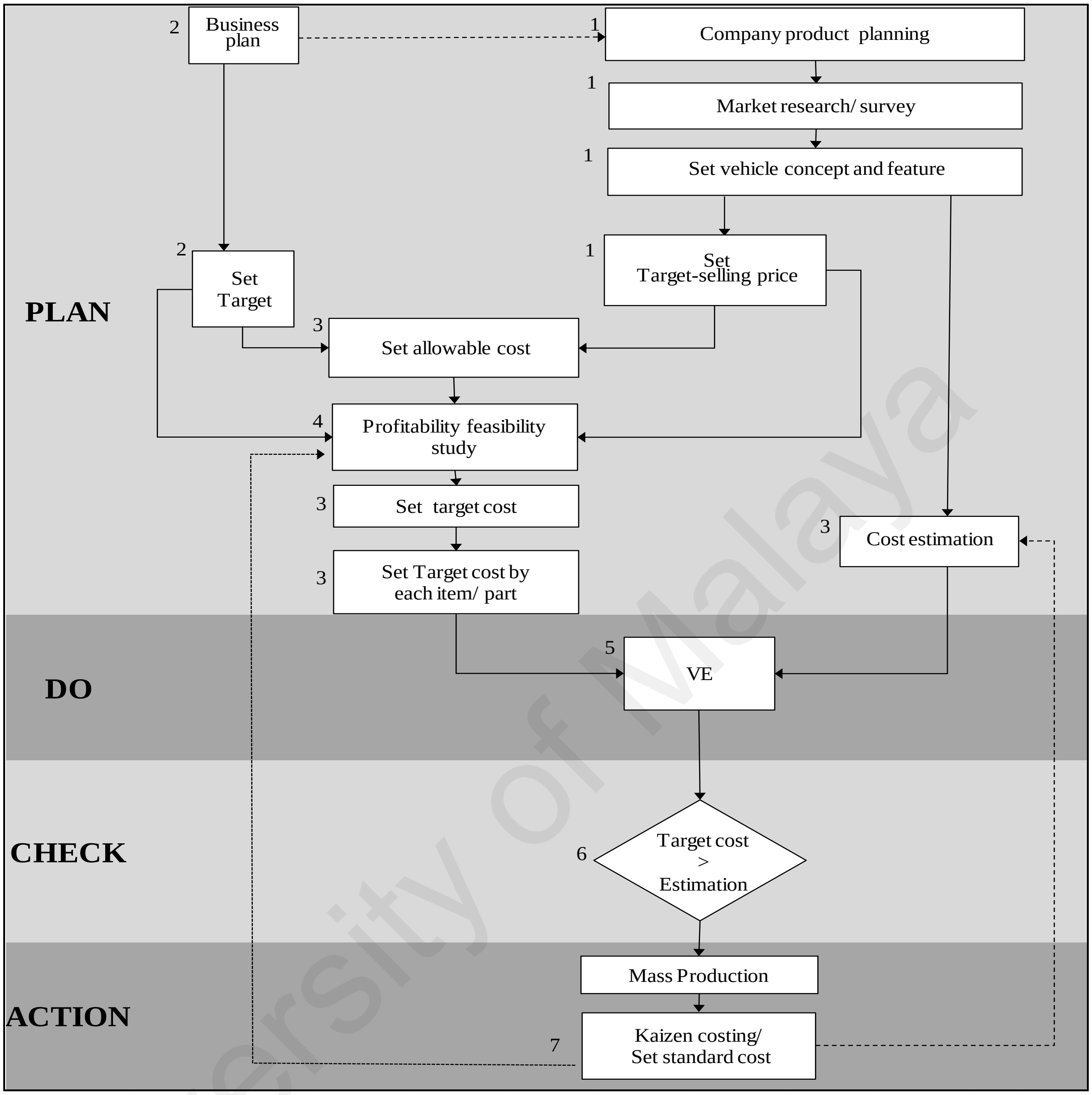

Figure 3-1: TCM Activities Process Flow

Adopted from:
Lee and Monden (1996); Monden and Hamada (1991); Cooper and Slagmulder (1999); Okano (2005); Kato et al. (1995)

Notes:
The number on the top left shows the step number of the TCM process. [1] STEP 1: Setting the target-selling price; [2] STEP 2: Setting the target profit; [3] STEP 3: Setting the target cost; [4] STEP 4: Making the profitability feasibility study; [5] STEP 5: Achieving the target cost; [6] STEP 6: Monitoring and reporting the cost achievement status; [7] STEP 7: Cost improvement.

The Plan stage consists of four steps – target-selling price setting, target profit setting, target cost setting and making the profitability feasibility study. In the first step, based on the company product planning, market research is conducted to understand the customers' requirements concerning the product specifications and features, and the acceptable market selling price. From the market input, the product specifications, features, and tentative selling price are decided. In the second step, the target setting profit is set based on the business plan. Next, in the third step, the allowable cost is determined by subtracting the target profit from the target-selling price. The total target cost is set with some adjustment between the range of allowable cost and the estimated cost. Then, the target cost is broken down to all the cost items, such as purchased parts cost, investment cost and in-house production cost. At the same time, based on the assumption of the product specifications and features, all the related costs are estimated. For the purchased part cost estimation, the estimation relies on the suppliers. In step four, after the target-selling price, target profit and allowable target cost have been set, the profitability study will be calculated to assess the profit and loss in introducing the new product. This profit and loss simulation only focuses on representative variants. If the simulation shows a profitable condition, the top management approves the proposal and allows it to proceed to the next stage.

The Do stage consists of activities to achieve the target cost. In this stage, the engineering tools, especially VE, are used to close the differences between the target cost and the cost estimation.

In the Check stage, the achievement status of the target cost against the estimation cost is monitored continuously until the mass production stage through periodical meetings. If the target cost is met, the product will proceed to the mass production stage.

Finally, in the Action stage, after the product has been through the mass production stage and introduced to the market, the cost improvement stage is conducted. The actual profit and loss achievement status is analysed against the original target to find the root causes and responsible departments. The target cost is used as the standard cost for future operation. Through the Kaizen Costing, the continuous cost improvement activities are conducted to continuously improve the cost. This cost information will be used for future product development.

3.4 Theoretical framework of TCM enablers

Generally, many different factors or enablers can influence the SMA implementation effectiveness at different stages (Anderson & Young, 1999). Anderson and Young (1999) in their study on the impact of the contextual and process factors on ABC, one of the SMA methods, conclude that implementation effectiveness correlates with the contextual and implementation process factors. The contextual factors are factors that are related to the organization's external and internal environment, and by characteristics of the individual evaluating the innovation. Whereas, the implementation process factors are factors that are related to the interaction of the project team and the organization, and the internal functioning of the project team, such as communication and goal clarity among team members (Anderson & Young, 1999). Furthermore, Anderson and Young (1999) argue that contextual factors affect the implementation process and implementation result of SMA, while the implementation process factors only affect the implementation result of SMA. The authors conclude that even though the contextual factors might impede the SMA implementation result, improvement of the process factors might mitigate the indirect effect of the contextual factors to the SMA implementation result.

According to the contingency theory, it is expected that the contingent factors influence the TCM practices, and the suitability of contingent factors and TCM practices affect the organizational performance (Drury, 2004). By using the contingency theory as the underpinning theory, this research intent to explain the key enablers that positively associated with the successful implementation of TCM in the case study context.

Even though there are many tools and techniques have been highlighted by scholars, this research categorized and focuses on nine factors as TCM enablers: Advanced Manufacturing Technologies (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training. Besides these nine enablers are the common enablers highlighted in the literature, these enablers also are the most dominant factors discovered and confirmed from the personal interviews with some key TCM users, observation during the field visits, and found in internal documentations such as company quarterly magazines, reports and press releases. Therefore, it is expected that all these enablers have a positive association with the successful implementation of TCM in a typical Malaysian automotive company too.

The next subsections below explain the development of each proposition of these nine enablers. These propositions will be tested using the data obtained from the questionnaire survey conducted on the TCM users of Company A.

3.4.1 TCM enablers

This research proposes that the implementation of advance manufacturing techniques (AMT), confrontational strategy, a customer centric, an information-sharing network, lean manufacturing implementation, supplier relationship, a teamwork orientation organization culture, top management support and commitment, and training have a positive association with the successful implementation of TCM. The successful implementation of TCM is measured by three dimensions - development and design efficiency, marketability and cost reduction. Figure 3-2 summarizes the theoretical framework used in this research in a chart form.

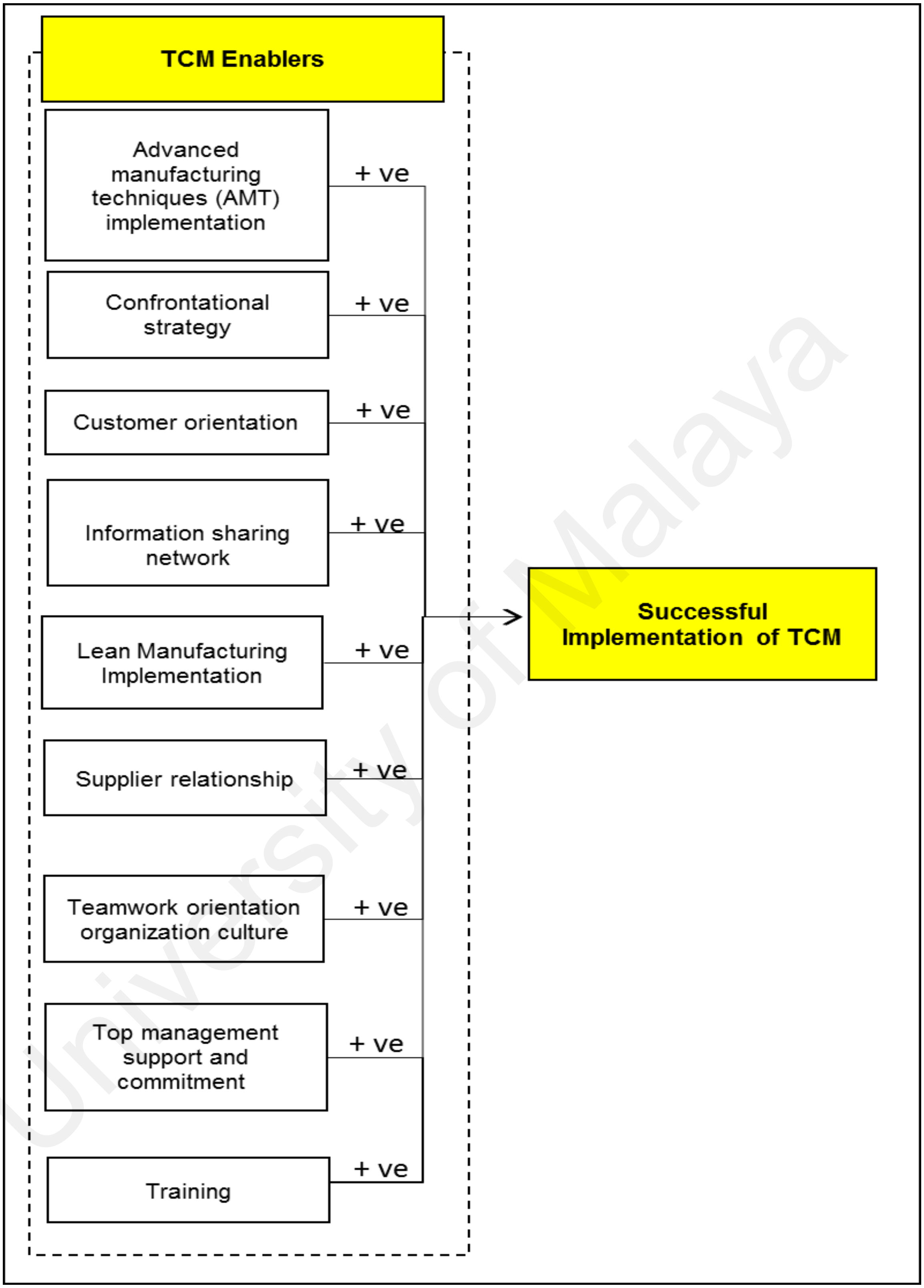

Figure 3-2: Theoretical framework of TCM enablers

3.4.1.1 Implementation of advanced manufacturing technologies (AMT)

In this research, AMT implementation is defined as the application of technologies and computerized systems to improve products or processes in the organization (Kaplan & Atkinson, 1998; Sakurai, 1990).

Kato et al. (1995) in their case study found that the management of successful TCM companies regarded technology as the greatest potential cost reduction tool that helps to produce the product with high quality and low cost. Sakurai (1989) highlights that the implementation of AMT, such as numerical control devices and industrial robots, helps the Japanese companies to produce multiple products at low cost. In addition, the implementation of AMT allows efficient information flow, integrated and automated activities across the value chain. This helps the companies to increase quality, reliability, manufacturing flexibility and learning phase, and to reduce the stock, space, setup lead-time, and labour cost (Isa & Foong, 2005; Sakurai, 1989). Accordingly, the implementation of AMT helps companies to achieve manufacturing excellence and produce the best products at the lowest price (Mcnair & Mosconi, 1987).

Japanese companies believe that TCM is a combination of human intelligence and creativity with leading edge technologies as its support system (Kato, 1993). Thus, Japanese companies use information systems widely to support their TCM activities. Among the information systems used are: (1) system to support pricing and target profit computation, (2) system to support design and development like CAD and CAE, and (3) cost database management system (Cooper & Slagmulder, 1998; Kato et al., 1995).

Given the above discussion, the following proposition was developed:

Proposition 1: AMT implementation is positively associated with the successful implementation of TCM.

3.4.1.2 Confrontational strategy

In this research, the confrontational strategy is defined as the company strategy that focuses on differentiation and low cost strategy simultaneously to achieve competitiveness in terms of cost, functionality and quality (Cooper, 1995).

Historically, high market competition and diversification of customers' needs forced the Japanese companies to implement TCM (Tani, 1995; Sakurai, 1989). An empirical study by Decker and Smidt (2003) on 32 Dutch manufacturing firms found that TCM was likely to be adopted in an uncertain environment with intense competition. Additionally, in the study of Ax et al. (2008) concerning the relationship between TCM adoption and competition intensity in 57 Swedish manufacturing companies, it was found that the adoption of TCM was positively correlated with competition intensity. In fact, in a highly competitive market, the companies must establish a unique position against its rivals to gain a competitive advantage by performing activities differently or performing different activities from its rivals (Hitt et al., 2004).

Kato (1993) emphasizes that most of the leading Japanese companies that are using TCM pursue both cost leadership and product differentiation strategies. He further posits that no company is able to be a major player in the market by solely relying on the differentiation strategy without being cost competitive. Additionally, Copper (1996) also argues that TCM is likely to be used by lean enterprises pursuing a confrontational strategy. This is because, being in the current highly competitive market, it is necessary to compete in terms of cost, quality and functionality simultaneously. Thus, the companies must pursue both a cost leadership and a differentiation strategy (Cooper, 1996).

Therefore, the following proposition was developed:

Proposition 2: Confrontational strategy is positively associated with the successful implementation of TCM.

3.4.1.3 Customer orientation

In this research, customer orientation is defined as the sufficient understanding of one's target customers to be able to create superior customer value continuously (Narver et al., 1990).

Under the current highly competitive market, there are many products on the market that have similar functions or with better functions. Customers are also not particularly loyal to any company and switch brands easily if the companies do not offer the product they want or do not offer it at the best price they want (Cooper, 1996). This shows that customers have the final power to define the price of a product with designated functions by selecting the best price that reflects the set of product functions in the market (Kaplan & Atkinson, 1998).

The price led concept of TCM makes the TCM companies more adaptable to the market and customer needs (Swenson et al., 2003). This is because the starting point for the target cost is the anticipated selling price for the product, which is determined by market analysis. Based on market analysis, the company defines their target customers, the features or specifications that these customers want in the product and the price that these customers are willing to pay for each feature or specification, and the product as a whole. All the customer requirements like quality, cost and timely delivery, need to be considered in parallel with the product features and used as a base for guiding the cost (Swenson et al., 2003). Accordingly, Swenson et al. (2003) identify customer orientation as one of the principles of the TCM.

Given the above discussion, the following proposition is put forward:

Proposition 3: Customer orientation is positively associated with the successful implementation of TCM.

3.4.1.4 Organizational information-sharing network

In this research, an information-sharing network is defined as information sharing between the company and its business partners, such as employee, joint venture partners, suppliers and trading companies, that is sufficiently detailed, frequent and timely to meet the company's requirements (Yigitbasioglu, 2010). This variable specifically focuses on information sharing activities which is related with TCM between the case company and its business partners.

Information sharing among business partners helps to reduce the behavioural uncertainty and increase the level of trust (Kwon & Suh, 2004). The study of Yigitbasioglu (2010) on information sharing between buyers and key suppliers at 221 Finnish and Swedish companies found that information sharing improves the buyer's performance in terms of output, particularly resource usage, and flexibility. He also found that the extent of the information shared between buyers and suppliers depends on the environmental uncertainty, demand uncertainty, key suppliers' dependence on the buyer and the buyer's dependence on the key suppliers.

TCM is a cost management tool for reducing the overall cost of the product over its entire life cycle, which involves all business aspects (Sakurai, 1990; Kato et al., 1995). In setting a realistic target-selling price, target profit and target cost, TCM requires comprehensive internal and external information (Cooper & Slagmulder, 1999; Kato et al., 1995; Monden & Hamada, 1991). Furthermore, since achievement of the targets need to be simultaneously attempted in all areas (Huh et al., 2008), communicating the targets to related members is vital to ensure the achievement of target cost and target profit (Everaert et al., 2006). Product planning and cost meetings act as a simultaneous engineering device that creates an interactive interaction between the managers from various departments and backgrounds (Tani, 1995; Tani et al., 1994). Accordingly, an information-sharing network helps the companies to speed up the information flow, increase the effectiveness and efficiency, and respond to the customer quickly (Li & Lin, 2006).

Hence, a proposition is set forth as follows:

Proposition 4: The information-sharing network is positively associated with the successful implementation of TCM.

3.4.1.5 Lean manufacturing implementation

In this research, lean manufacturing is defined as a production system that eliminates waste in all activities that do not create value added (Albright & Lam, 2006). The main concept in lean manufacturing is to reduce non-value added and irrelevant activities that do not contribute to the value of the product (Albright & Lam, 2006). Through the implementation of lean manufacturing, companies are capable of exploiting temporary advantages through the elimination of waste and be better than their competitors (Hibbets, 2003). According to Wickramasinghe and Alwattage (2007), the implementation of lean manufacturing helps the Japanese companies to successfully implement cost reduction and quality improvement programmes.

Copper (1995) posits that TCM is likely to be used by lean manufacturers. This is because lean manufacturers exert immense pressure on all cost elements through the overlapping system for cost, quality, design and production (Ansari et al., 2006). Gagne (1995) also states that among the companies that are likely to gain benefit from TCM are companies that have a cost reduction system during the planning, design and development stages, and companies that implement lean manufacturing methods, such as JIT, VE and TQM. This is because during the TCM planning stage, it is difficult to visualize and reflect accurate conditions. After the product has been launched, there is a possibility that the actual results might not reflect the target cost. Thus, continuous improvement by using lean manufacturing tools helps to bring back the cost as per plan (Helms et al., 2005).

Additionally, Sakurai (1989) argues that many Japanese companies that implement JIT also implement TCM. This is because the small lot production concept in JIT increases the effectiveness of TCM. Kato (1993) also argues that the Western companies that manage to implement a JIT production system with some modification are good candidates for implementing TCM. Additionally, Nishimura (1995) posits that the combination of TCM and JIT allows a product to be produced at low cost and of high quality.

Furthermore, TCM cannot be implemented successfully without cost engineering tools (Sakurai, 1989). In the case study research conducted by Gandhinathan et al. (2004) on Indian automotive product manufacturers, they found that the VE was a vital tool in achieving the target cost during the design stage. In the case study conducted by Lee and Monden (1996) at Daihatsu, they also found that VE is the main tool used to achieve the target cost.

Accordingly, above arguments lead to the following proposition:

Proposition 5: The implementation of lean manufacturing is positively associated with the successful implementation of TCM.

3.4.1.6 Supplier relationship

In this research, the supplier relationship is defined as the supplier involvement or cooperation in achieving the buyer's target (Helms et al., 2005). Compared with the organization information-sharing network, this variable specifically focuses on suppliers' tangible supports, such as cooperation in joint development and cost reduction activities, and intangible supports, such as cooperation in information and knowledge sharing, to achieve the TCM objectives.

According to Tani et al. (1994), cooperation with the supplier is one of the major success factors of TCM. Kato (1993) even regards suppliers as “a treasure island for cost reduction activities” (Kato, 1993, p. 35). This is because almost 75 per cent of the total product cost usually comes from purchased material and components. Thus, achieving TCM goals is unlikely without relying on the suppliers (Swenson et al., 2003). A study made by Carr and Ng (1995) found that Nissan UK focuses on the supply chain cost to control its total cost. This is because 81 per cent of Nissan’s manufacturing cost is covered by the material costs, which include the raw material, purchased material, transportation and duty cost. Thus, the impact of cost reduction activities from the material cost is almost four times bigger than any other cost element, such as overheads or labour cost.

In the integrated TCM system, the buyer’s target cost for each part becomes the target-selling price of the suppliers. By transmitting the competitive pressure from the buyer down to its supply chain, the whole supply chain is more efficient in achieving the cost reduction (Kaplan et al., 1998). The case study research by Cooper and Slagmulder (1999) on seven Japanese companies found that Japanese companies transmitted the cost pressure to their suppliers. The Japanese suppliers proactively find ways by themselves to design and manufacture the product so that they could make an adequate return. Ellram (2000) studied the link between purchasing and supply management in the TCM practices by sampling 11 American companies from eight industries. She found that companies with institutionalized TCM place the purchasing members as the key member of the TCM cross-functional team.

Among the important roles of the purchasing members are following up any problems that arise and ensuring that the suppliers achieve their target cost reduction (Ellram, 2000). In addition, Carr and Pearson's (1999) study on the buyer-supplier relationship with performance outcomes of 739 American firms found that strategically managed long-term relationships with suppliers have a positive impact on the financial performance of the companies.

Given the above discussion, the following proposition was developed:

Proposition 6: The supplier relationship is positively associated with the successful implementation of TCM.

3.4.1.7 Teamwork orientation organization culture

In this research, a teamwork orientation organization culture is defined as company's employees working together to achieve the company's goal (George & Jones, 2005).

TCM requires high design effort to achieve the expected cost, which is equal or below the target cost. This can be achieved by improving the product manufacturing processes and design without sacrificing the value added functions or features (Kaplan et al., 1998). Without the full effort of the whole organization and the total involvement of all employees throughout the organization, it is unlikely to meet the cost reduction target and achieve the target cost (Cooper & Slagmulder, 1988; Monden & Hamada, 1991).

Teamwork is one of the critical factors that have a positive impact on the success of the New Product Development (NPD) project (Lynn & Akgun, 2003). Accordingly, Feil et al. (2004) also posit that teamwork orientation is one of the critical success factors for the successful implementation of TCM. This is because rigorous cost reduction is unable to be achieved without the full cooperation from the related departments. In Japan, through Cross- Functional Management (CFM), the cooperation from members with different functions and knowledge backgrounds help to generate unique strategies (Tani, 1995). This helps to achieve the target cost for the product at the given level of functionality and quality (Monden & Hamada, 1991). Furthermore, Tani (1995) emphasizes that simultaneous engineering or "rugby" style product development in the Japanese companies helps to generate the cooperative effort from all the related departments.

Hence, a proposition is developed as follows:

Proposition 7: A teamwork orientation organization culture is positively associated with the successful implementation of TCM.

3.4.1.8 Top management support and commitment

In this research, top management support and commitment is defined as top management willingness to provide the necessary resources, power and authority for TCM success (Pinto & Slevin, 1989).

There are many studies highlight that top management support and commitment is vital for the project success (Pinto & Slevin, 1989; Kerzner, 1987; Kuen & Suhaiza, 2012). Top management support and cooperation in terms of sufficient resource allocation and empowerment to project leaders is necessary for successful project implementation. The implementation stage is the most crucial stage that requires top management support because in this stage, resources, such as manpower, money and raw material, are highly needed and unexpected issues are also likely to arise (Pinto et al., 1989). Pinto et al. (1989), in their study on the critical success factors for R&D projects, found that top management support is vital for granting the necessary power to the project managers controlling the needed resources and rewarding the final results. Similarly, Kerzner (1987) emphasizes that top management is necessary for successful project implementation.

Similarly, in Malaysia, a few studies found that top management has a significant role in project success (Chang & Zailani, 2012; Kuen & Suhaiza, 2012; Islam et al., 2009). For example, a study made by Chang and Zailani (2012) on 79 manufacturing companies in Malaysia found that top management support and project mission are the main critical factors that indirectly supported the NPD. Kuen and Suhaiza's (2012) survey study on 79 Malaysian manufacturing companies found that top management support is positively related to the indirect project success in the Malaysian manufacturing sector. In addition, a study by Islam et al. (2009) at semiconductor companies in Malaysia found that top management support is a moderator in the relationship between team learning and NPD process.

Cooper and Slagmulder (1999) posit that effective TCM requires a highly disciplined process. Accordingly, Feil et al. (2004) highlight that the top management plays an important role in creating TCM awareness, aligning the employees' mindset, cultivating a cross-functional team environment, and providing resources to achieve the TCM targets. For example, a case study by Lee and Monden (1996) found that in Daihatsu, Japan's top management encourage their employees to participate in contributing VE ideas by establishing a formal VE suggestion system.

Given the above discussion, the following proposition is put forward:

Proposition 8: Top management support and commitment is positively associated with the successful implementation of TCM.

3.4.1.9 Training

In this research, training is defined as a process of employees acquiring capabilities to support the achievement of the organizational goals (Mathis & Jackson, 2004).

The globally competitive environment requires competent employees with updated knowledge, fresh ideas, abilities and skills that can deliver results. Accordingly, employees must be trained continuously to update and maintain their capabilities (Mathis & Jackson, 2004). Furthermore, developing and empowering the employees helps to cultivate a culture of continuous improvement (Yamashina, 2000) and retain employees, and, eventually, promotes the organization's competitiveness (Mathis, 2004).

Generally, failure to educate and train all relevant personnel will lead to system implementation problems (Leong & Jarmoszko, 2010). Furthermore, without adequate training and no in-depth knowledge of the companies, the employees are likely to focus on short-term thinking and quick results (Albright et al., 2006). Accordingly, Pinto and Slevin (1989) emphasize that selecting, recruiting and training people with the right administrative and technical skills has a positive impact on the success of the project implementation.

In terms of TCM practices, since the achievement of targets needs to be attempted simultaneously in all areas, well trained and members with broad experience who are capable of spotting and implementing cost reduction activities are needed (Helms et al., 2005; Cooper & Slagmulder, 1998; Gagne, 1995). In Japan, the Japanese companies mainly develop their employees through OJT and job rotation (Okano & Suzuki, 2007; Feil, Yook, & Kim, 2004; Sadoi, 1998). This "learning by doing" concept of training allows the employees to understand the whole business processes and the impact of their actions on the business environment. This eventually leads the employees to continuously improve (Feil, Yook, & Kim, 2004).

Thus, the following proposition is developed:

Proposition 9: Training is positively associated with the successful implementation of TCM.

3.4.2 Successful implementation of TCM

The relationship between the contingency factors and the management accounting system affects the organizational effectiveness. The organizational effectiveness can be measured in terms of the organizational objectives (Otley, 1980). A study by Adler et al. (2000) on manufacturers in New Zealand found that the implementation of advanced management accounting techniques results the improvement in companies' profitability, cost reduction and quality improvement.

Generally, TCM implementation helps the companies to ensure that the products are sufficiently profitable when launched on the market (Ansari & Swenson, 2006; Cooper &

Slagmulder, 1998; Adler et al., 2000). Accordingly, even though there are various objectives of the implementation of TCM, the final objective is to improve the companies' long-term profitability (Ansari & Swenson, 2006; Cooper & Slagmulder, 1998). On the other hand, cost reduction, development and design efficiency and marketability are commonly highlighted as the short-term objectives of the implementation of TCM (Huh et al., 2008; Tani et al,. 1994; Adler et al., 2000; Dekker & Smidt, 2003). A survey study by Tani et al. (1994) found that the main objectives of TCM implementation by most Japanese companies are cost reduction, quality, satisfying customers' needs and the timely introduction of new products, respectively.

However, as this research is unable to show the profit achievement level due to the case company's confidential issues, the success of the implementation of TCM is evaluated based on three dimensions only- efficiency, marketability, and cost reduction improvement. Furthermore, since these dimensions reflect the short-term effect of the TCM practices (Huh et al., 2008), it can be easily acknowledged by the respondents. Furthermore, since TCM is defined as "a profit management process" in which the specific targets in "quality, prices, reliability, delivery date and other targets" must be attained simultaneously (Huh et al., 2008), this research combines the dimension of efficiency, marketability, and cost reduction improvement as one dependent variable to measure the success of the implementation of TCM.

3.4.2.1 Cost reduction

In Tani et al.'s (1994) survey of Japanese companies in Japan, they found that among all the objectives, cost reduction is the main objective of TCM implementation.

Similarly, using the same survey tool, the study by Dekker & Smidt (2003) on Dutch manufacturing firms in Holland found that cost reduction is regarded as the main objective of TCM implementation. Huh et al. (2008) posit that cost reduction is a performance variable concerning the financial achievement through supply chain management and product cost management. This dependent variable can be measured by product cost reduction, upstream cost reduction, reduction in raw materials purchased, and waste reduction on the shop floor.

The main objective of the cost achievement activity can be achieved by reviewing all the possible ideas of cost reduction during the product design stage. As the product is not actually being produced at this stage, any revisions due to new data or information availability are easy and not costly (Ansari et al., 2006). Once the product is ready to launch, there are limited opportunities left for cost reduction. Thus, several authors have argued that it is difficult to make major cost reductions after the design stage because almost 80 per cent of the product cost is fixed at the product design stage. Any large-scale efforts to reduce the cost during the manufacturing stage are pointless (Shank et al., 1999; Kato, 1993).

3.4.2.2 Design and development efficiency

Huh et al. (2008) posit that the development and design efficiency is a TCM performance variable related to the efficiency of the R&D management and the design steps. This dependent variable can be measured by the efficiency in the design to cost, strengthening the design and development process, and the cost reduction effort by engineers, as well as improving the design and development technology.

The target cost is set before the new product development starts by deducting the target profit from the target-selling price. From here, the companies work towards achieving the target cost to ensure the new product can generate profit when launched (Shank et al., 1999). Accordingly, this target cost helps the engineering teams to be conscious about the cost implications of their design in the later stages of the product cycle (Everaert & Bruggeman, 2002). In addition, since the TCM starts in the upper stream of the production stage, the market requirements are considered and integrated earlier in the design stage (Sakurai, 1989; Monden & Hamada, 1991). This helps to increase the efficiency by avoiding time, money and effort lost in design changes due to over engineering countermeasures to fit the market requirement after the product has been introduced to the market (Helms et al., 2005; Kato, 1993).

3.4.2.3 Marketability

Huh et al. (2008) posit that the marketability is a TCM performance variable that concerns the improvement in delivery and quality. It can be measured by quality improvement, shorter lead-time, product features that meet the customers' requirements, and the timely introduction of the new product.

TCM implementation helps the companies to consider all the customers’ needs in terms of quality, price, reliability and delivery date and other targets (Huh et al., 2008). Hence, the target-selling price is set by the market, and the cost reduction is guided by the customers’ voice without sacrificing customer value (Ansari et al., 2006). In TCM, the cost reduction activities do not sacrifice the product quality or reliability. Instead, the cost reduction is only conducted through a reduction in the non-productive areas (Newman & Mckeller, 1995).

3.4.3 Summary of theoretical framework

Based on the above arguments, this research proposes nine important enablers that are necessary for the successful implementation of TCM. Table 3-2 summarizes the propositions used in this research.

Table 3-2: Summary of propositions for TCM enablers

Proposition	
PROPOSITION 1:	AMT implementation is positively associated with the successful implementation of TCM
PROPOSITION 2:	Confrontational strategy is positively associated with the successful implementation of TCM.
PROPOSITION 3:	Customer orientation is positively associated with the successful implementation of TCM.
PROPOSITION 4:	The information-sharing network is positively associated with the successful implementation of TCM.
PROPOSITION 5:	The implementation of lean manufacturing is positively associated with the successful implementation of TCM.
PROPOSITION 6:	The supplier relationship is positively associated with the successful implementation of TCM.
PROPOSITION 7:	A teamwork orientation organization culture is positively associated with the successful implementation of TCM.
PROPOSITION 8:	Top management support and commitment is positively associated with the successful implementation of TCM.
PROPOSITION 9:	Training is positively associated with the successful implementation of TCM.

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3.5 Summary

This chapter discussed the fundamental theories and the development of the conceptual and theoretical frameworks used in this research. The first section discussed the two fundamental theories, contingency theory and dynamic capabilities theory, used for this research. The contingency theory posits that the best design of management accounting systems should depend on the specific situational factors of the company itself. This is because the situational factors that affect each control system are exclusively unique. While, the dynamic capabilities theory posits that the ability of an organization in a dynamic market to develop its external and internal competence is through creating new resources, and integrating or re-configuring its resource mix as a source of competitive advantage. These theories will be used as the underpinning theories to explain the findings of this research.

The following section discussed the conceptual model of the TCM implementation process based on several case studies made by scholars in the Japanese automotive companies in Japan. This conceptual framework was used as the case study guidelines for looking at the significant evidence and reflecting on the key issues for this research. The conceptual framework of TCM implementation was segregated into the PDCA stages and the seven main steps, which were (1) target-selling price setting, (2) target profit setting, (3) target cost setting, (4) profitability feasibility study, (5) achieving the target cost, (6) achievement status monitoring and reporting, and (7) cost improvement stage.

The last section developed a theoretical framework used in the quantitative approach of this research. There were nine factors: advance manufacturing techniques (AMT) implementation, confrontational strategy, a customer centric, an information-sharing network, lean manufacturing implementation, supplier relationship, a teamwork orientation organization culture, top management support and commitment, and training, which were proposed as enablers that have a positive association with the successful implementation of TCM. In this theoretical model, the successful implementation of TCM was measured by three dimensions- development and design efficiency, marketability and cost reduction.

The next chapter explains the research methodology used in this research. It justifies the selection of the research method and the case company. The explanation of the research design method will be segregated into the qualitative and quantitative approach. Generally, the qualitative approach will be used to investigate the TCM implementation process and enablers that exist in the case company. Then, the quantitative approach will be used to statistically test the key enablers that positively associated with the successful implementation of TCM. Under each approach, the instrument development, data collection procedures and data analysis method will be explained in detail.

CHAPTER 4: METHODOLOGY

4.1 Introduction

This chapter discusses the research design method used in this research. Based on the nature of the research questions, the conceptual and theoretical frameworks as discussed in the previous chapters, this research uses a single embedded case study method as suggested by Yin (2003). This case study employs multi-sources of data collection by using the qualitative and quantitative approaches. The qualitative approach is used to investigate the TCM implementation process and why Company A implements TCM "as it is", and to identify the TCM enablers that exist in the case company. The data are collected through interviews, documents, and direct observation. The quantitative approach is used to statistically test the enablers that have a positive association with the successful implementation of TCM in the case company. The data are collected through a questionnaire survey distributed to the case company's employees. The insights obtained from the quantitative level analysis are used to supplement the results of the qualitative level analysis. This provides a comprehensive understanding concerning the enablers that have a positive association with the successful implementation of TCM in the case company.

The next section in this chapter discusses and justifies the rationale for using the case study method in a single industry and a single company. Then, the following section describes the overview of the research design based on the three case study principles suggested by Yin (2003). The fourth section explains the case study protocol used to guide the case study research. Then, the following section explains the research site selection and background of the selected case company. The sixth and seventh sections explain the qualitative and quantitative evidence data collection approaches in terms of instrument development, data collection method and data analysis, respectively. Finally, the chapter ends with an explanation of the validity and reliability issues and the approaches used to address the issues.

4.2 Rationale for case study research method

The researcher considered a few arguments in selecting the case study as the research method. There are three main reasons as to why this research has been conducted using the case study method. First, the case study method is the most appropriate method to answer the research questions. This is because the case study method is used when a "how" or "why" question is being asked about the current set of events that the researcher has either little or no control over (Yin, 2003). Furthermore, Yin (2009) argues that:

> *A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. In other words, you would use the case study method because you deliberately want to cover contextual conditions – believing that they would be highly pertinent to your phenomenon of study (Yin, 2009, p. 13).*

Additionally, according to Ansari et al. (2007) in the early development of TCM, most of the literature comprised descriptive and prescriptive studies, which were based on case studies of the early adopters of TCM. This shows that the case study method helps the researchers to keep thorough and significant characteristics of the real situation, such as the organization and managerial processes (Yin, 2003).

Second, the TCM implementation is quite new outside Japan (Ansari et al., 2007; Sulaiman et al., 2004; Nishimura, 2005) and there is a lack of specific studies to understand the TCM implementation process and factors that support the implementation in detail outside the Japanese environment (Sulaiman et al., 2004). In addition, Johnson and Kaplan (1987) argue that most of the textbooks and accounting management research have focused on developing a sophisticated model in a simplified production setting, which only reflects minor problems faced by the practitioners and results in inaccuracy and overlooks the actual accounting management practices. The case study method helps to provide valuable insights into the body of knowledge, which cannot be provided by the traditional empirical and modelling approach (Yin, 2003; Ellram, 2006). Accordingly, Sulaiman et al. (2004) emphasize that the current studies on management accounting practices only focus on exploratory descriptive research in which the results only reflect percentages and frequencies. They suggest that further studies should involve case studies in an attempt to examine the specific factors that hinder many Asian countries from implementing strategic cost management. Furthermore, Tani et al. (1994) also suggest that researchers should use the case study method in order to understand the complexity and differences of TCM practices.

Third, a case study allows more relevant data collection because the entire organization can be investigated in-depth and with great attention to detail (Yin, 2003). A case study enables a thorough understanding of the company's strategy, industrial type, size, and cultural and social context. Through direct and in-depth contact with practitioners, the TCM practices can be covered thoroughly and a number of propositions can be evaluated. Moreover, case study research provides the opportunity to use various sources of evidence. Multi-sources of evidence allow the researcher to develop the converging lines of inquiry, a process of triangulation and corroboration, and to address a wider range of historical, behavioural and observational issues (Yin, 2003).

Based on the above arguments, in this research context, the researcher posits that the case study is the appropriate approach to uncover the differences in the TCM implementation process, possible causes of the differences and the critical factors that support the successful implementation of TCM in the context of Malaysian automotive company.

4.2.1 Single embedded case study method

In determining the case study design, Yin (2003) highlights that there are two important decisions have to be made. First, is to select a single or a multiple case study design. Second is to select a single (holistic) or multiple (embedded) unit of analysis.

According to Yin (2003), a single case study is suitable under four main circumstances: (1) the case represents the critical case in testing a well-formulated theory, (2) the case is unique, (3) the case is representative of the typical case, or (4) the opportunity to access the case is very rare. Accordingly, this research uses a single case study method for a few reasons. First, TCM was not developed wholly from an established theory but gradually from practical applications, which make it environment specific and unique (Feil, Yook, & Kim, 2004). Since the development of TCM in Malaysia is still new, it can be considered that under this context the implementation process is unique. Furthermore, in the early development of TCM, most of the studies were conducted in a single case study mode due to the unknown territory of TCM (Ansari et al., 2007). An analysis made by Ansari et al. (2007) of the Japanese and English related TCM literature from 1995 to mid-2005 found that almost half of the literature comprised non-empirical studies and the balance used empirical studies. Out of 50 per cent of the empirical studies, 25 per cent of the research methodologies were based on a single site case study method. The multiple case studies were very small which were 11 per cent in the English literature and 6 per cent in the Japanese literature. Second, considering that the case company covers the majority of the automotive market shares in Malaysia for several consecutive years, this company is representative of the typical case of the TCM implementation process in the Malaysian automotive industry context. Third, inasmuch as TCM involves the secrecy of the company in terms of costing, profit and new products (Kato, 1993) it is a rare opportunity to gain access to the case company for TCM study.

In terms of unit analysis selection, Yin (2003) highlights that it is related to the fundamental problem of defining what the case is and how the research defines its research questions. Single or holistic analysis is advantageous when no logical subunits can be identified or when the relevant theory underlying the case study is holistic. On the other hand, embedded or multiple units of analysis incorporates subunits of analysis, which increases the opportunity for extensive analysis and enhances the understanding of the single case (Yin, 2003). In that TCM implementation is still new outside of Japan (Nishimura, 2005), there is a lack of solid model that outlines the critical enablers of the successful implementation of TCM in non- Japanese environment. Thus, an embedded or multiple unit of analysis is selected in this research. In this research, the primary unit of analysis is the case company and the sub unit is the case company's employees who are directly and indirectly involved in the TCM practices.

By conducting a single case study with multiple units of analysis, the researcher is able to understand the differences in the management accounting practices and the complex mixture of interrelated influences (Scapens, 2006) specifically in terms of the possible causes of the differences and critical factors that positively associated with the successful implementation of TCM in the case company context. Furthermore, this method also helps to provide an in-depth understanding of the TCM practices and the modifications to the implementation process from the perspective of the dynamic capabilities theory and contingency theory. Thus, based on the above arguments, a single embedded case study method is used in this research.

4.3 Overview of the research design

The research design is "a logical plan for getting from 'here' to 'there'. 'Here' is the initial question to be answered and 'there' is some set of conclusions (answers) about these questions" (Yin, 2009, p. 26). Based on the research questions, this research uses Yin's (2003) positivist single embedded case study research method to answer the research questions. According to Yin (2003), there are three principles must be fulfilled to conduct and deliver a high quality case study research. First, the use of multiple sources of evidence to develop converging lines of inquiry. Second, maintaining a chain of evidence to increase the reliability. Third, creating a case study database to organize and document the collected data. The sub-section below explains how this research covers each of these principles in detail.

4.3.1 Principle 1: Use of multiple sources of evidence

In order to develop converging lines of inquiry for high quality case study research (Yin, 2003) multi-sources of data evidence were collected in three steps. In the first step, the qualitative data were collected through interviews, documents, and direct observation.

There are four objectives of this step. First, to understand the context of the case company including its organizational structure, business and management accounting practice. Second, to understand what triggered the case company to implement TCM. Third, to investigate in-depth the TCM practice in the case company. And, finally, to investigate the TCM enablers that exist in the case company. In the second step, the quantitative data were collected through questionnaire surveys distributed to the company's employees. The objective of this step was to test the enablers that had been highlighted by the previous studies and the initial findings from the first step. Then, the data were analysed using statistical analysis. Finally, in the third step, the qualitative and quantitative data were triangulated to obtain comprehensive interrelated connections to answer the research questions.

4.3.2 Principle 2: Maintain a chain of evidence

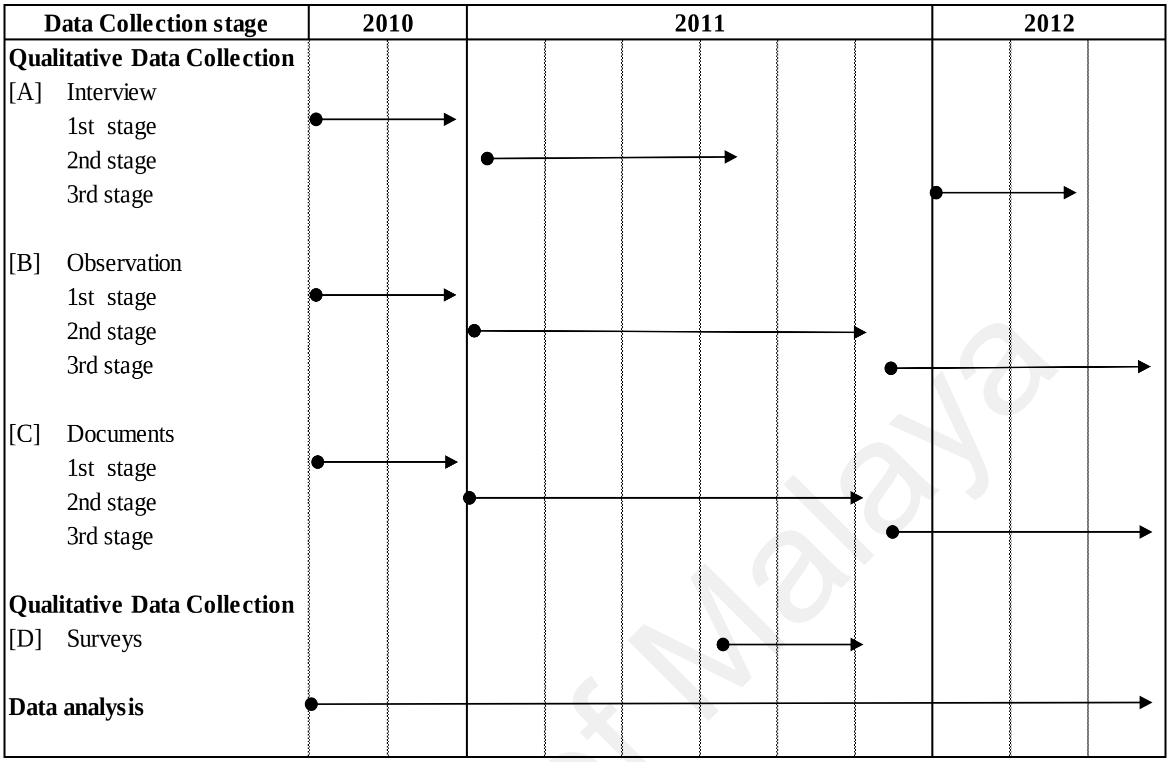
The case study reliability can be increased by maintaining a chain of evidence (Yin, 2003). Yin (2003) argues that this allows the external observer "to follow the derivation of any evidence from initial research questions to ultimate case study conclusions" (Yin, 2003, p. 102). In order to understand the whole TCM implementation process at Company A, this research focused on Model X1, which is a full model change of the most saleable passenger car of Company A. By focusing on one model, the researcher was able to understand the TCM implementation process for each product development stage.

This case study covered the data collection of Model XI for approximately 47 months; 33 months during the development period and 14 months after launching period. Even though, the data collection coverage period was 47 months, the actual field data collection started from August 2010 until June 2012, which was approximately 22 months.

Before this time, the data were collected from the company's historical internal documents only such as meeting minutes, report presentations and proposal papers. Initially, this case study was intended to last 40 months only – a 34-month period for the product planning stage until the mass production stage, and a 6-month period after the launching stage. However, the study was extended for another 7 months after the researcher found that Company A had started to implement cost reduction activities for Model X1 after this model had been launched by introducing a new model project code, Model X2. Due to this unexpected phenomenon, the researcher decided to extend another 7 months to understand the reasons and to strengthen the previous findings.

In conjunction with the research questions, this study was conducted in three main stages for the qualitative data collection and only one stage for the quantitative data collection. Table 4-1 summarizes the organizational structure of the data collection stages and data analysis.

Table 4-1: The period of data collection and data analysis.



The qualitative data were collected through interview, observation and documentations. There were three main stages for the qualitative data collection. The first stage was from August to December 2010, the second stage was from January to November 2011 and the third stage was from December to June 2012. The main objective of the first stage was to understand the fundamental concept and context of the TCM practice at Company A. In this stage, the researcher assimilated herself as a part of Company A's community. This allowed the researcher to understand the case company culture and identify the actors who played a key role in the organization, especially in TCM practice. The observation data collection were focused on understanding the Company A's environment through field visits. The documentation data were collected to understand the general background about Company A. Preliminary interviews were conducted to obtain preliminary information before conducting formal interviews. The second stage data collection was conducted after the fundamental concepts and familiarization with the case company were developed. In this stage, formal interviews were conducted based on the case study interview protocol. The observation data were collected by attending specific TCM related meetings to understand the TCM implementation process in detail. The document data collections were based on TCM and its inter-related matter only. Finally, the third stage data collection was conducted to strengthen and to identify any findings that did not emerge during the previous stages, and to finalize the explanation building for the case study. In this stage, the observation data and document data were focused on TCM related activities to support the survey findings.

As for the quantitative data collection, the data were collected in the second half of 2011. This questionnaire survey was designed after some preliminary findings concerning the TCM enablers found in the qualitative data collection stage. Then, the survey questions were distributed to the employees of Company A who were involved directly or indirectly with the TCM implementation process.

For the data analysis, the data were analysed continuously starting from the beginning until the end of the data collection stage.

4.3.3 Principle 3: Create a case study database

Organizing and documenting the collected data by creating the case study database is one of the criteria for a high quality case study (Yin, 2003). Generally, the case study data documentation consists of two components, which are the data or evidentiary base and the investigator's report. The data or evidentiary base is the case study raw data like notes that can be accessed for individual inspection. Notes are the most common element of the database in case studies (Yin, 2003). For the investigator's report, this dissertation is the result drawn therefrom. Yin (2003) suggests that investigator's report should "contain enough data so that the reader of the report can draw independent conclusions" (Yin, 2003, p. 102).

Accordingly, in this research, all the data were organized and analysed starting from the early stage of data collection. Notes were taken in handwritten form from interviews, field observations and document analysis. No editing was made to the notes as the priority was given to the case study report editing. However, the notes were organized and categorized for later access (Yin, 2003). The database, which consists of research notes, survey and all documentation were grouped, analysed and summarized into several categories, which became the chapters of this research and sub-topics within the chapters. However, due to the issue of confidentiality, the data will be disposed of after approval of the dissertation.

Nevertheless, the actual data collection and data analysis process were not exactly structured because changes were made to accommodate the unexpected emerging issues. This was because there was no exact point where the data collection ended and the data analysis began. This overlapping process of data collection and analysis improved the data collection and data analysis (Patton, 1990). For example, the recorded interviews or document data were analysed first before the subsequent interviews in order to grasp and discuss new emerging issues with the next respondents. Regarding the data collection of this research, it was guided by the conceptual and theoretical frameworks. However, at the end of the data collection process, in order to organize the data analysis, the researcher combined the two sources of data collection, which were (1) the research questions generated from the initial stage of the study, and (2) the analytic insights that emerged during the data collection (Patton, 1990).

In summary, in order to deliver a high quality case study, this research took a few measures to ensure the three principles of case study: (1) use multiple source of evidence, (2) maintain the chain of evidence and (3) create a case study database, were complied.

4.4 Case study protocol

The case study protocol is the major tool for increasing the reliability of the case study. This is because the case study protocol helps to focus on the subject of the case study and anticipate the problems of the case study. Yin (2003) suggests that case study protocol should consist of: (1) an overview of the case study project, (2) field procedures, which included the data collection procedures and case study site selection, (3) case studies questions, and (4) a guide to the case study report. Based on this guideline, the summary of the case study protocol of this research is attached in Appendix A. The detail case study protocol concerning the overview of the case study was covered in Chapter 3.

Regarding the case study protocol for data collection procedures, a letter of consent with an interview protocol and survey questionnaire was submitted to the Company A's Human Resources General Manager to obtain approval for the case study research before conducting formal data collection. Refer to Appendix B for the letter of consent. As stated in the Consent Letter, all the collected data were strictly confidential and reported anonymously for the purpose of this research only. Anonymity helps to protect the real case and its real participants from any subsequent actions of the results (Yin, 2003). Neither individual names nor the company name were used in any oral or written report and were replaced with an anonymous code. The respondents' quoted opinions were represented in code numbers with general classifications of position, which were technical staff, lower management, middle management, and top management. The technical staff level was an engineer and executive. The lower management level was a specialist engineer and assistant manager. The middle management level was a department manager, senior manager, and deputy general manager. The top management level represents a general manager, executive director and managing director. The respondents' departments were mentioned to demonstrate the tendency and variation of the respondents' answers based on department. All the raw data including the documents, notes taken, digital recording and transcribed interviews were made available as needed to the auditors. Nevertheless, these raw data were not available to the administration of the company being studied nor made public. After the research had been concluded, the raw data were destroyed.

The case study protocol of the case study site selection and case study questions will be covered in detail in the following sections of this chapter.

4.5 Research site

This section discusses the research setting selection process of the case study site and the background of the case company in which the case study was conducted.

4.5.1 Research site selection

According to Boeije (2010), the case study location must reflect the research topic most strongly. Therefore, in order to select the right case company, the researcher made a preliminary study by approaching a few companies through simple questionnaires concerning TCM practices. From the feedback, the researcher went to several companies to make a preliminary visit for screening purposes, as suggested by Yin (2003). This process helped the researcher to identify the right case company properly before conducting the formal data collection. From this screening activity, the researcher found that compared with other companies, Company A provided the most significant evidence as it has designed, documented and reflected the TCM concept.

Additionally, in responding to the competitive global and the local automotive environment, Company A provided an interesting and dynamic setting to understand the TCM implementation. This was because the case company had the status of a national automotive car manufacturer, which was affected by the liberalization of the automotive industry. Furthermore, given that Company A was established through a strategic alliance with a Japanese automotive manufacturer over almost two decades, the TCM implementation at Company A was likely to be more mature than other companies.

Furthermore, the case company has a big size organization with total average revenue of the past 3 years more than USD500 million and with more than 10,000 employees. Since its establishment in 1990s, the case company has sold more than 2 million units of passenger cars of various products inclusive of export markets and has become Malaysia's automotive market leader for several consecutive years.

With the case company being the most likely “to yield the best data” (Yin, 2003, p. 21) as the main operational criteria, Company A was selected as the case company for this research.

4.5.2 Case company background

Company A was one of the Government Linked Companies (GLC) among the automotive manufacturing companies that were established under the Heavy Industrial Policy projects (Tham, 2004). This company was established in the 1990s through a joint venture between Malaysian and Japanese companies. By 2015, this case company had already produced eight models and become Malaysia’s automotive market leader for several consecutive years. Company A has received various awards and recognitions for its outstanding products both domestically and from overseas. It is also listed among the most valuable brands in Malaysia.

Company A is situated in the east of Peninsular Malaysia. Among the facilities at Company A are a corporate building, R&D testing laboratories and styling studio, vehicle test track, manufacturing plant, engine plant, pre-delivery inspection area, vehicle distribution stockyard, training centres and parts warehouse. It had the capacity to produce 250,000 units per annum on a 2-shift cycle. As at 2012, Company A sourced its parts and components from 114 local suppliers and 15 overseas suppliers. It also had 180 sales and 170 service outlets nationwide. In terms of the workforce, there are over 10,000 employees working under Company A’s organization and around 57,000 people working under the community of Company A inclusive of suppliers and dealers. Company A’s vision is to contribute to the development of the Malaysian society through excellence in terms of the quality of its product and services. This vision is translated through its mission of aiming to be a world class automotive company well-known for its excellent quality and reliability (Source: Company website).

4.5.2.1 Organizational structure

Company A is a dynamic organization with challenging goals. In order to equip the company efficiently towards its business goal, Company A divides its operations under three main subsidiaries – Company A1, Company A2 and Company A3. Company A1 is responsible for the sales, marketing, and distribution operations of Company A's vehicles as well as the after sales service and spare parts operations. Company A2 is responsible for the manufacturing operation of Company A's vehicles. Company A3 is responsible for the assembly of the vehicle engines and also the manufacturing operations of selected engine component parts. After re-structuring at the end of 2001, Company A4 was incorporated with Company A2 and Company A3 as its subsidiaries. Under this new restructuring, the direct subsidiaries of Company A are Company A1 and Company A4.

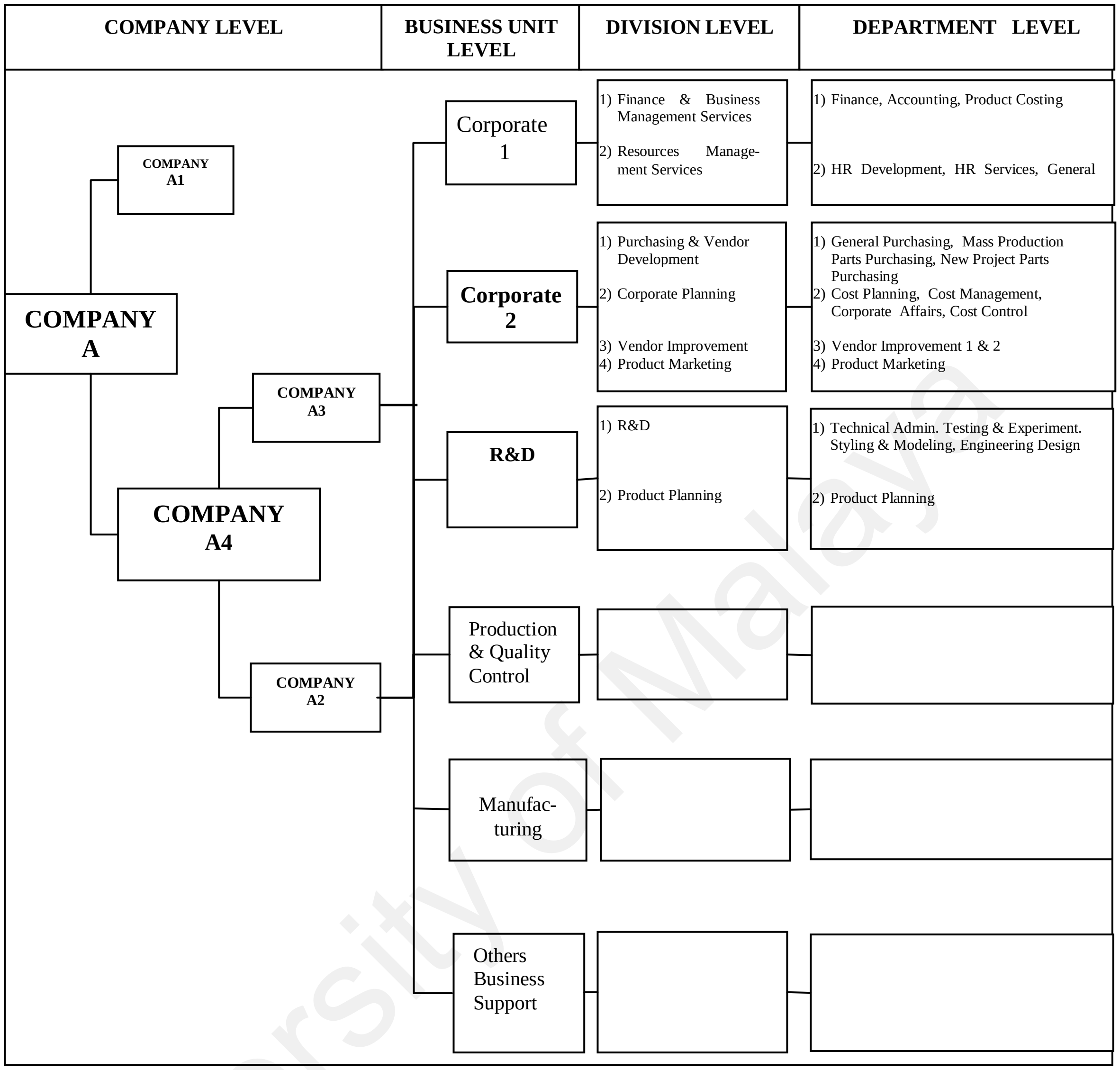


Figure 4-1: Simplified Organizational Structure of Company A
Source: Internal documents, 2012

Company A is a highly hierarchical and dynamic organization. Figure 4-1 illustrates the simplified organizational structure of Company A as of the first half of 2012. The organizational structure of Company A is divided into three different organizational levels – business unit level, division level and department level. In general, the company level is led by the Managing Director, the business level is led by the Executive Directors, the division level is led by the General Managers and the department level is led by the Managers. At Company A, the TCM implementation only relates to certain divisions and departments under Company A4. Thus, Figure 4-1 only provides details of the organizational structure of the divisions and departments that are involved with TCM implementation. As of 2012, the business units under Company A4 are Corporate 1, Corporate 2, Research and Development (R&D), Production and Quality Control, Manufacturing and other business support units. Under the Corporate 1 business unit, the divisions are Finance and Business Management Services, and Resources Management Services. Under Corporate 2 business unit, the divisions are Purchasing and Vendor Development, Vendor Improvement, Corporate Planning, and Product Marketing. Under the R&D business unit, the divisions are R&D and Product Planning. The TCM activities of Company A are anchored by the Cost Planning Department under the Corporate Planning Division of the Corporate 2 business unit. Besides the Cost Planning Department, the TCM activities mainly involve the Engineering Design Department of the R&D Division, Product Planning Division, New Project Parts Purchasing Department of Purchasing and Vendor Development Division, and the Product Marketing Division. The TCM also indirectly involves the Finance and Business Management Services Division of Corporate 1 business unit and the Vendor Improvement Division of Corporate 2 business unit.

Nevertheless, since Company A was a dynamic organization, this organizational structure was not static. From when the case study started in 2010 until the end of the case study period, there was frequent re-structuring within the business unit and division levels, which involved the re-organization of departments within the organization.

4.6 Qualitative approach

As highlighted by Yin (2003), qualitative data can be collected through several common ways, such as documentation, archival records, interviews, direct observation, participant observation and physical artefacts. However, in this study, the qualitative data were only collected through interviews, documentation and direct observation. The following section explains the qualitative data collection in terms of its instrument development, data collection procedures and data analysis method.

4.6.1 Interview

For the case study, interviews are the most important source of data. Yin (2003) emphasizes that "interviews are an essential source of case study evidence because most of the case studies are about human affairs. These human affairs should be reported and interpreted through the eyes of the specific interviewees, and well informed respondents who can provide important insights into a situation" (Yin, 2003, p. 92). Furthermore, interviews also provide quick information concerning the previous history of the situation, which helps the researcher to identify other relevant sources of evidence (Yin, 2003).

4.6.1.1 Interview instrument development

This case study used preliminary interview or unstructured informal interview and in-depth interviews. For the preliminary interview, it was conducted informal, flexible and free flowing conversation with no specific of questions. This preliminary interview was used as a preliminary step in the research process to help the researcher become familiar with the current phenomena, to understand the overall structure of the TCM implementation and to identify the main key players of TCM at Company A. As for the in-depth interviews, the interview questions were based on the interview protocol set forth in Appendix C. The interview protocol was developed based on Ellram (2000) and Ellram et al. (2006) and re-constructed to suit the research objectives and the research questions. After setting the initial draft of the interview protocol, it was shown to two academicians and one practitioner for comments, after which the interview protocol was revised and re-designed before being finalized.

The interview protocol was divided into two sections; section A focused on the TCM while section B focused on the background of the interviewees. In section A, there were 56 interview questions, which were divided into four main parts. In the first part, the questions were designed to understand the TCM implementation history of Company A. The questions in the second part were designed to understand the TCM implementation process at Company A. The questions in the third part were designed to understand the issues concerning TCM implementation and the questions in the final part were designed to understand the results of TCM implementation. In the second part, the questions on the TCM implementation process were divided into five small categories – Plan Stage, Do Stage, Check Stage, Action Stage and enablers of the TCM practices. The details of the TCM implementation process were divided into the PDCA cycle stages (Plan-Do-Check-Action) in order to understand the TCM process easier. In setting the questions on the TCM implementation process and TCM enablers, the conceptual and theoretical frameworks were used as guidelines.

However, the interview protocol and research frameworks were not considered as definite or comprehensive. This was because the interviews were guided conversations rather than structured inquiries. In the case study interview, the actual flow of the questions asked was flexible rather than rigid (Yin, 2003).

4.6.1.2 Interview data collection

Open-ended interviews and focused interviews are the most common types of interview conducted in case studies (Yin, 2003). These interviews can be conducted in several ways such as face-to-face interviews, telephone interviews and computer assisted interviews (Cavana, Delaheya, & Sekaran, 2000). This research used the purposive sampling method because this sampling method helped to focus on the specific target group with confined key respondents who were able to contribute a lot on the issues related to the research (Boeije, 2010; Cavana et al., 2000).

In the first interview stage, the researcher used preliminary interviews through informal face-to-face conversations to gain freer responses from the respondents involved. For this interview stage, there were no particular criteria set for the selection of the respondents. The respondents were introduced by the researcher's contacts. Since, the objectives of the preliminary to generate ideas about the subject being investigated, this interview was not guided by a specific set of questions. Nevertheless, for each interview session with the respondent, the researcher introduced herself and explained the objectives of the session. Through the preliminary interview process, the research found out how the Company A's employees think and how they react to subject under investigation. This input was necessary to frame and finalize the interview protocol and survey questionnaire, so that the interview and survey questions would be almost natural to the respondents.

After understanding some of the background and having identified several key informants from the preliminary interviews, the official data collection began with in-depth interviews in the second and third interview stage. In these stages, the interviews were conducted based on the interview protocol attached in Appendix C. The data collection was gathered through in-depth interviews with a few key personnel of Company A who were involved with TCM from the related departments. These included Product Marketing, Purchasing and Vendor Development, Cost Control, Product Planning, Research and Development, Accounting, Cost Planning Department, and a few of Company A's suppliers. The profile of the interview respondents will be explained in Chapter 5.1.

Generally, the interview questions were passed to the respondents three days before the actual interview process. The interviews were conducted on premises of Company A or those of its suppliers. Before starting the interview, the objectives of the interview were explained to the respondents. The interview protocol and TCM implementation process conceptual framework was used to guide the interviewer during the interview process. By using such guidance, the uniformity and consistency of data can be assured. During the face-to-face interviews, the probing method was also used to follow the flow of the interview. In addition, a few new additional questions were asked to probe for more information during the interview sessions. In the event of a conflict of information, the respondents were also asked directly about their opinions about the TCM implementation process and the enablers outlined by the literature and previous respondents. However, some of the interviews were conducted in a spontaneous way with the basic guidelines as the interviewees felt uncomfortable in a formal setting. In any event, some clarification was needed after the in-depth interviews were conducted; hence, following the interviews, emails were sent to the respondents to obtain further clarification. After each interview session, the respondents were thanked personally. Upon request, the report findings were shared with the respondents.

Notes were taken during the interview sessions and most of the interviews were digitally recorded. However, due to certain business issues and confidentiality, some participants were reluctant to have a formal session and refused to be digitally recorded. In this case, soon after each interview was completed, the researcher summarized and reconfirmed all the points that had been highlighted by the respondents.

4.6.1.3 Interview data analysis

Generally, whenever possible, with the approval of the respondents, all the interviews were digitally recorded to ensure a full understanding. However, hence the objective of the preliminary interview to get general preliminary information on the subject being studies, no data analysis was made for study report. The in-depth interviews conducted in second and third interview stage were analysed but not fully transcribed, inasmuch as the main purpose of the research was not to have a full record of speech and transcript. Besides the digital recording of the interviews, the researcher also took written notes during the interviews. Then, all the field notes were used as a reference during the interview data analysis. After being transcribed, a draft was sent to the respondents for verification of the facts and comments. This was to verify the analysis made and to ask detailed questions for clarification. Subsequently, all the feedback was incorporated to refine the analysis. Moreover, the objectives of this process were to reduce researcher bias and increase the reliability of the results, which, ultimately, increase the internal consistency and content validity.

In order to triangulate and conclude the data collection derived from the interviews, cross-case analysis was made. This cross-case analysis was made by grouping the answers together from different persons with the common topics or questions from the interview guidelines (Patton, 1990). Then, the case study interviews were analysed through content analysis. Here, the content analysis was defined as a process of identifying, coding and categorizing the primary pattern of the data. This analysis also allowed the themes to emerge from the raw data (Cavana et al., 2001). In this research, NViVo8 software was used to code, categorize and analyse the content analysis.

4.6.2 Direct observation

Direct observation evidence is data collected from field visits and observation of meetings, sidewalk activities, and factory work, et cetera (Yin, 2003). The observations can range from formal, such as observation of meetings, to casual data collection activities, such as a field visit. The findings are usually useful in offering additional information to the research (Yin, 2003).

There are five important reasons for observation. First, it helps the researcher to obtain a comprehensive "picture" of the site and "a sense of setting", which cannot be gained by talking to people. Second, it provides a "rich description" for further analysis and interpretation. Third, it helps the researcher to understand the culture of the case company. Fourth, it enables the researcher to understand the experience of the interview respondents who are less articulate. And, finally, it helps the researcher to crosscheck and validate the data obtained from the interview (Simon, 2009).

4.6.2.1 Direct observation data collection

In this research, direct observation data collection was made through company presentations, meetings, field visits and during interviews. The opportunity for direct observations was made by frequent visits to the case study setting. In this research, the observation data were collected under three stages. The first stage started as soon as the researcher gained access to the case company through field visits. In this stage, the observation objectives were mainly to evaluate the social acceptance towards outsiders and to verify that the case company was conducting TCM. This observation mostly covered the organizational culture in terms of information sharing openness among workers, facilities and the equipment existing in the case company, and factory shop floor condition, et cetera. In this stage, informal and formal interaction with various levels of employee of the case company helped the researcher to understand the background culture of the case company.

After the basic concepts, themes and the main key respondents of TCM had been identified, the selection of observation sites were more selective and focused. Starting from the second stage observation, the observations were carried out in TCM related meetings and activities, such as quality gate meetings for each new product development stage, internal cost reduction meetings, cost reduction meetings with suppliers, monthly cost achievement meetings, daily meetings of the Cost Planning Department and many others. The objective of this stage was to clarify the TCM implementation process, issues and themes for strengthening and solidified strategies with others data collection methods. Finally, the last stage of observation was conducted after the results of the survey were finalized. The results were used as a base to re-observe and re-evaluate the TCM implementation process, issues and themes at the case company. At this stage, the continuation of the TCM activities after the mass production stage was also observed.

4.6.2.2 Direct observation data analysis

The observations were recorded in the field notes. Then, the observation findings were compared against the preliminary conceptual framework and theoretical framework. The initial findings from the observation were used as the guidelines to finalize the selection of enablers that support the TCM implementation. As highlighted in Chapter 2, there are many enablers highlighted by the previous studies. The initial observation findings helped the researcher to select the right enablers as the proposition before conducting the survey. Furthermore, the findings from the observation were used to understand the actual TCM implementation process conducted at the case company. For example, how the team members consult with one another to resolve issues, and how the issues relates to other stages. These findings were used to strengthen the conceptual framework for the TCM implementation process.

Nevertheless, the data analysis was developed simultaneously with the documentation and interview data collection. If there was any conflicting observation, it was compared with what had been highlighted by the respondents and written in the documents, the questions were raised during the interviews to obtain clarification from the key respondents.

4.6.3 Documentation

Documentation data evidence can be collected through agendas, announcements and minutes of meetings, written reports of events, and administrative documents, such as proposals, progress reports, and articles appearing in the mass media or in newspapers (Yin, 2003). Data sources from documents are very important to corroborate and enhance the evidence from other data sources. Documents help the researcher to verify spelling, names or titles mentioned in the interviews, and provide details to corroborate with other data sources. In addition, the inference from documents may lead to new questions and new findings (Yin, 2003).

4.6.3.1 Documentation data collection

In general, the documents were collected based on three stages. In the first stage, the documents collected were more general, which focused on the company background and overview of the TCM practice. Examples of the general documentation include company information from the case company official website, company quarterly magazines, press releases, newspaper and magazine articles.

The second and third stages of document collecting were mostly based on the TCM related matters, which involved the meetings attended by the researcher and the documents received during the interviews. However, for the third stage, the documents collected focused more on the new findings, especially to find relevant evidence relating to the survey results. With the consent of the case company, examples of documents collected in this stage included internal documents, such as cost achievement progress report, management presentation, slide presentations, cost reduction meeting minutes, and cost related activity reports and proposals. The researcher also received specific internal documents, such as TCM training material, TCM practices guidelines and TCM related standard working procedures. These documents were shown by the respondents during the interview sessions and meetings attended by the researcher. Upon receiving the internal documents, a brief explanation was made by the respondents. The researcher also re-analysed the internal documents before continuing with the subsequent interviews.

4.6.3.2 Documentation data analysis

All the documents were reviewed and summarized using the Document Summary Sheet. Appendix D shows the blank format sample of the Document Summary Sheet. By using the Document Summary Sheet, each main document was summarized into three main items: a brief description of the document, the significance of the document to the research and a summary of the document contents. Then, for easy data storage and retrieval, an annotated bibliography of these documents was established (Yin, 2003). Due to the large amount of documents, the documents were separated into a primary file and secondary file to categorize the importance of the database (Yin, 2003).

All the findings from the documentation were triangulated with the findings from the interviews and direct observation to strengthen the research findings and conclusions. These findings were combined and categorized to address the conceptual and theoretical frameworks. If any conflicting data or discrepancy occurred, the questions were raised during the next interview session or/and a short telephone interview was conducted to verify the discrepancy.

4.6.4 Data analysis method

Every case study analysis should have a general analytic strategy to define the priorities of what to analyse and for what reason. Three types of general analytic strategy are: 1) to follow the theoretical propositions, 2) to define and test rival explanation, and 3) to develop the case description. For a single case study, any of these strategies can be used with specific analytic techniques: pattern matching, explanation building, addressing rival explanations and logic models, for case study analysis (Yin, 2003). In this research, the data analysis was based on the conceptual and theoretical frameworks using the pattern matching technique.

4.6.4.1 Pattern matching

Pattern-matching plays an important role in case study research analysis. According to Yin (2003), five main elements should be considered in designing the case study: 1) research questions, 2) units of analysis, 3) propositions, 4) the logic linking the data to the propositions, and 5) the criteria for interpreting the findings. Pattern-matching is related to the last three elements. The pattern matching is conducted by comparing the empirical based pattern against the predicted pattern of the research (Yin, 2003). The basic steps of pattern matching are as follows. First is to develop the theory as a predicted or proposition before data collection. Second is to define the criteria use for data collection. Third is to compare the actual or empirical pattern with the predicted pattern based on the predetermined criteria. If the predicted pattern matches the actual pattern, a solid conclusion can be drawn (Yin, 2003).

For data analysis, this research relied on the conceptual and theoretical frameworks set prior to the data collection stage. After all the qualitative data had been coded, categorized and analysed, pattern matching was conducted. This started with developing the empirical pattern based on the collected data. Based on the research questions, two types of empirical pattern were developed, the TCM implementation process empirical pattern and the TCM enabler empirical pattern. For the TCM implementation process empirical pattern development, the collected data were arranged in a time-series empirical pattern chronology to match with TCM PDCA cycle stages. Then, the empirical pattern and conceptual pattern were matched by analysing the pattern in terms of what, who, when and how. For example, in each PDCA stage, "what the activities were" in the empirical pattern was matched against "what the activities should have been" in the conceptual pattern, "who had been involved" against "who should have been involved", "what methods had been used and how" against "what methods should have been and how" and "when the activities had been conducted" against "when the activities should have been conducted".

For the TCM enabler analysis, the TCM enabler empirical pattern and the predicted pattern or the theoretical propositions, were matched by analysing the pattern in terms of "what enablers existed" in the empirical pattern against "what enablers should have existed" in the predicted pattern. Each proposition was assessed separately. If the proposition was deemed to be satisfied, it was selected to be used in the survey questionnaire and tested statistically. If the proposition was not deemed to be satisfied, it was dropped from the survey items.

4.7 Quantitative approach

This section explains the quantitative approach in terms of development of the survey instrument, data collection procedures and data analysis method. The main objective of the questionnaire survey was to test statistically the enablers highlighted by the literature and identified during the qualitative data collection.

4.7.1 Survey

Yin (2003) posits that a survey facilitates a more structured interview, which can be designed as part of the case study to produce quantitative data. It follows the same method of sampling procedure, instruments and analysis as the normal survey method but with a different role. The findings from the survey are considered as one of the components of the overall assessment and not necessarily taken as the ultimate result in the assessment of the study (Yin, 2003). In this research, the survey questions were designed to generate quantitative data as part of the case study evidence. The survey questions were distributed to Company A's employees who were directly or indirectly involved with TCM.

4.7.1.1 Development of survey instrument

Generally, the questionnaires were adapted from previous research and were reconstructed to suit the research questions. Since there was a tendency for the survey questionnaire to be misunderstood, several stages were structured to obtain a comprehensive questionnaire. Then, the questionnaire was pre-tested by six academicians and three TCM practitioners. The objective was to rectify any questionnaires inadequacy and to ensure the content of the questionnaire was clear, relevant and easy to be understood before the questionnaires were distributed to the respondents at large. After receiving the feedback, the structure and wording of the questionnaire was revised including words that were ambiguous. Here, the researcher also added a few additional questions to make it more comprehensive. The questionnaire was not pilot-tested because most of the survey instrument was adapted from established existing research.

The survey questions were divided into three sections. The questions in section 1 were related to the proposed factors that support the TCM implementation. The questions in section 2 were related to the perceived successful implementation of TCM. The last section asked the respondents for demographic data. For the TCM enablers, the items used to operationalize the constructs were taken from previous researchers: Advanced Manufacturing Technology (AMT) implementation measurement adapted from Burgess and Gules (1998), confrontational strategy measurement adapted from Zahay and Griffin (2010), a customer orientation measurement adapted from Narver and Slater (1990), an information-sharing network measurement adapted from Chen et al. (2010), lean manufacturing implementation measurement adapted from Chenhall (1997), supplier relationship measurement adapted from Carr and Pearson (1999), a teamwork oriented organizational culture measurement adapted from Lynn and Akgun (2003), top management support and commitment measurement adapted from Krumweide (1998) and Anderson and Young (1999), and training measurement were adapted from Saraph et al. (1989) and Krumweide (1998). The variable of TCM successful implementation was measured by three dimensions – efficiency, marketability and cost reduction improvement. The measurements of TCM successful implementation were adapted from Huh et al. (2008). The constructs and the sources are summarized in the Table 4-2.

Table 4-2: Research constructs and sources

	Construct	Sources
A	***ADVANCED MANUFACTURING TECHNOLOGIES (AMT) IMPLEMENTATION***	
1	Computer Aided Engineering (CAE).	Burgess and Gules, 1998
2	Computer Aided Design (CAD).	
3	Computer Aided Manufacturing (CAM).	
4	Numerically-Controlled machines or tools (NC) (e.g. Parameter controller).	
5	Flexible manufacturing system.	
6	Robots.	
7	Computer Integrated Manufacturing (CIM).	
B	***CONFRONTATIONAL STRATEGY***	
1	Level of capacity utilization.	Zahay and Griffin, (2010)
2	Level of operating efficiency.	
3	Low overhead cost.	
4	Emphasis on finding ways to reduce production cost.	
5	Uniqueness of its products.	
6	Targeting clearly identified segment or segments.	
7	Offering products that are suitable for its price segment.	
8	Offering quality products.	
C	***CUSTOMER ORIENTATION***	
1	Customer commitment.	Narver and Slater, (1990)
2	Create customer value.	
3	Understand customer needs.	
4	Customer satisfaction objectives.	
5	Measure customer satisfaction.	
6	After sales services.	
D	***INFORMATION-SHARING NETWORK with business partners***	
1	Company shares exclusive information with its business partners.	Chen et al. (2010)
2	Company shares business knowledge of core business processes with its business partners.	
3	Company A and its business partners exchange information that helps in the establishment of business planning.	
4	Company A and its business partners keep each other informed about events or changes that may affect the other partners.	
5	Company A shares common information technology (software) to facilitate communication with its business partners.	
6	Information sharing on important issues is a critical element to maintain the business partnerships.	
7	Company A and its business partners share cost information that helps TCM performance.	
E	***LEAN MANUFACTURING IMPLEMENTATION***	

Table 4-2, continued

Construct		Sources
1	Programmes to improve the suppliers' quality and reliable delivery of materials and components.	Chenhall, (1997)
2	Programmes to reduce waste or non-value added activities throughout the production process.	
3	Programmes to reduce time delays in manufacturing and designing products (e.g. improve cycle time).	
4	Involvement of employees in quality improvement programmes (e.g. training, involvement in improvement teams).	
5	Involvement of Company A's department personnel (e.g. Manufacturing, R & D, and Marketing) in Company A's strategic planning.	
6	Developing close contact between manufacturing and customer (internal or external).	
7	Programmes to coordinate quality improvements between departments.	
F	***SUPPLIER RELATIONSHIP***	
1	Company A enters into special agreements with suppliers who have improved performance.	Carr and Pearson, (1999)
2	Company A is loyal to its key suppliers.	
3	Company A has very frequent face-to-face planning or communication with its key suppliers.	
4	There is high corporate level communication on important issues with key suppliers.	
5	There are direct computer to computer links with key suppliers.	
6	Purchasing Department can influence first tier supplier's responsiveness to the purchasing requirements.	
7	Company A supports its suppliers in production related matters.	
8	Company A works with its suppliers starting from the product development stage.	
G	***TEAMWORK CULTURE***	
1	TCM related members acknowledge conflict and work together to resolve issues on the team.	Lynn and Akgun (2003)
2	TCM related members help one another by sharing knowledge and information.	
3	TCM related members encourage diverse perspectives and different points of view from others in the team.	
4	TCM related members demonstrate interest and enthusiasm during team activities.	
5	TCM related members acknowledge the contributions made by others in the team.	
6	TCM related members are working together towards a unified goal.	
7	TCM related members freely share information (technical, market, etc.) with others in the team.	
8	Overall, TCM related members are very trustworthy.	
9	TCM related members are usually considerate of each other's feelings.	
10	TCM related members are friendly.	
11	I can rely on my TCM related members.	
H	***TOP MANAGEMENT SUPPORT AND COMMITMENT***	

Table 4-2, continued

	CONSTRUCT	SOURCES
1	In Company A, TCM receives strong and active support from the top management	Krumweide (1998)
2	Upper management in Company A provides adequate resources to the TCM implementation effort.	
3	TCM is closely tied to Company A's competitive strategies.	Anderson and Young (1998)
	Company A's management has provided visible support for the TCM initiatives.	
5	Support for implementing TCM in Company A comes from both the manufacturing operations and support groups.	
6	Support for implementing TCM in Company A is widespread.	
I	***TRAINING***	
1	Specific work-skill training (technical and vocational) is given throughout Company A.	Saraph, Benson &, Schroeder (1989)
2	Team building and group dynamics training is given to employees in Company A.	
3	Top management at Company A give commitment to employee training.	
4	Resources are available for employee training at Company A.	
5	Adequate training is provided for designing TCM at Company A.	Krumweide (1998)
6	Adequate training is provided for implementing TCM at Company A.	
7	Adequate training is provided for using TCM at Company A.	
J	***TCM SUCCESSFUL IMPLEMENTATION***	
I	***EFFICIENCY IMPROVEMENT***	
1	TCM implementation has resulted in efficiency in the 'design to cost'.	Huh et al. (2008)
2	TCM implementation has resulted in efficiency in strengthening the design or development process.	
3	TCM implementation has resulted in efficiency in cost reduction efforts by the engineers.	
4	TCM implementation has resulted in efficiency in improving design or development technology.	
5	Overall, the benefits of TCM outweigh the cost of installing a new method or system.	
II	***PRODUCT MARKETABILITY IMPROVEMENT***	
1	TCM implementation has resulted in an improvement in quality.	Huh et al. (2008)
2	TCM implementation has resulted in product features that suit the needs of the customer.	
3	TCM implementation has reduced the development lead time.	
4	TCM implementation has resulted in the timely introduction of new products.	
III	***COST REDUCTION IMPROVEMENT***	
1	TCM implementation has resulted in product cost reduction.	Huh et al. (2008)
2	TCM implementation has resulted in upstream cost reduction.	
3	TCM implementation has resulted in a reduction in purchased materials and raw materials.	
4	TCM implementation has resulted in waste reduction in the factory floor.	

The AMT implementation construct measured seven items: Computer Aided Engineering, Computer Aided Design, Computer Aided Manufacturing, Numerically-Controlled machines or tools, Flexible manufacturing system, Robotics and Computer Integrated Manufacturing (Burgess & Gules, 1998). All these items were measured using multiple seven-point Likert scales ranging from 1= “not at all” to 7= “To a great extent”.

The confrontational strategy was measured by eight items: level of capacity utilization, level of operating efficiency, low overhead cost, focus on finding ways to reduce cost, uniqueness of its products, targeting the identified segments, offering products that are suitable with it price segments and offering quality product (Zahay & Griffin, 2010). Original items were slightly modified to adapt with the research context. All these items were measured using multiple seven-point Likert scales ranging from 1= “not at all” to 7= “To a great extent”.

The customer orientation was measured by six items: customer commitments, create customer value, understand customer needs, customer satisfaction objectives, measure customer satisfaction and after sales services (Narver & Slater, 1990). All these items were measured using multiple seven-point Likert scales ranging from 1= “not at all” to 7= “To a great extent”.

Information-sharing network was measured by seven items: case company shares exclusive information with its business partners, case company shares business knowledge of core business processes with its business partners, case company exchanges information with its business partners for business planning purpose, both case company and its business partners keep each other informed about events or changes that may affect the other partners, case company shares common information technology to facilitate communication with its business partners, information sharing on important issues is a critical element to maintain the business partnerships, and case company and its business partners share cost information that helps TCM performance (Chen et al., 2010). The original items were slightly modified to adapt to the research context. All these items were measured using multiple seven-point Likert scales ranging from 1= "strongly disagree" to 7= "strongly agree".

The lean manufacturing construct was measured by seven items: programmes to improve the suppliers' quality and delivery, programmes to reduce waste or non-value added activities, programmes to reduce time delays in manufacturing and designing products, involvement of employees in quality improvement programmes, involvement of departments' personnel in company's strategic planning, developing close contact between manufacturing and customer, and quality improvements programmes between departments (Chenhall, 1997). All these items were measured using multiple seven-point Likert scales ranging from 1= "not at all" to 7= "To a great extent".

The supplier relationship construct was measured by eight items: case company enters into special agreements with suppliers who have improved performance, case company is loyal to its key suppliers, case company has very frequent face-to-face planning or communication with its key suppliers, high corporate level communication on important issues with key suppliers, direct computer to computer links with key suppliers, Purchasing Department capability to influence supplier's responsiveness to the case company's requirements, case company supports its suppliers in production related matters and case company works with its suppliers starting from the product development stage (Carr & Pearson, 1999). The original items were slightly modified to adapt to the research context. All these items were measured using multiple seven-point Likert scales ranging from 1= “strongly disagree” to 7= “strongly agree”.

Teamwork orientation organization culture was measured by eleven items: TCM related members acknowledge conflict and work together to resolve issues, TCM related members help one another by sharing knowledge and information, TCM related members encourage diverse perspectives and different points of view from team members, TCM related members demonstrate interest and enthusiasm during team activities, TCM related members acknowledge the contributions made by team members, TCM related members are working together towards a unified goal, TCM related members freely share information with team members, respondent feels the TCM related members are trustworthy, respondent feels that the TCM related members are usually considerate of each other’s feelings, respondent feels that the TCM related members are friendly and respondent feels the TCM related members are reliable (Lynn & Akgun, 2003). Original items were slightly modified to adapt to the research context. All these items were measured using multiple seven-point Likert scales ranging from 1= “strongly disagree” to 7= “strongly agree”.

The top management support and commitment construct was measured by six items: TCM receives strong and active support from the top management, upper management provides adequate resources to the TCM implementation, TCM is closely tied to case company’s competitive strategies, management has provided visible support for the TCM initiatives, TCM practice receives support from manufacturing operations and support groups, and TCM practice received company wide support (Krumweide,1998; Anderson and Young, 1998). The original items were slightly modified to adapt to the research context. All these items were measured using multiple seven-point Likert scales ranging from 1= “strongly disagree” to 7= “strongly agree”.

The training construct was measured by seven items: specific work-skill training (technical and vocational) is given throughout company, team building and group dynamics training is given to employees, top management’s commitment to employee training, resources are available for employees training, adequate training is provided for designing TCM, adequate training is provided for implementing TCM, adequate training is provided for using TCM (Krumweide, 1998; Saraph, Benson &, Schroeder, 1989). Original items were slightly modified to adapt to the research context. All these items were measured using multiple seven-point Likert scales ranging from 1= “strongly disagree” to 7= “strongly agree”.

TCM successful implementation was operationalized by three performance dimensions: design and development efficiency improvement, product marketability improvement and cost reduction improvement. All these items were measured by seven-point Likert scales ranging from 1= “strongly disagree” to 7= “strongly agree”. The original items were slightly modified to adapt to the research context. Design and development efficiency improvement was measured by five items, which assessed the TCM performance on efficiency improvement in terms of: “design to cost”, strengthening the design or development process, cost reduction efforts by the engineers, improving design or development technology and the benefits of TCM outweigh the cost of installing a new method or system. Product marketability improvement was measured by four items, which assessed the TCM performance on marketability improvement in terms of: quality, product features that suit the needs of the customer, reduction in development lead time and timely introduction of new products. Cost reduction improvement was measured by four items, which assessed the TCM performance on cost reduction improvement in terms of: product, upstream processes, purchased materials and raw materials, and waste on the factory floor (Huh et al., 2008).

4.7.1.2 Survey data collection

Even though the Company A has around 10,000 employees, through the initial qualitative data collection, it was identified that only a few departments and personnel were directly or indirectly involved with TCM in Company A. In general, the total number of direct and indirect TCM users was less than 200 personnel. Departments such as Cost Planning, Product Marketing, Research and Development, Purchasing and Vendor Development, Product Planning were considered as the directly involved with TCM because of their high involvement in TCM processes. As for Accounting and Vendor Improvement Department, it was considered as indirectly involved with TCM due to their low involvement in TCM processes. In spite of their low involvement, these departments were still likely to recognize the necessary enablers that support the successful implementation of TCM at Company A. No questionnaires were distributed to departments that did not have any involvement with TCM processes. According to Cavana et al. (2000), "As a rule of thumb, sample size between 30 and 500 could be effective depending on the type of sampling design used and research question investigated" (Cavana et al., 2000, p. 280). Considering the small population of Company A's employees who directly or indirectly involved in TCM, only onehundred sets of survey questionnaires in printed booklet form were distributed to the respondents by the researcher herself and by the researcher's contacts. A cover letter from the researcher was attached with the survey questionnaires ensuring anonymity and confidential of the respondents. The following items were included in the survey booklet:

1. Survey cover letter (Refer to Appendix F)
2. Explanation of study and terms used and how to answer the questionnaire (Refer to Appendix G)
3. Survey form (Refer to Appendix H)

The respondents provided their feedback to the survey questions in the printed booklet. For all the survey questions, a seven-point Likert scale was used to rate the respondents' feedback on the measurement items. The scale was anchored on the low end by "not at all or strongly disagree" and high end by "To a great extent or strongly agree". Under each group of measurement variables, a free space column was also provided for respondents to include any additional remarks. These remarks were considered as part of the respondents' feedback and quoted as qualitative findings.

Considering the range of the survey questions, the survey was distributed to respondents for a one-week period to allow adequate time for completion. Once completed, the survey was submitted to the designated collection areas and collected by the researcher and researcher's contacts. In this way, the researcher had no knowledge as to which respondent gave which survey response and anonymity was guaranteed. With the researcher's contacts assistance, almost all respondents managed to submit the feedback within the designated period. Nevertheless there were less than 10 percent of respondents who did not reply on the stipulated time. Through researcher's contacts, it was known that non-replied respondents' reason was too busy with current tasks to complete a survey. This confirmation was important to avoid non- bias response issue. For non-replied respondents, no further follow up was made to the respondents because the replied rate almost reached 90 per cent.

4.7.1.3 Survey data analysis

For data analysis, all the questions were coded into code numbers as listed in Appendix I. Then, all the survey results were input into an Excel spreadsheet based on these codes before transferring it into Statistical Package for Social Science (SPSS) Version 18 and Smart Partial Least Squares (PLS) Version 2.0 for detail statistical analysis. SPSS was used to analyse the demography of the respondents, whereas PLS was used to statistically test the TCM enablers. PLS is a multiple regression method for testing models with multiple item constructs. It is useful when the factors are many, there are many missing data, they are highly collinear and the sample size is relatively small. Furthermore, PLS is a suitable methodology for exploratory research and model testing (Kwun & Alshare, 2007). Hulland (1999) contends that compared with PLS, LISTERL, a well-known causal modelling technique, is poorly suited for small data sample sizes as it results in improper solutions in some cases. In conjunction with this, he advocated that PLS is a suitable method to counter small data sample issues (Hulland, 1999). Hence, as this research has 80 measurements aggregated into 10 groups, PLS was the appropriate method to test the model.

The data will be assessed in two stages. The first stage is the measurement model assessment. In this stage, the purpose is to evaluate the reliability and validity of the constructs and indicators. The data will be assessed in terms of indicator reliability, internal consistency reliability, convergent validity and discriminant validity (Henseler, Ringle, & Sinkovics, 2009). The second stage is structural model assessment. The structural model visualizes the relationship between the exogenous and endogenous variables by using the path diagram. Then, the data will be assessed in terms of path coefficient, t-value and R^2 by using bootstrapping procedures (Henseler, Ringle, & Sinkovics, 2009).

4.8 Validity and reliability issues

The quality of the social research design can be evaluated using four common tests – construct validity, internal validity, external validity and reliability. By integrating these tests in the research design, readers will have the confidence in the process of the investigation, data analysis, data interpretation and the findings (Yin, 2003). In case study research design, these tests are applied from the design stage until the data conclusion stage (Yin, 2003). This section discusses the validity and reliability issues and the approaches used to address the issues.

4.8.1 Construct validity

In case study research, there are three tactics to increase the construct validity. First is the use of multiple sources of evidence during the data collection. Data triangulation can be achieved by corroborating the same phenomena and data from multiple sources. "With data triangulation, the potential problems of construct validity can also be addressed because the multiple sources of evidence essentially provide multiple measures of the same phenomenon" (Yin, 2009, p. 117). Second is to establish a chain of evidence during the data collection. Third is to have the draft of the case study report to be reviewed by the key informants (Yin, 2003). Regarding validation of the respondent, Simons (2009) posits that this allows the individual to validate whether they have been presented fairly and accurately, and to decide the credibility of the interpretation. However, the researcher still needs to cross check with other data sources and have criteria as a guideline to decide whether the respondents' responses are worth (Simon, 2009).

In this research, multiple data sources were used and data collections were taken in a few stages and organized to increase the construct validity. The objectives were to produce more robust findings and interpretations. Then, in order to establish the chain of evidence, data verification processes were conducted in each data collection method. For interview data collection verification, the researcher summarized the field notes before ending each interview and concluded the main findings with the respondents in order to obtain the initial confirmation. Then, after transcribing the interviews, the written summaries were given to the respondents to validate the content interpretation. For the document data collection verification, the collected data from documents, such as newspaper articles, company documents, and meeting minutes, were also discussed during the interviews sessions. For the observation data collection verification, the findings were discussed with the main key respondents and related members of the event being observed and were discussed with the interviewees during the interview sessions. In this way, the results of all data collection findings were crosschecked closely for triangulation. If inconsistent results were detected, additional individuals were interviewed or additional company documents and information were collected to resolve it. However, if inconsistent and inaccurate information issues were unable to be resolved, it was omitted from the findings. After concluding the study, a copy of the case report was given to a few key informants for review.

4.8.2 Internal validity

Internal validity is developed by establishing the causal relationship by showing certain conditions that lead to other conditions. This is to differentiate it from a spurious relationship. In the case study data analysis, pattern matching is one of the techniques to increase the internal validity. The empirical based pattern is compared against the predicted pattern of the research. If the patterns match, the results help to strengthen the internal validity of the case study (Yin, 2003).

In this research, pattern matching was conducted to increase the internal validity. Pattern matching was developed through a few steps. First, for the purpose of benchmarking, two predicted patterns were made, a conceptual framework of the TCM implementation process and a theoretical proposition of successful TCM enablers. Second, all the qualitative data collected on the TCM implementation process and TCM enablers were organized in empirical patterns. Finally, the empirical patterns and the predicted patterns were compared by analysing whether they were in line with one another based on predefined criteria. Generally, what, who, when and how were used as the criteria for analysis comparison. This helps to conduct a more comprehensive analysis on the TCM implementation process and key enablers for successful implementation of TCM.

4.8.3 External validity

External validity is to test "whether a study's findings are generalizable beyond the immediate case study" (Yin, 2003, p. 37). Yin (2003) emphasizes that a statistical generalization is possible in survey research where the sample can be generalized to a larger universe. However, for case studies, a statistical generalization is not possible due to the purposefully small sample to examine a phenomenon in-depth. Thus, for case studies the generalization relies on analytic generalization. Analytic generalization is generalization in "which a previously developed theory is used as a template with which to compare the empirical results of the case study. If two or more cases are shown to support the same theory, replication may be claimed" (Yin, 2003, p. 33). In case studies, a complete research design represents the "theory" of what is being studied (Yin, 2003). In addition, according to Cavana et al. (2001), case studies can only be replicated to organizations that have a similar situation in terms of the nature of the problem and problem definition.

In order to allow successful transferability, from this research study context to a reader's present context, the researcher provided thick descriptions of the research for the purpose of reference and comparison. The early section of this chapter explained the underlying theory development of this research in detail, such as how the case study site selection was made, how the conceptual and theoretical frameworks were developed, how the data collection instrument was developed, and how the samples were selected. This information will help readers to make decisions regarding how closely the contexts may or may not match.

4.8.4 Reliability

The reliability test is to ensure other researchers can derive the same findings by following the same research procedures outlined by the original researcher. The objective of the reliability test is to minimize the biases and errors. By properly documenting the procedures of the case study and making the steps as operational as possible, other researchers can repeat the process and gain the same results. In addition, reliability can be increased by using the case study protocol (Yin, 2003).

Regarding the researcher's bias and respondent bias issues, the researcher admits there might be a possibility of bias between the researcher and the study contexts in terms of the organization, the organization members and the issues related to the study. In order to reduce the bias, the researcher did her best to minimize the effect of the relationship by integrating the opinions from various departments. As one of the respondent bias countermeasures, the study was conducted over a long period of about 22 months. This allowed the respondents to be more relaxed and behave naturally (Cavana et al., 2000). Furthermore, the researcher also performed case study protocol. This protocol helped the researcher to carry out data collection by focusing on the case study subject and anticipate the case study problems. The overview of the case study protocol was covered in section 4.4.

4.9 Summary

This chapter depicted the research design used to investigate the TCM implementation process, possible causes of the differences, and the key enablers that have a positive association with the successful implementation of TCM. It covered the justification for using a single embedded case study, selection of the research site and the research design activities conducted in terms of instrument development, data collection and data analysis. This chapter also explained the approach taken to handle the validity and reliability issues.

In this research, a case study was selected as the research method mainly because it was the most appropriate approach to uncover the research questions. Since the development of TCM in Malaysia is still new and TCM is environment specific (Feil, Yook, & Kim, 2004; Nishimura, 2005), the TCM implementation at Company A can be considered as a unique case. Moreover, considering the size of the organization and its market share, and its strategic alliance with a Japanese automotive company, this company offered a unique environment and the best site for data collection. Accordingly, this research used a single embedded case study with Company A's employees as the subunit. The main objective of the subunit was to understand in-depth the critical enablers that support the successful implementation of TCM.

This case study research was based on Yin's (2003) positivism case study method in which the data were collected through multi-source collection mainly through interviews, document review, direct observation and survey. This helps to increase the validity through data triangulation. To understand the TCM practice at the case company, the data were collected using the qualitative approach. Then, the analysis was made by comparing the empirical patterns with the predicted patterns from conceptual and theoretical frameworks by using the pattern matching method. For the enablers of TCM, the data were collected using the qualitative approach and then re-collected using the quantitative approach. Then, the survey was analysed using SPPS and PLS applications.

The findings of the TCM implementation process and its enablers will be explained separately under the qualitative findings and quantitative findings in Chapters 5 and 6, respectively. Chapter 5 will discuss the qualitative findings of the TCM implementation process, and the qualitative assessment of the each TCM enablers. Then, Chapter 6 will discuss the statistical analysis of the TCM enablers.

CHAPTER 5: QUALITATIVE FINDINGS

5.1 Introduction

This chapter discusses the qualitative findings of this research. Accordingly, this chapter synthesizes the qualitative data collected from the interview, documents and direct observations to identify how TCM is being practiced and to assess the enablers that support the successful implementation of TCM. The conceptual framework for the TCM implementation process and TCM enablers' theoretical framework are used as guidance for the data analysis.

The organization of the chapter is as follows. The first section discusses and analyses the profile of the interview respondents. The next two sections answer the research question one: (1) How do the TCM practices in a typical Malaysian automotive company differ from the Japanese automotive companies' TCM model?, and research question two: (2) Why do the differences in TCM occur?. It starts with the discussion on the development history of TCM at Company A. This section describes and discusses the perspective of TCM from Company A's viewpoint. The following section discusses the qualitative findings concerning the overall TCM implementation process at Company A guided by the PDCA cycle stages and seven main process steps, as outlined in the conceptual framework. Under each step, the explanation of Company A's TCM practice is provided. This is followed by the analysis of the comparison against the conceptual framework.

Then, the following section answers the third research question three: (3) Which enablers are perceived by the TCM users of a typical Malaysian automotive company as the critical enablers that have a positive association with the successful implementation of

TCM?. However, the assessment only focuses on nine key constructs: (1) Advanced Manufacturing Technology (AMT) implementation, (2) confrontational strategy, (3) a customer orientation, (4) an information-sharing network, (5) lean manufacturing implementation, (6) supplier relationships, (7) a teamwork oriented organizational culture, (8) top management support and commitment and (9) training. Although other factors were also identified during the qualitative data collections, those factors were omitted from discussion. This omission was made due to inconsistency of information provided by the respondents and lack of supporting evidence. Finally, this chapter also discusses the respondents' opinions concerning their perceived successful implementation of TCM in terms of cost reduction improvement, design and development efficiency improvement, and marketability improvement.

5.2 Interview respondents' profile

As shown in Table 5-1, the interviews covered various managerial levels within the Company A from different departments, including technical staff, lower management, middle management and top management who were involved with TCM. The respondents were selected based on purposive sampling method through the introduction of researcher's contacts and other respondents' reference. This helped the researcher to focus on the specific target group with confined key respondents who were expert in the research topic (Boeije, 2010; Cavana et al., 2000). In total, there were 24 respondents and 24 interview sessions, which, on average, lasted 1 to 2 hours for each session. Most of the informants were male. It was impossible to do gender balancing in the respondent selection as the population in the automotive industry is male dominated. In average, the respondents had 10 years of working experience. In order to preserve the anonymity of the respondents, code numbers were used to represent each respondent. Details of each interview session and the respondent profiles are attached in Appendix E.

Table 5-1: Interview respondents

Dept.	Total	Code	Position	Average Duration
Account	Respondent 1 Interview 1	Informant 7	Middle management	1 hour
Cost Control	Respondent 2 Interview 2	Informant 11 Informant 24	Middle management Middle management	1.5 hours
Cost Planning	Respondent 9 Interview 9	Informant 6 Informant 8 Informant 9 Informant 10 Informant 18 Informant 13 Informant 14 Informant 15 Informant 16	Middle management Middle management Middle management Top management Middle management Lower Management Technical Staff Technical Staff Technical Staff	2 hours
Product Marketing Department	Respondent 1 Interview 1	Informant 3	Lower management	1 hour
Product Planning Department	Respondent 1 Interview 1	Informant 2	Middle management	2 Hours
Purchasing & Vendor Development	Respondent 3 Interview 3	Informant 1 Informant 5 Informant 22	Middle management Technical staff Technical staff	1.5 hours
R& D (Designer)	Respondent 3 Interview 3	Informant 4 Informant 17 Informant 12	Middle management Lower management Middle management	1.5 hours
Suppliers	Respondent 4 Interview 4	Informant 20 Informant 19 Informant 23 Informant 21	Middle management Top management Middle Management Middle management	1 hour

In describing the results, data are presented with direct quotations to demonstrate trends and variability of opinions. Due to the confidentiality issues, anonymity was maintained to protect the real case and actual participants. The positions of respondent are mentioned but only under general classifications, which are technical staff, lower management, middle management, and top management. However, the respondents' departments are mentioned to demonstrate the tendency and variation of the respondents' answers based on the department.

5.3 History of TCM implementation at Company A

Company A is a Malaysian-Japanese joint venture (JV) company, which was established in the early 1990s. Since its establishment, many Japanese expatriates from Company A's joint venture companies have worked at Company A. According to the internal sources, the concept of TCM was taught by the Japanese expatriates to the management of Company A in the early years of the company's establishment.

The case company has implemented TCM since its establishment. The development of TCM at the case company was a gradually embedded process rather than a drastic embedded process. The implementation of TCM started from cost reduction activities through localization activities and negotiation activities of existing purchased parts. Then, the cost reduction activities expanded to "design to cost" at the design stage to secure profit for its new products. Nevertheless, the TCM activities at Company A could be considered as an evolving process with continuous improvement rather than a rigid and fixed method. This is because a project review post mortem was conducted after each new product started its mass production. From here, the TCM process issues were extracted, the improvements or the counter measures were planned for the next new product. According to the internal sources, these improvements only changed and improved the TCM activities in terms of how to achieve the target cost. No changes were made to the fundamental concept of TCM.

5.3.1 TCM implementation stages

In general, the TCM implementation at Company A could be divided into two stages: (1) the period before the re-structuring of Company A and (2) the period after the re-structuring of Company A.

5.3.1.1 Period before the re-structuring of Company A.

In the early years of Company A's establishment, all vehicles manufactured at Company A were fully developed by Company M. Company M is a Japanese automotive manufacturer and one of Company A's joint ventures partners. Company A only introduced a few small design changes to the exterior upper body of the predecessor product to meet the Malaysian markets, such as changing the front, rear bumper and back door.

Before the re-structuring of Company A, TCM activities were conducted but to a limited extent through cost reduction activities of localization and negotiation with suppliers. Localization means changing the sourcing of parts from CKD, imported from Japan, to locally produced parts. Through localization of activities, Company A helped to increase the demand for local parts and reduced the foreign exchange impact of the CKD parts. Nevertheless, in the initial stage, the target cost setting of the local parts was flexible and less rigid. This was because the main objective of localization activities was to get the cost savings compared to its original CKD parts cost. The localization would be implemented if the cost of the local candidate supplier's parts were lower than the cost of the CKD parts and passed the local parts testing. The localization activities from setting the target cost until negotiation with suppliers were highly segmented on a departmental basis. For example, the Cost Control Department under the Accounting Division focused on setting the target cost and monitored the cost level of the vehicle, the R&D Department focused on the technical aspects of the parts, and the Purchasing and Vendor Development Department focused on the part cost negotiation with suppliers. As commented by Product Marketing personnel, before the re-structuring of Company A, TCM was less integrated:

> *… (Previously) certain departments or certain groups doing their tasks process by process. After completed one process, second process continues. Now, first process and second process (for example), there are so called joined, integrated or simultaneous activities. That is a new improvement. (Informant 3, Lower management, Product Marketing Dept.).*

It can be concluded that before the re-structuring of Company A, TCM activities were implemented to some extent but they were not formally centralized, they were non-simultaneous and the activities were very limited.

5.3.1.2 Period after the re-structuring of Company A

At the end of 2001, Company A was restructured in order to prepare the company to enhance its capabilities and competitiveness towards the challenges arising from liberalization of the AFTA market. Under this re-structuring, Company A4 was established as a subsidiary that fully controlled the manufacturing operations of Company A with the majority of the shares being under its Japanese partners. Consequently, this re-structuring triggered the full reinforcement of the TCM implementation with the re-establishment of the Cost Planning Section. At Company A, "Cost Planning" was a common term used to represent the TCM.

Before the restructuring, the Cost Planning Section was already established but only as a small section under the Product Planning Department in the R&D Division. The re-structuring separated the Cost Planning Section from the R&D Division and re-established the Cost Planning Department under the Corporate Planning Division. Since the restructuring, the head of the Cost Planning Department was led by a Japanese expatriate from Company M. Under this re-structuring the new functions of the Cost Planning Department were to coordinate the entire activity plan for the Cost Planning activities, to summarize the profitability and cost estimation of the whole vehicle, to determine the cost estimation of the internal parts that is mutually agreed by all related departments, to propose an overall target cost and its distribution to the respective departments, to set up a standard cost table for the entire company's usage and to promote knowledge to the personnel directly involved in the development of parts. In general, the main function of the Cost Planning Department was to plan and conduct the cost planning activities or TCM activities for securing the new model's profit.

In the early stage, after the establishment of the Cost Planning Department, the TCM activities more focused on the cost reduction of purchased parts for existing products, in-house cost, warranty cost, overhead cost and logistics cost. Under the purchased part cost, the cost reduction activities were localization activities, VE and negotiation of discount. Furthermore, Company A's products only involved small design changes compared to its predecessor products. Thus, less emphasis was made to reduce the cost through product design in the design and development stage.

Starting from the second half of 2002 onwards with the development of passenger car, Model X (the predecessor product of model X1), Company A gradually produced products in which most of the upper body parts were developed by Company A. Subsequently, the TCM activities gradually started to focus on cost reduction through product design in the design and development stage.

In early 2011, the Cost Planning Department, Cost Control Department and Cost Management Department were centralized under the Accounting Division to strengthen the cost related activities of Company A. Cost Planning Department was responsible for the cost of the new products, Cost Management Department was responsible for the overall cost reduction of existing products, and Cost Control Department was responsible for the manufacturing cost of the existing products. Later, at the end of 2012, Company A started to make major organizational changes by integrating a few functions and departments under the Research and Development Division. These organizational changes also involved the Product Marketing Department, Purchasing and Vendor Development Department and the Cost Planning Department. The main objective for the re-structuring of the organization was to strengthen Company A's product design and development.

The re-structuring of the organization impacted on the TCM practice in terms of the roles and responsibility of the departments involved and the accuracy of the cost estimation. For example, in the early establishment of the Cost Planning Department, one of its responsibilities was to estimate the cost of the purchased parts. This was because in the early stages, most of the cost reduction activities for the purchased parts focused on localization. Thus, the target cost was mainly derived from the CKD cost level. This cost information could only be obtained by the Cost Planning Department from its counterpart at Company M. Later, as the TCM developed, the estimation was done together with other TCM members from the Purchasing and Vendor Development Department and R&D Department. The main objective was to obtain a more realistic estimated cost for the purchased parts. Nevertheless, this estimation was based on the current cost level information of the existing products' purchased parts. From here, cost reduction target was imposed to meet the target cost. Generally, the purchased parts target cost setting at the Company A was based on the combination method. However, at the end of the research, the case company started to implement the top-down method in setting the target cost for its new products (other than Model X1 and Model X2). In the top-down method, the target cost of purchased parts cost was set based on the benchmark costs of Company M's products to meet the global competitive level. This new target cost setting method was anchored by the R&D Department.

The TCM activities at the case company were an evolving process with gradual improvement. Generally, after the end of each project, the TCM activities were reviewed and the improvement would be implemented for the next new product development. Nevertheless, for each project the basic concept of TCM was the same, except the strategies or methods used to set, achieve and monitor the target cost. For example during the Model X, since Company A had just started to produce most of the upper body parts, huge investment was made for in-house facilities, and high development costs for technical support. Thus, besides the monitoring of the cost of the purchased parts, management also focused on monitoring the development and investment costs. However, since Model X1, a full model change of Model X, the focus was solely on monitoring the cost of the local purchased parts because it was the major contributor to the vehicle cost. Furthermore, since the in-house facilities already existed, less new investment was made for the development of Model X1. Furthermore, in terms of the purchase parts, as the information became available, more solid and realistic methods were used to set the target cost of the purchased parts.

5.3.2 Why Company A started to fully implement TCM

There were two main reasons as to why the Company A started to implement TCM fully. First was to remain profitable by preparing the company for tough competition after AFTA. Company A recognized that the liberalization of the automotive market made the market more competitive. Since the re-structuring, Company A already started to equip itself towards the challenges of AFTA with the specific mission to achieve certain targets in the Customer Satisfaction Index (CSI), cost reduction and market share by launching the "Triple T" Vision (pseudonym). This vision helped to give awareness to all employees about the company's direction. As commented by the respondents, the main objective of TCM implementation was for profit planning, which helped the company to remain profitable against stiff automotive market competition.

> *I think the reason (of TCM implementation) may be because competition is getting very stiff. We have to make sure we achieve the overall profit that we want…TCM will determine the profit of the company. (Informant 2, Middle management, Product Planning Dept.)*
>
> *Cost Planning (TCM) is for Profit Planning. If P2 doesn't have Cost Planning (TCM activities) I think it is quite tough, difficult to plan profit especially for new models. (Informant 6, Middle management, Cost Planning Dept.)*
>
> *I think it (the TCM implementation) is in line with the management's profitability targets. I believe when you want to have a profit, of course you have to see in many different angles for example like raw material process whether you are competitive or not. And I think with the bigger volume of exclusive parts, you must ensure that the actual overall yield is feasible. (Informant 4, Middle management, R&D Dept.).*

The second reason was because of the new management direction after the restructuring of Company A. Since its restructuring, Company M is the main shareholder of Company A4 that controlled the manufacturing operation. Accordingly, the Cost Planning Section was also re-established in the same year to strengthen the TCM activities. As commented by the R&D middle management:

> *... To say that Company M is 100% actual push factor (to implement TCM) is not correct. Actually, management (Company A) wants it. But Company M assists in terms of how and of course they would implement how it is done in Japan and transfer it here. (Informant 4, Middle management, R&D Dept.).*

Nevertheless, Company M played a main role in triggering the implementation and influencing the practice of TCM in Company A. In fact, since its restructuring, the Cost Planning Department was led by the Japanese managers. Thus, most of the TCM methods were copied from Company M. Furthermore, prerequisite for any project to start is to receive an approval from Company M. This was because Company A relied on the technical aspect from Company M and Company M was among the main shareholders of Company A. Accordingly, the direction or the strategies planned must be in line with the direction of Company M. On the question of how Company M influenced the Company A's TCM practice, the Cost Planning middle management commented that:

> *Company A's Cost Planning (TCM) activities have a lot of influence from Company M. Company M's Cost Planning (TCM) way is changing. Accordingly, Company A way is also changing (follow Company M). Project by project Company M's (Cost Planning/TCM) direction is actually different. Actually, the project approval has to get approved both from Company A and Company M (top management). Especially, Company M has lots of*

power. If direction is against the Company M's direction, the project cannot get approval from Company M. So, whenever we propose a project, we need to understand the Company M's (Cost Planning) direction. (Informant 6, Middle management, Cost Planning Dept.).

Company A relied on the support of Company M for TCM implementation. This was because the personnel in the Cost Planning Department, the Department that anchored the TCM activities, were still new and had limited TCM experience. Furthermore, most of the personnel were engineers with limited background of accounting knowledge. Additionally, the high turnover rate of the Cost Planning personnel meant that the knowledge of the TCM was not retained. As commented by the middle management of R&D Department,

Company M's management or Company M's intervention also comes into the picture because we can say that our Cost Planning (CP) Department is still young, and in that sense Company M has a stronger hand in that team. So, I would say and I would believe that actually Company M has quite a lot of say in this item. The original team under our CP (department) was dissolved. Because many left and then there was a new team. So, the development of the CP group itself is actually still not yet mature. So, because of that Company M still plays a bigger role. (Informant 4, Middle management, R&D Dept.)

It can be concluded that Company A started implementing TCM thoroughly because of the new management direction and to remain profitable after AFTA. However, the TCM practice was influenced by Company M as the shareholder and technical partner of Company A, the technology and the lack of knowhow of Company A's personnel.

5.3.3 TCM perceived definition

At Company A, TCM was known as Cost Planning. There were no documents found using TCM term and none of the respondents familiar with the TCM term. Since TCM concept was introduced by Company M, the Japanese ex-patriates at Company A called TCM as "*Genka kikaku*". As highlighted by the previous scholars (Sakurai, 1989; Feil, Yook, & Kim, 2004; Huh et al., 2008), there are various translations found to represent "*Genka kikaku*" such as Target Costing, Target Cost Management, Cost Planning and Cost Projection. In order to make the respondents more familiar and comfortable in each interview session, the TCM term was replaced with Cost Planning.

Generally, at Company A, Cost Planning was defined as an activity to plan and secure the new product's profit. As stated in the company documents, the Cost Planning activities were defined as:

> *An activity to secure the profit planning of all models (products), from the profit planning stage until the phase off stage (Source: Internal document).*

However, even though all the respondents acknowledged the Cost Planning activities definition in the company's documents, the individual respondents' definitions of Cost Planning varied. In the interviews conducted with the Cost Planning Department personnel who were directly involved in TCM, their definitions of Cost Planning or TCM were as follows.

> *Cost Planning (TCM) is an activity to achieve the target profit. (Informant 18, Middle Management, Cost Planning Dept.).*

Cost Planning (TCM) is an activity conducted to achieve the target cost set. (But) Most of our activities are focused on achieving target cost not target profit. By achieving target cost, automatically we achieve our target profit. (Informant 16, Technical staff, Cost Planning Dept.).

Cost planning is planning activities. How to achieve the targets based on what management wants and these targets not are necessarily in terms of numbers. (Informant 14, Technical staff, Cost Planning Dept.)

In explaining TCM, one of the respondents highlighted that each product had a few variants or grade types, such as basic, standard and high grade. Generally, Company A focused on the achievement of profitability for the overall portfolio. Nevertheless, certain variants might be produced even though the management knew from the planning stage that these variants would not be profitable. Similarly, Howard and Hebig (1996) also highlighted that the Japanese companies focused on portfolio profitability of all related products instead of focusing on the profitability of individual products. As commented by the respondent:

Cost Planning (TCM) is an activity to achieve the target profit and target cost agreed by the management. However, it does not mean that all variants of the models (products) are profitable. Some of the variants might have negative profit because the company has to produce it as a community service. (Informant 13, Lower management, Cost Planning Dept.)

In summary, the case company defined TCM as a tool to secure the profit. However, instead of focusing on the profitability of the individual variants, Company A focused on portfolio profitability. Furthermore, the TCM activities mainly focused on achieving the target cost in order to achieve the target profit set by the top management.

5.3.4 Perceived successful implementation of TCM

Besides profit, the TCM implementation helped the case company in terms of improved efficiency, marketability, and cost reduction. Regarding the improvement in efficiency, the target cost and target profit in TCM worked as specific goals for the employees, especially for the TCM members. As commented by a respondent, the targets in TCM had driven all the members in one direction who were striving to achieve it:

> *We set what we want and we work to get that. That's why the target is very important, in order for us to plan our activities or our concept or our ideas (Informant 3, Lower management, Product Marketing Dept.).*

TCM implementation also developed the members' knowledge by exposing them to a wider perspective of their job's value chain. For example, how their designs would impact the product life cycle cost and overall costs. This developed their creativity and increased the efficiency in design by cost.

> *My staffs have now learnt about the whole system. So, they are not only an engineer "by design" but they also "design by cost". So, that it is adding value to them. That is probably not a really direct benefit but it is a benefit (Informant 4, Middle management, R&D Dept.).*

In terms of marketability, TCM helped Company A to understand the customers' requirements and customers' priorities from the results of the market surveys. Accordingly, through tough trade off decisions due to the cost constraints, this market information helped the management to make the right decision by selecting the customers' most value added function.

During the Model Y, the Product Marketing proposed to have the split seat and gear shift at the Instrument Panel (IP)... Lastly, our Product Marketing agreed to take gear shift at IP because it has more priority (to the customer). (Informant 2, Middle management, Product Planning Dept.).

Regarding cost reduction, the TCM implementation process helped Company A's employees to be cost conscious. In every decision, they identified cost as the main priority:

...For example, like what my staff would usually do when there are problems. Usually they received "monren" parts with problems. Then, they do the analysis and they will approach me with a few options. For example like they have three kinds of counter measures, options A, B, and C. Options A, B and C will also be given some cost and lead time. We do not necessarily choose the cheapest, of course we will choose the best in terms of optimization of lead time, schedule and cost. But, the cost definitely plays a big role (Informant 4, Middle management, R&D Dept.).

Additionally, through the TCM activities, TCM members also learned how to estimate the cost of parts. This knowledge assisted the members to verify the suppliers' quoted price. This reduced the upstream cost and eventually reduced the total vehicle cost:

In an automotive industry like our company, every stage of development of the parts we have to check the cost level and verify. Are the technical changes valid or not? So we want to gain a win-win situation with our suppliers. If we don't have the target cost, what is the basis that we want to challenge the suppliers? (Informant 5, Technical staff, Purchasing & Vendor Development Dept.).

Suppliers do not simply throw their quotation in without any consideration. So, I think we can more or less control suppliers. Because we have our own basic calculation, we know the range where the cost should be. So, we can control our own overall vehicle cost and I think that will affect our overall profitability (Informant 4, Middle management, R&D Dept.).

Accordingly, the TCM implementation helped Company A to communicate its targets to the employees. Through TCM process implementation, TCM members learned the value chain of the tasks, the impact of their design to the cost, the right cost level of the parts, and the features most valued by the customers. These knowledge help to improve Company A's efficiency and marketability, and eliminate the unnecessary costs.

5.4 TCM implementation process at Company A

This section discusses the qualitative findings on the TCM practices, which were guided by the conceptual framework for the TCM implementation process. The data were obtained through interviews; company internal documents such as operation procedures, presentation materials and reports; and observations through several TCM related meetings attended by the researcher, such as cost reduction challenge meetings, morning meetings, and TCM quality gates meetings.

At Company A, the Cost Planning or TCM activities were considered as a part of New Product Development (NPD) activities. The NPD activities were planning activities for the development of new product which were anchored by the Product Planning Division of R&D business unit. Generally, at each major step of TCM implementation process, Company A sets a quality gate meeting. It functions as the checkpoints with certain criteria that need to be complied with. In each quality gate meeting, the decision to proceed to the next stage was decided by the top management. Since TCM was a part of NPD, some of the TCM quality gates were the same as those of the NPD.

For easy explanation, the TCM implementation process at Company A was narrated in PDCA stages with seven steps. However, even though the process was narrated in seven steps, the TCM process was actually very interactive and most of the activities happened simultaneously with the prior or next process because of simultaneous engineering. There are four steps under the Plan stage: (1) setting the target selling price, (2) setting the target profit, (3) setting the target cost, and (4) making the profitability feasibility study. The step under the Do stage or execution stage is cost reduction activities conducted to achieve the target cost. The step under the Check stage or monitoring stage is monitoring and reporting of the cost achievement status. The step under the Act stage or improvement stage is cost improvement. Then, under each step, the explanation is divided into two sections. The first section explains the TCM practice of Company A. The second section summarizes the differences of TCM practice in Company A compared to TCM conceptual framework shown in Figure 3-1 in Chapter 3.

5.4.1 Plan stage

This sub-section explains the activities conducted at the case company in the Plan or planning stage and compares the differences with the conceptual framework. There are four TCM steps under the Plan stage of the PDCA cycle: (1) setting the target-selling price, (2) setting the target profit, (3) setting the target cost, and (4) making the profitability feasibility study.

5.4.1.1 Step 1: Setting the target-selling price

a) TCM practice at Company A

The company used business planning and market survey information to set a realistic target-selling price. For smooth explanation, the major elements in setting the target-selling price are divided into three sub-sections: (i) business planning, (ii) market survey and (iii) setting the target-selling price.

i) Business planning

In general, Company A considered three main elements in setting the strategy for its future business plan which were market condition, company strategies and company resources. The market condition covered the economic and industrial condition including government policy, competitors' movement, and people's lifestyle, et cetera. Company strategies covered the business scale, profit, products positioning of the shareholder group, and brand strategy, et cetera. Company resources covered the development and production capability, sales network condition, and own technology, et cetera.

Company A made a long-term plan for its future product range. Agreement meetings were conducted with its JV partners before fixing the long range product planning. However, compared with previous years, this long-term product planning was reviewed frequently to reflect the latest market condition. This is due to the frequent changes in competitors' products and changes in government policy, such as fuel price and bank loan interest.

ii) Market survey

Company A made considerable efforts to understand the customers through various market surveys. The Product Marketing Department was responsible for the market research activities for the future products. Generally, there were three categories of surveys: (1) annual market survey of existing products, (2) future trend market survey, and (3) new product market survey. The annual market survey of existing products was conducted twice a year. The objectives were to understand the customer feedback on the existing products and to understand current market trends. The future trend market survey was conducted once a year. Company A used this information to understand the future market trend. A new product market survey is a survey conducted on the target market for each new product. However, before conducting the new product market survey, the product features and specifications assumptions were already set by the Product Marketing Department. These features and specifications assumptions were set based on previous analysis of the annual and future product market surveys. Nevertheless, not all the information was based on previous market surveys due to the time lag of updated market information. The competitors' products trend was also considered in deciding the new product features and specifications assumptions. The objective of new product market survey was mainly to verify the product features and specification assumptions of the new product. Therefore, the target market was sampled when the product was conceptualized to confirm the features and specification of the new product from the perspectives of potential customers only. Company A did not conduct the new market survey to find out the requirements of the potential customers concerning the new product features and specifications. As emphasized by the Product Marketing Department staff, the objective of the new product market survey was only to verify the features and specification assumptions that had been forecast by the marketing group.

> *We make some assumptions. Say we are going to make a new product, a limited version to the target customer. So, we make assumptions that the customer is female customer, for body colour they want some specific colour, and then they like some decoration, so that is our assumptions. And then with our assumption we go out and ask people. You will accept this colour or not? This colour is suitable for you or not? So we ask that kind of question. And once we get the result, then we can show that our assumption is correct. (Informant 3, Lower management, Product Marketing Dept.).*

Nevertheless, in finalizing the product specifications, priority was given to the items that were most valued by the customers based on the market research. A tough decision was made by trade off of some specifications with the best specification items that were valued by customers. As commented by the R&D middle management, customer value priority was the most important element in making decisions when finalizing the product specification:

> *… which is the priority, if I give this, you have to cost down or drop other part…sort like barter system...if you choose gear shift at IP(Instrument Panel) shift you cannot have split seat. You have to drop one because the cost is very high… Lastly, our Product Marketing agreed to take gear shift at IP because it has more priority (to the customer). (Informant 2, Middle management, Product Marketing Dept.)*

iii) Setting the selling price

Based on the internal and external input, and product features and specifications, the tentative target-selling price was set by the Product Marketing Department. This tentative selling price would be reviewed again before the product launching by analysing the latest product profitability status and market condition.

The Product Marketing Department conducted the Product Marketing Concept meeting, one of the quality gate meetings in NPD, to get the top management's approval to proceed with the project and approval of a tentative selling price. Due to the confidentiality of the issue, this meeting was only attended by the top management of certain related departments. In justifying the tentative selling price to the top management, the product price mapping was used to visualize and justify the product pricing against its competitors. The product price mapping tabled out similar products of the closest competitors, and Company

A's predecessor product and new product with its price ranges by variants. All products were clustered based on the brand and arranged on the X-axis. With the Y-axis as a price axis, each product brand was arranged in order based on the price of its grade types or variants (i.e. basic, standard, high or premium grade), engine capacity (i.e. 1.0 litre, 1.3 litres or 1.5 litres) and engine transmission (i.e. manual or automatic) type. A comparison between the predecessor product and the new product was also provided to show the new product features and specifications differences. This visualization helped the top management to easily understand the target market position, product price range position and current market status.

In this Product Marketing Concept meeting, the market share of existing products' against the Total Industry Vehicles (TIV), new product market strategy, target market, trend and movement of competitors' products, and projected volume were also presented to the top management. The justification for the introduction or development of a new product was also explained in detail to the top management. Generally, three types of justification were used: (1) to enhance the model line-up, (2) to increase or sustain volume, or (3) to improve profit. The predecessor product actual sales trend was used to support the justification. Company A did not use any computer system simulation to predict the sales volume, selling price or the model mix variant ratio.

Besides getting approval from Company A's top management, the product concept had to be approved by Company M's top management. This was because during the development and manufacturing side, Company A highly relied on Company M in respect of technical expertise. After receiving approval for the Project Marketing concept from both sets of top management, the project was allowed to go to the next stage in which more detailed studies were made by all the related departments.

The TCM activities or Cost Planning activities by the Cost Planning Department at Company A only started after the Product Marketing Concept approval meeting. From here onwards, the Cost Planning Department started to detail up the cost and profit simulation study and achievement scenario planning study.

b) Differences compared to the conceptual framework

In terms of setting the tentative selling price, conduct thorough market research, consider the internal and external factors in setting the selling price and using the business plan in introducing the new products, the case study findings supported the previous literature.

However, regarding the market survey, this research found one difference compared to the conceptual framework. Previous studies highlight that from the output of the market research, the Japanese companies determine the types of new product to be developed and the contents of the product features and specifications (Cooper & Slagmulder, 1999). In the case company, a new product market survey was conducted after the new product features and specifications were already conceptualized. Company A did not conduct a market survey to capture what features and specifications the customers' required in the new product. Instead, the objective of this new product market survey was only to verify or justify the prior assumptions concerning the new product features and specifications. This difference might due to the range of changes that could be made by Company A for the new product against its base or predecessor product. Since Company A used its joint venture's base product platform, the platform parts such as chassis, engine and transmission parts were carried over from its joint venture company's base product. Company A only customized the upper body of the product to suit Malaysian market's requirement in terms of styling, features and ride comfort. This limits the level of customer orientation in its new product development.

5.4.1.2 Step 2: Setting the target profit

a) TCM practice at Company A

The process of setting the target profit required many analyses and simulations. However, the case company did not use any computer simulation system to simulate the target profit. This target profit setting process was concurrent with the cost estimation and initial profitability feasibility study making process. Even though Company A had a company business plan based on the forecasted budget, Company A did not have a company-wide mid-term or long-term profit plan that considered future competitive planning like Daihatsu or target profit guidelines like Toyota, as highlighted in the literature (Kato, 1993; Lee & Monden, 1996; Okano, 2005). As commented by the Japanese ex-patriate of the Cost Planning Department, even though Company A had the business plan, the profit planning was calculated based on the profit level of existing products and did not consider the target profit level of future competitive products:

> *Company A does have 3 or 5 year business plans, which include profit planning. However, the profit planning was not officially authorized by our top management and not considered as our future plan. It was calculated based on current existing model profit, not considered future company targets. In this sense, I understand that this company does not have mid-term or long-term plan. But company must have long-term and mid-term profit planning. In*

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> *order to establish long-term profit planning, our company has to study how we want to be. This one we don't have (Informant 6, Middle management, Cost Planning Dept.).*

He further commented that the lack of information on the company profit planning caused the new product target profit setting to be based on the predecessor product's profit level with some adjustment:

> *...the profit target should be in line with the company direction. So, the company must have long-term or middle term profit planning for 3 years later. How much profit do we want to get, what expectation on each model, like this planning is nothing at this company. Even though we want to establish the profit target for a new project, we don't have any direction. So we have to study the profit target (by ourselves). So, one of the ways is to look at the existing model as a base (Informant 2, Middle management, Cost Planning Dept.)*

Based on financial accounting information, Company A studied the predecessor product's historical profit trend to set the target profit for the new product. A particular month of historical accounting statement or actual profitability was selected as the base profitability for the new product. The target profit per unit of the new product was set from the predecessor product's actual operating profit ratio per unit with some adjustment of profit increment and decrement considerations. Generally, it was set based on below formula:

New product target profit =
Predecessor product target profit – estimated profit decrement + estimated profit increment.

Estimated profit increment was an estimated profit gain from cost improvement activities. Whereas, profit decrement was an estimated profit loss due to unavoidable cost such as material price increment and foreign exchange rate increment. In order to justify the new product target profit level, Company A used the yearly average profit of the predecessor product and company business plan target profit, which was calculated based on the forecasted budget, as reference points. In the initial stage, the target profit setting only focused on one variant or grade type of the particular product as the representative variant. Normally, the representative variant was the variant that has the highest projected volume. Later, the target profit of other variants and weighted average target profit were also calculated and presented to the top management as references.

b) Differences compared to the conceptual framework

In general, this case study supports the previous literature findings in terms of the thorough analysis and simulation made to set the target profit. Previous studies (Lee & Monden, 1996; Cooper & Slagmulder, 1999; Kato et al., 1995; Okano, 2005) highlighted that the Japanese companies use various ways to set the target profit. This case study found that in setting the target profit, Company A used the predecessor product profit ratio from a particular month of historical accounting statement with some adjustments. Then, the yearly average of predecessor product profit level and business plan profit level were used as reference points to justify the target profit of the new product. This simple method was used due to the absence of mid-term or long-term profit planning, which considered the future competitive market condition and target profit guidelines information. Accordingly, the case company relied on financial accounting information as the main source of information for target profit setting.

5.4.1.3 Step 3: Setting the target cost

a) TCM practice at Company A

The process of target cost setting at Company A could be divided into three main elements: (i) setting the total target cost, (ii) calculate the estimated cost, and (iii) allocate the target cost. This activity was mainly anchored by the Cost Planning Department.

i) Setting the total target cost

The total target cost at Company A was set by deducting the target profit from the tentative selling price.

ii) Calculate the estimated cost

In TCM activities, the project assumptions were used as a guideline to estimate accurate total cost. Accordingly, before the calculation of the estimated cost started, the Product Planning Department set the project assumption. The project assumption was defined as a set of assumptions for a particular project development. These assumptions were set based on the company's direction, government policy, and market survey results and competitors threat. Examples of project assumptions were the timing of the base cost, model life, total sales volume, total cost planning volume, ratio of volume for each variant, and foreign exchange rates. For example, the foreign exchange rates project assumption was used to convert the imported material costs which were quoted in foreign currencies to the same rate of local currency value. Without locking the foreign exchange rates based on the project assumptions, the cost changes occurred at each development stage would include the foreign exchange rate fluctuation impact. This would distort the monitoring and reporting of the project related cost changes occurred at each development stages. Accordingly, in order to set realistic and accurate project assumption, the latest information input was necessary. As commented by Informant 2:

Input of latest data is important because I think Cost Planning (TCM) success depends on accurate assumptions. When we made Cost Planning (TCM), everything is based on assumptions. You make currency assumptions, material price assumptions, process assumptions, et cetera (Informant 2, Middle Management, Product Planning Dept.).

Based on these assumptions, all the related departments estimated the costs. Generally, these estimated costs were estimated based on current cost level such as current skill, experience and facilities. Then, these estimated costs were passed to the Cost Planning Department for total cost and profit simulation. These cost estimation activities involved the cooperation of many departments. For example, the new investment and development cost data were estimated by all the related departments, local part cost estimation was estimated together by R&D, Cost Planning, and Purchasing and Vendor Development Department, CKD parts cost was estimated by Company M, in-house cost was estimated by the Product Engineering Department, and other cost expenses were estimated by the Cost Planning Department based on the average historical accounting statements for particular periods that were received from the Accounting Department. All the estimated costs were compiled in a product profitability feasibility format to simulate the total estimated cost of the new product. Step 4 in the next section will explain the details of the profitability feasibility study.

For the new investment and development costs, all the related departments estimated their cost based on the initial product features and specification assumptions. Investment cost is the cost related to capital expenditure, while the development cost is the cost related to the operation expenses required to develop the new product. Then, the cost estimation was compiled by the Product Planning Department to obtain the total estimated investment and development cost. After that, each department went through several budget challenge meetings with the Chief Engineering (CE) to finalize their estimated investment and development cost. After the estimated costs had been finalized, the Product Planning Department submitted the cost information to the Cost Planning Department for calculation of the profitability feasibility study.

As for the local purchased parts, the parts were divided into exclusive parts and non-exclusive parts. The non-exclusive parts were also known as common parts. Parts were defined as common part if they were already existed and also used in other products. Thus, the cost of a common part was extracted from the current cost database and no cost estimation was made. While an exclusive part was defined as a part that was exclusively used in the new product. There were two categories of exclusive purchased parts. First category is a part that is developed specifically for the new vehicle product. This was also known as a new exclusive purchased part. Second category is an existing part that has engineering design changes specifically for the new vehicle product. This was also known as a new Engineering Changes Instruction (ECI) purchased parts.

Generally, Company A used two approaches to estimate these exclusive parts. The approach selection depended on the availability of the part cost information itself. Nevertheless, both estimation approaches were made based on the current cost level. The first approach was absolute cost estimation by using cost tables. However, this method was limited to certain manufacturing processes, such as plastic injection, stamping parts and machining parts due to the unavailability of the respective cost tables. The absolute cost estimation considered all the cost elements in manufacturing and delivery of the part, such as material cost, purchased part cost, manufacturing processing cost, transportation cost, tooling cost, packaging cost, profit and administration cost. The second approach was the differential cost estimation by calculating the specification cost changes compared to the existing part. For the model X1 project, both of these estimation approaches were calculated together by three departments – Cost Planning, R&D, and Purchasing and Vendor Development. However, for the functional parts that TCM members did not have the expertise or limited cost information, such as the wire harness, the case company relied on the estimation of the suppliers. Usually, for new exclusive parts, the estimated part cost was used as the target cost. Agreement meetings with Company M's R&D counterparts were conducted to finalize the target cost of each exclusive part.

As for the CKD parts, the cost estimation was done by Company M. As CKD parts cost were controlled by Company M, Company A only received the total cost of CKD parts by variants. For the target cost of the localization parts, or parts that changed sourcing from CKD to local, the absolute target cost was provided by Company M.

The Cost Planning Department compiled all the estimated costs and categorized them by cost item: in-house cost, local purchased parts cost, overhead cost, exclusive fixed cost, sales and distribution cost, tax and duty cost, project risk budget and CKD parts cost. The project risk budget consisted of the material increment budget and the Chief Engineer (CE) budget.

iii) Allocate the target cost

Normally, the total estimated cost was unable to meet the total target cost. Accordingly, the cost reduction target was planned to close the difference between the total estimated cost and total target cost. The total cost reduction target ratio was set by dividing the gap between total target cost and total estimated cost with the total estimated cost. Then, this cost reduction target was imposed to certain cost items in order to make the total estimated cost meets the total target cost.

For this activity, all cost items were categorized into controllable or uncontrollable. An uncontrollable cost item was defined as the cost reduction activities unable to be conducted, such as tax and duty, overhead cost, sales and distribution cost, and project risk budget. While, a controllable cost item was defined as the cost reduction activities able to be conducted, such as exclusive fixed cost, in-house cost or local purchased parts cost. Then, for each controllable cost item, it was further divided into two categories, new exclusive and carry over. New exclusive was the new cost item that was exclusively related to the new product development. Carry over was the common cost item, which was not exclusively related to the new product development. Based on this total cost reduction target amount, Cost Planning imposed the cost reduction target ratio equally to the estimated cost of each new exclusive controllable cost item only. In other words, the target cost of each new exclusive controllable cost item was set by summing up the estimated cost with its cost reduction amount. On the other hand, no cost reduction target was imposed on the estimated cost of common controllable and uncontrollable cost items. Thus, the target cost for all these cost items were same with their estimated cost.

In summary, total target cost allocation was set based on below formula:

Total target cost allocation (with cost reduction) =
[Estimated cost of each exclusive controllable cost item x Cost reduction ratio] +
Estimated cost of each common controllable cost item +
Estimated cost of each uncontrollable cost item

Then, a kick off meeting was conducted to disseminate the target cost of each cost element to each responsible department. As for the local purchased parts, the total target cost was further broken down to each R&D designer group: Shell body, Body Others, Interior, Electrical, Engine, Drive Train and Chassis groups. Each R&D designer group only received their target cost in absolute amount. Company A did not breakdown the target cost into each function (i.e. seat, air conditioner, steering) nor into each part (i.e. right front seat, left front seat, back seat). From here, each design group was responsible to meet their group target cost by conducting VE for the necessary items. The details of the VE activities will be explained in section 5.4.2.1.

b) Differences compared to the conceptual framework

In terms of setting the total target cost, project assumptions for cost estimation, absolute and differential method of cost estimation, these case findings support the previous literature. Below findings strengthen the previous literature by providing the details of the processes.

First, the previous literature mentioned that TCM cost reduction activities were conducted to eliminate the waste (Monden & Hamada, 1991) of non-productive and non-value added activities (Kaplan, 1984). This case study strengthen the previous findings by specifying the cost reduction activities in terms of which cost items the cost reduction could be applied to. In the organization being studied, the cost reduction target was only imposed on the exclusive controllable cost items. No cost reduction was imposed to the common controllable and uncontrollable cost items. In other words, the cost reduction activities were only imposed to the cost items that can be fully controlled during the project development.

Second, the previous literature mentioned two types of cost estimation method – differential cost estimation (Kato et al., 1995; Monden & Hamada, 1991) and the absolute cost estimation method (Okano, 2005; Monden & Hamada, 1991). Monden and Hamada (1991) and Kato et al. (1995) highlight that the differential method is used when the previous parts exist and when there is a time constraint. This study supports previous findings. In addition, this case study found that the selection of the method of estimation also depended on the availability of cost information. In the event of cost information being available in detail, such as cost table availability, the absolute cost estimation method was used.

This research also found three differences compared with the conceptual framework. First, unlike the Japanese companies that have different definitions for allowable cost and target cost (Monden & Hamada, 1991; Sakurai, 1989), the case company did not differentiate between the target cost and the allowable cost. After deducting the target profit from the target-selling price, no adjustment was made to make the target cost more attainable.

Second, unlike the Japanese automotive companies that break down the target cost of purchased parts to the part basis (Tani et al., 1994), the case company only break down the target cost to the R&D designer group level. This target cost inclusive of the total cost reduction should be achieved by each R&D designer group. Each design group was responsible to conduct the necessary VE to any selected purchased parts in order to meet the allocated target cost.

Third, unlike Japanese automotive companies, which rely heavily on their suppliers for purchased part cost estimation (Cooper & Slagmulder, 1999), Company A did not rely solely on its suppliers. Instead, some of the cost estimation was done together by the R&D Department, Cost Planning Department and, Purchasing and Vendor Development Department. Company A only relied on the suppliers' estimation for the functional parts, which the TCM members did not have the expertise or only had limited cost information. The involvement of suppliers was very low at the case company. Accordingly, the low supplier relationship meant the case company did not rely on the suppliers' cost estimation except for certain functional parts.

5.4.1.4 Step 4: Making the profitability feasibility study

a) TCM practice at Company A

After approval of the Product Marketing Concept proposal, the Product Planning Department kicked off the project and led the project committee, which consisted of all the related departments – Purchasing and Vendor Development, R&D Designers, Logistics, Product Engineering, Cost Planning, Quality Assurance, Quality Control and Production Planning. The Product Planning Department instructed all the related departments to submit their development preparation related cost information to the Cost Planning department. After all the information was gathered, the Product Planning Department conducted the Project Proposal meeting; one of the NPD quality gate meetings to get management approval on quality, cost and delivery. This meeting was joined by the top management level of the related departments. In this meeting, a detailed explanation was presented to the top management concerning the project assumptions, product concept, product specifications and features, product schedule until mass production, total investment and development cost, and profitability status. The results of the profitability status per unit vehicle were shown in the representative variant and in the weighted average of all variants. In terms of tabulating the profitability status per unit vehicle, bar graph diagrams were used to show the status of total target cost against total estimated cost, and total target profit against total estimated profit.

For the Project Proposal meeting preparation, the Cost Planning Department was responsible for preparing the profitability feasibility study and making the achievement scenario planning. An achievement scenario planning was a set of concrete strategies or planning to cover the difference between the target cost and the estimated cost in order to meet the target cost, such as conducting VE. For the Model X1, the total estimated cost was higher than the total target cost. Accordingly, the Cost Planning Department planned the achievement scenario planning concerning how to cover the difference through the cost reduction activities. Nevertheless, this achievement scenario planning must be conducted during the development stage and must be materialized before the mass production stage started. The summary of achievement scenario planning was shown in the same bar chart diagram of target cost and estimated target cost, and presented to the management during the Project Proposal meeting.

The cost information used in the profitability feasibility study came from various sources. The Cost Planning Department gathered all the costs information from the related departments and compiled the estimated cost to calculate the profitability feasibility study. In general, the source of the cost information can be classified into five categories. First, the information was derived from estimation by the related departments, such as facilities related investment cost was estimated by Production Engineering Department. Second, the information was derived from a particular month of the predecessor product profitability, also known as historical accounting statement, from the Accounting Department such as in-house variable costs. From this base cost, some additional cost estimations for the new product from Product Engineering Department were added. Third, the information was derived from the monthly average of the predecessor product profitability from the Accounting Department, such as overhead cost, depreciation cost and indirect labour cost. As the case company used the actual costing method, the predecessor product profitability by month from the Accounting Department highly fluctuated according to the production volume. Thus, Cost Planning used the monthly average of the predecessor product profitability. Fourth, the information for the total local purchased parts cost was derived from the accumulated purchased parts cost listed in the master part list, a list of purchased parts required to produce one unit vehicle. Generally, the initial quotation submitted by the suppliers would be used. However, in the event of no information received, the estimated cost would be used. Fifth, the information of the CKD parts cost was derived from Company M. Based on this information, the Cost Planning Department used project assumptions, such as foreign currency exchange rates, cost planning volume and product model life, to calculate the per unit vehicle of total estimated cost. For example, the per unit vehicle cost of investment and development cost was calculated by dividing the total cost with the total model life volume of the product. The model life volume of the product was calculated by multiplying the product model life in number of months by the monthly cost planning volume.

For the profitability feasibility study making, the Cost Planning Department used the profitability feasibility format sheet to calculate the total estimated cost and total estimated profit per unit vehicle for each variant. Based on volume ratio of each variant, the total estimated cost and total estimated profit was also calculated in weighted average per unit vehicle. Generally, this format sheet was similar to the accounting profit and loss format in which it sets out the target-selling price, all the estimated costs and estimated profit in one sheet. Inside the profitability feasibility format, all the cost items were tabulated and categorized into seven categories – local purchased parts cost, CKD parts cost, in-house cost, sales and distribution cost, fixed cost, other expenses, and tax and duty cost. The CE budget and material impact budget were also included in the other expenses category as a risk management. These budgets were allocated inside the profitability feasibility format to cater for any additional unexpected market demand or government requirement. Then, the total estimated cost was deducted from the tentative target-selling price in order to simulate the estimated profit. Company A simulated a few types of profit: gross profit, operating profit, also known as profit before tax, contribution margin (selling price minus the variable cost) and contribution margin after exclusive fixed costs (contribution market minus the exclusive fixed costs).

Generally, Company A constructed the profitability feasibility study concurrently with the target profit and target cost setting. In the initial stage, the calculation was made for the representative variant only. Later as more details information received, the calculation was made for all variants and summarized in the weighted average to represent the profitability of the product. This calculation was continuously updated several times until the mass production stage. This was because the case company need to monitor the cost reduction result of achievement scenario planning which was set to cover the difference between total target cost and total estimated cost. Furthermore, the development period of the new product model was around 32 months with several design changes. Thus, the cost and profit achievement status need to be monitored thoroughly and reported during each quality gate meeting. Additionally, after the mass production stage, the Cost Planning Department continuously calculated the actual profit per unit vehicle by using the profitability format sheet based on the actual historical accounting statement cost information. Nevertheless, this profitability format sheet was less complicated then the profitability feasibility study format used in the development stage. The objectives were to evaluate the project achievement in terms of profit level on a quarterly basis until the end of the model life of the product and to capture the profit movement. Any decrement in the profit trend would trigger the case company to take prompt actions.

b) Differences compared to the conceptual framework

In general, this case study supports the previous literature findings in terms of using the profitability study as a tool to grasp the total estimated cost, to simulate the new product profit level and as a decision tool to decide the profitable level for the project (Monden & Hamada, 1991; Cooper & Slagmulder, 1999). However this case study found that the decision to decide the profitability level of the new product was not solely depended on the result of the profitability feasibility study. The case company also considered the achievement scenario planning through cost reduction activities to cover the differences between the estimated cost and target cost during the development stage.

This study strengthens the previous studies by providing the details of how the profitability feasibility study was conducted at the case company. These items were summarized in six main items. First, in order to ensure the product could earn an adequate profit margin, all related cost information was gathered from various departments. Second, the Cost Planning Department calculated the profitability feasibility study based on project assumptions, such as foreign currency exchange rates and cost planning volume. The purpose was to convert all the cost information to the same level as the project assumptions. Third, in order to calculate the profitability feasibility study, the case company used a profitability feasibility format sheet. Based on this format sheet, all the estimated costs were compiled to simulate the total estimated profit per unit vehicle. Fourth, the result of the profitability feasibility study was presented to the top management with an achievement scenario planning. Fifth, the profitability feasibility study was frequently updated along the development stage to monitor the cost and profit achievement status result. Sixth, after the product has been launched, Company A continuously updated the profitability using the actual cost information from Accounting Department by quarterly basis until the end of the product model life to monitor the accumulated actual profit against the accumulated target profit.

5.4.2 Do stage

This sub-section explains the activities conducted at the case company in the Do or execution stage to meet the TCM targets and compares the differences with the conceptual framework. Under the Do stage of the PDCA cycle, Company A conducted several cost reduction activities to meet the target cost.

5.4.2.1 Step 5: Achieving the target cost

a) TCM practice at Company A

After receiving the top management approval in the Project Proposal meeting, all related departments put full effort to achieve the target cost by executing the cost reduction activities. In achieving the target cost, Company A implemented all the cost improvements, cost cutting, and cost shifting methods. Among which, the cost cutting by reducing the inefficient or non-value added was mostly practiced. The cost shifting method was the most unpopular method. This was because Company A has a requirement for a specification with a high level of quality. Any change in the type of material needs to pass the testing requirements. Basically, three activities were conducted to achieve the target cost: (i) supplier selection, (ii) VE activities, and (iii) other cost reduction activities.

i) Supplier selection

At Company A, the process for achieving the target cost focused more on the local purchased parts. It started by selecting the suppliers that could meet the target cost from the initial design stage. This was because the cost of the local purchased parts covered around 40 to 50 per cent of the total vehicle cost. Generally, the designs were classified into two categories – In-house Drawing and Outsource Drawing. For In-house Drawing, the drawing was designed, developed and scaled by Company A and Company M and then passed to the selected supplier. For Outsource Drawing, Company A only prepared the concept and basic specification design of the part and passed it to selected supplier for the detailed design and development. Generally, the Outsource Drawing involved the functional parts, such as air-conditioning and headlamp.

For each exclusive part, the suppliers were requested to tender their projects based on the initial drawings by submitting the most competitive price using a specific quotation format provided by Company A. This format required the suppliers to indicate their price with a detailed breakdown of cost by the material cost, manufacturing process cost, purchased parts cost, tooling cost, packing cost, transportation cost, admin cost and profit. Upon receiving quotations from the suppliers, the quoted prices were compared against the target cost. Generally, meeting the target cost and offering the most competitive price were the main criteria for supplier selection.

In the supplier selection process, the Purchasing and Vendor Development Department conducted the Supplier Committee meeting. In this meeting, each proposed part was presented in an A3 size paper report with target cost, suppliers quoted price, suppliers' background, part process manufacturing flow and information pertaining to the historical performance of the supplier, such as supplier's performance track record and forge cases. This information was to ensure that fair judgement was made by Company A's management in selecting the suppliers. This meeting was joined by the middle and top management level of the Cost Planning Department, R&D Department, Logistics Department, QA Department and Manufacturing Department. The objective of this meeting was to obtain a consensus concerning the nomination of the suppliers before it was proposed to the top management for finalization. Then, the names of the nominated suppliers were presented to the Managing Directors and Executive Directors for their final approval. After the selection of the suppliers, the TCM members from the R&D, and Purchasing and Vendor Development Departments monitored each supplier's part during the development process.

ii) VE activities

The case company used VE as a main tool to achieve the target cost. Three types of VE were conducted in the different stages of product development with different purposes. Zero Look VE was conducted in the planning stage to create the product concept and for setting the target for the function and cost. First Look VE was conducted in the design stage to achieve the target value by achieving the target function and target cost. Second Look VE was conducted in the mass production stage by improving the value, improving the function or reducing the cost. Since, the Product Planning Department already integrated the Zero Look VE during the product planning stage by setting an appropriate product specifications, Company A's designers mostly focused their activities on the First Look VE and Second Look VE. Generally, the First Look VE involved the new exclusive purchased parts and the Second Look VE involved the existing or common purchased parts. As commented by the respondent on VE activities:

> *The Zero Look VE is integrated by our Product Planning Department during the specification setting. For engineering designers, our current activities only focus on First Look and Second Look VE (Informant 12, Middle Management, R&D Dept.).*

Among the VE activities conducted were deleting or changing non-value added child parts or process, and changing the type, size or thickness of the material. Nevertheless, the VE items would not sacrifice the basic safety requirement of the vehicle. The main objectives of VE were to omit items that had less relative importance to the customers' requirements and to increase design optimization regardless of the cost impact. As commented by the R&D middle management respondent, the VE main purpose was to optimize the design and not all the VE resulted in a cost reduction:

Basically, the purpose of VE is to optimize the design while the performance quality of the product should be maintained or upgraded from the previous part or model. During the design stage, designers or engineers mainly focus on how to achieve part performance through design. VE is not for cost reduction but it's a kind of process used to determine the optimum design to achieve the target performance of the parts or vehicles. For example, we want to install a meter (meter combination) using four bolts. But by doing VE, three bolts are enough to keep the meter performance. In this case, it looks like a cost reduction instead of VE (but actually it is VE). But if we need four bolts to install a meter instead of three bolts, as the performance cannot be met if we use three bolts, then this is also called VE but not cost reduction. (So) Not every VE can be used as cost reduction (Informant 12, Middle management, R&D Dept.).

As the development stage approaches the mass production stage, any engineering changes increase the cost. For example, after the tooling fabrication, any engineering changes to counter the failure of unexpected engineering issues that are involved in a tooling modification would incur higher cost. As highlighted by the respondents from the R&D middle management, VE failure caused the costs to increase due to a tooling modification to counter the issues:

At the design stage, normally a VE consideration study is conducted based on previous design to determine whether to improve the performance or part quality. At this stage, normally, a reduction can be achieved by reducing the weight, using cheaper material but with the same performance, reduce the number of processes et cetera. The percentage of success is still maybe 50-50 as the changes might not work for the new part even though the previous part was a success. If this happens, the cost to redesign for countermeasure VE might be higher than the cost of the original part (without VE activity) (Informant 12, Middle management, R&D Dept.).

... For example let us say for the carpet, we want to do VE by reducing the thickness of the 'felt'. But, after it goes to testing the NVH (Noise, Vibration, and Harshness) level is not met and the 'felt' has to be put back. In fact, more 'felt'. And so as it is no longer at the design planning stage, and the part has already been made, we have to add the 'felt'. May be some slight modification has to be done on top of the 'felt' addition. So you want to reduce maybe 1 ringgit and yet ended up having to put back the 'felt', which is 1 ringgit and

maybe another few more cents for modification of the mould (Informant 4, Middle management, R&D Dept.).

Furthermore, even though the VE on a particular part passed the Computer Aided Engineering (CAE) analysis during the design stage, the outcome of the whole vehicle crash test at the end of the development stage might be different. This was because the crash test result was affected by the performance of other surrounding parts connected to the VE parts. As commented by the R&D middle management, the success of VE as a cost reduction tool is very subjective:

... Probably we did the CAE analysis, probably we did some tests on the mock up but those mock ups in the CAE analysis were only on a single part. But when the part goes in a vehicle, it is being tested as a whole vehicle. So many things have to change as a complete package. We cannot wait until that stage to actually conclude our VE. The VE has to come in earlier because it needs tooling modification. We can do some VE, we can do some CAE analysis with okay results but after the whole vehicle is sent for crash test impact, for example, certain parts failed. And, because of that, we have to increase the thickness or change material or revert back to the original plan or may be with a higher specification (Informant 4, Middle Management, R&D Dept.).

One of the R&D middle management commented that proper study and development concept direction were very important in realizing VE as a cost reduction tool.

So, the moral of the story, the cost reduction during the design stage is only effective if the designers properly study or benchmark other competitor parts. Secondly, the VE for the cost reduction during the design stage is very effective if the development concept is cost (reduction) instead of items (specification) change or quality upgraded. In the design activity, many cases happen that cost reduction can only be achieved if we sacrifice the specification, styling or performance in order to achieve cost. The CE of the project should decide the option, which, normally, is in line with the development policy concept (Informant 12, Middle management, R&D Dept.).

The benchmark information was very important to increase the successfulness of the VE activities as a cost reduction tool. For data gathering for benchmarking information, the case company conducted tear down activities, in which the competitors' cars were reverse engineered to analyse the structure, material, features, design and cost of the parts. The results were compiled and were used for the design and development of future new products. Nevertheless, the collected cost benchmark information was still insufficient for the TCM activities. As commented by one of the survey respondents:

> *TCM implementation is (at this company) still in the early stage. Currently, we do not have enough information for cost benchmarking (Informant 16, Technical staff, Cost Planning Dept.).*

iii) Cost reduction activities

Generally, once the product specifications have been decided at the planning stage, the case company did not add new product specifications or functions to meet new requirements from the market feedback during the product development stage unless the government introduces new regulations that should be complied promptly. Nevertheless, throughout the development stage, many minor technical design changes occurred to cater to the technical issues, such as part matching issues and manufacturing workability issues.

In each development stage, the selected suppliers submitted their updated quotation to the Purchasing and Vendor Development Department based on technical changes. If the supplier's quoted price was higher than the estimated technical cost changes of Company A, the company usually used negotiation to persuade suppliers to meet the target cost. As for the cost reduction activities for the local purchased parts, Company A analysed its major local purchased parts cost by comparing it with Company M's part cost level to identify cost reduction ideas. A detailed analysis was made for each cost item: material cost, purchased part cost, manufacturing cost, tooling cost and administration cost. Then, further negotiation was conducted with the suppliers to reduce the cost. However, some suppliers were not willing to meet the target cost based on negotiation only. Accordingly, the challenge meetings were conducted continuously between the suppliers and Company A's TCM team members to discuss how to meet the target cost. Before each challenge meeting, an internal meeting was conducted among the TCM team members to brainstorm and obtain consensus concerning the cost reduction ideas. In the challenge meeting, the suppliers were asked to justify their estimation with some evidence. The supplier quotations were accepted if the cost justifications were reasonable. However, if the justifications were not convincing, the TCM team members consulted with the suppliers and highlighted the points concerning how to achieve the target cost. Several challenge meetings were conducted until both parties were satisfied with the cost level. Finally, in the event of no conclusion being reached, Company A's top management became involved. Nevertheless, the involvement of the top management did not always reach the expected results. In each challenge meeting, the meeting minutes concerning what to do, who to do, when to do were written on the white board. At the end of the meeting, the printed minutes were signed by all members and distributed to the participants. Based on the minutes, the counter measures activities were followed up by the TCM team members.

Additionally, Company A also conducted in-house cost reduction activities to achieve the in-house target cost. The in-house cost covered the raw material, main material, direct labour, consumable and energy cost of the in-house production processes. The in-house cost reduction activities were anchored by Product Engineering Department. Among the cost reduction activities conducted for the in-house cost were process improvement and cycle time reduction.

b) Differences compared to the conceptual framework

In general, this case study supports the previous literature findings in terms of VE as a tool to achieve the target cost and teamwork in achieving the target cost. This case study also found two items that were different from what had been highlighted by the previous literature. First, rather than continuously conducting VE to meet the target cost like the Japanese companies (Lee & Monden, 1996), Company A focused on the negotiation of local purchased parts. This might due to the suppliers of Company A hardly suggested any cost reduction ideas and information for effective VE. Accordingly, attaining the target cost upon initial quotation submission was the main criteria for the selection of suppliers. By using the cost estimation of TCM members as a reference point, at each development stage, a series of negotiation meetings were conducted with suppliers to challenge the suppliers' estimated cost. The Company A's top management also involved in the final negotiation meeting with the suppliers.

Second, unlike the Japanese companies that continuously fine-tuned the specification, functionality and quality from market feedback during the development stage (Cooper & Slagmulder, 1999), Company A only adopted the changes due to compulsory new regulations introduced by the government. No changes were made to the specification and functionality to meet new market feedback during the development stage. Company A seemed to lock all the functionality specifications during the planning stage.

5.4.3 Check stage

This sub-section explains the activities conducted at Company A in the Check or monitoring stage and compares the differences with the conceptual framework. Under the Check stage of the PDCA cycle, Company A monitored and measured the TCM results against its targets, and reported the achievement of the results.

5.4.3.1 Step 6: Monitoring and reporting the cost achievement status

a) TCM practice at Company A

At Company A, the development process for the new model product took approximately 34 months from planning until the mass production stage. During the development stage, Company A conducted continuous meetings to monitor and report the cost and profit achievement status. Generally, there were three types of meeting related to the TCM activities were held: NPD quality gate meetings, monthly cost achievement meetings, and target profit and cost achievement meeting. The Cost Planning Department was responsible for gathering the cost related information from the related departments, prepared and reported the cost and profit summary status.

NPD quality gate meetings were conducted at each development stage by the Product Planning Department of R&D Division. The main objectives of NPD development quality gate meeting were to present the status of delivery, quality and cost to the top management, and to obtain their approval to proceed to the next level of the development stage. For these meetings, the Cost Planning Department was responsible to report the TCM activities in terms of cost and profit achievement status. Accordingly, at each development stage, Cost Planning Department updated the profitability feasibility study by using the latest cost information to capture the total estimated cost and to simulate the total profit per unit vehicle. The summary of the results was presented in a bar graph diagram, and submitted to the Product Planning Department as one of the presentation materials. Each NPD quality gate meeting had a different cost achievement level passing rate criteria that had to be achieved before proceeding to the next stage of development.

Monthly cost achievement meetings were conducted on a monthly basis starting after the tooling design had been finalized until the mass production stage. These were anchored by the Cost Planning Department. The main objectives of these meetings were to frequently reflect on the estimated cost changes of the local purchased parts due to any design engineering changes or supplier price changes, and to monitor the result of achievement scenario planning that was set during the Project Proposal meeting. This was because the purchased parts cost contributed the biggest impact on the target cost achievability. Accordingly, each R&D designer group was responsible to present the cost achievement of their group by monthly basis. If any design changes caused cost increment to any parts, responsible group had to find savings at other parts to offset it. However, in the monthly cost achievement meetings, the profit status was not reported.

The monthly cost achievement meetings notified all the related departments concerning the cost achievement status of the local purchased parts. This allowed the related departments to take the necessary actions to counter the shortfall promptly. In this meeting, the case company only focused on the local purchased parts because it covered the biggest cost items of the vehicle cost and within Company A's control. The case company did not monitor the CKD parts cost because this cost was monitored separately by Company M. In the monthly cost achievement meetings, the cost achievement status of the local purchased parts by each design group and the total local purchased parts cost summary per vehicle were presented to the management. Here, the cost changes as per the latest supplier quotations were compared against the target cost and previous month's cost achievement status. In the absence of actual suppliers' quotations reflecting the latest cost due to design engineering changes, Company A used R&D designer estimation to reflect the impact on the cost. However, the participants of this meeting were limited to the CE, lower management and middle management of the R&D Department, and Purchasing and Vendor Development Departments.

The Target Profit and Cost Achievement meeting was conducted by the Cost Planning Department before the mass production stage started. The objective was to report the overall profit and cost achievement status per unit vehicle to the top management. Here, the profitability feasibility study was updated to capture the latest total estimated cost and to simulate the total profit per unit vehicle. Nevertheless, for uncontrollable cost items, which were not involved with the cost reduction activities, such as overhead cost, warranty cost, transportation cost, the cost amount remained the same as the base cost. For the cost of the local purchased parts and the CKD cost, the actual supplier quotations were used to reflect the actual cost. As for the in-house cost and selling and distribution cost, the latest estimated costs were used. Then, the profitability feasibility study results were translated into a bar graph diagram to show the cost and profit achievement movement from the base cost until the time of mass production. Inside the bar graph diagram, the analysis of cost and profit movement was also shown according to a few categories, such as VE, specification changes, cost reduction activities and others. In this meeting, the summary of the TCM activities and the project review were also presented. Due to the confidentiality of profit information, this meeting was only attended by the top management of certain departments. The results of this meeting were also used to make judgements for reviewing the selling price. Besides that, the re-finalization of the selling price also considered the current market condition, competitors' product specifications and customer perceived value towards the new product.

Besides above meetings, the Production Control Department conducted the production preparation progress status meeting by monthly basis after tooling design approval stage. Generally this meeting related with NPD in terms of monitoring the progress of new product development. The objective of this progress meeting was to monitor the project preparation in terms of delivery and quality towards the mass production stage. In this meeting, all the project committee members reported their development progress status and presented their reports in turn to the committee. The meeting was conducted standing up and lasted for one to two hours. Each department evaluated the status progress by themselves according to three conditions – OK, NG or Half OK. The level of evaluation was based on the impact of the issues to the project's mass production timing. However, this presentation only focused on quality and delivery issues. Due to the issue of confidentiality, no cost and profit status were presented at this meeting. This meeting was attended by the lower management to the top management of the related departments involved with the production operation and product development – Manufacturing, Product Engineering, Quality Assurance, R&D, and Purchasing and Vendor Development Departments.

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b) Differences compared to the conceptual framework

In terms of conducting the continuous meetings to monitor the cost achievement and finalizing the costs for the final reporting, the case study findings support the previous literature. Nevertheless, compared to the previous literature (Monden & Hamada, 1991; Cooper & Slagmulder, 1999; Kato et al., 1995; Okano, 2005), this case study found that not all cost items were monitored at the same frequency. Among the cost items, the cost monitoring frequency of the local purchased parts was higher. Besides that, at Company A, the TCM activities meetings were related to the NPD quality gate meetings. Without management approval, the project was not allowed to proceed to the next level of development stage. Nevertheless, all TCM activities meetings only involved certain departments and certain management levels in Company A due to the confidentiality surrounding the cost and profit status. Before the mass production started, the total estimated profit and cost were finalized. This information was used to review and reset the selling price.

5.4.4 Act stage

This sub-section explains the activities conducted at Company A in the Act or improvement stage, and compares the differences with the conceptual framework. Under the Act stage of the PDCA cycle, Company A evaluated the achievement status against its targets and took countermeasures to close the differences.

5.4.4.1 Step 7: Cost improvement

a) TCM practice at Company A

Three months after mass production, the Cost Planning Department captured the actual cost and conducted an Actual Profit and Cost Achievement Status meeting to the top management. At this timing, the data were almost stable for reflecting the actual mass production stage. The main objective was to report the actual cost and profit movement from the TCM or Cost Planning's viewpoint. Normally, the uncontrollable factors, such as the material market price, foreign forex exchange, and government tax and duty were among the risks that would make the actual cost higher than the estimated cost. Accordingly, based on the historical accounting statement, the actual result of cost, profit, production volume, and model mix were analysed and compared against TCM planning. Besides that, the remaining tasks, next actions, overall project review and improvement items were also explained in this meeting. After this meeting, the Cost Planning Department continued to monitor and report the actual profit and cost achievement status to the top management on a quarterly basis until the end of the product model life cycle; for example, 6 years. The purpose was to compute the actual profit and cost from the TCM's viewpoint. For this meeting too, the actual cost data were taken from the historical accounting statements with some adjustments were made to some cost items. For example, instead of using a particular month of general and administration cost, an adjustment was made by using an average monthly result. Furthermore, for the future new product, a particular month of the predecessor product profitability or historical accounting statement with some adjustment was used as the base cost.

Even though Model X1 achieved its target cost and target profit, due to the drastic market competition movement under automotive liberalization, Company A acknowledged that the selling price level of Model X1 was not competitive enough compared to the future products of its competitors. This might be because the target cost of the exclusive local purchased parts was set using the current cost level, which was less competitive. Accordingly, as commented by the middle management of the Cost Planning Department, the issue of balancing the realistic cost and challenging the target cost was very important in setting the competitive target cost:

> *I think the Model X1 project was successful in terms of management's direction. But the direction, which is to avoid shortfall, was not suitable for Company A. (During the model X1) the strategy to follow the direction (of Company M) was to make an agreeable target. Consequently, the target was very realistic but not challenging. This was based on Company M's (target cost level) trend at that time. Target setting in the early stage is very important for cost planning. And, I think management understanding of the challenge is essential to carry out good cost planning (Informant 6, Middle management, Cost Planning Dept.*).

Company A did not practice standard costing, Kaizen Costing and Cost Maintenance activities. Thus, after the mass production stage no variance checking was made on the actual standard cost against the target cost. Due to the absence of Kaizen Costing and Cost Maintenance activities, there were no further cost reduction activities conducted to meet the target cost at the production stage. Even though the manufacturing operation of Company A had kaizen activities or continuous improvement activities, the target cost reduction of these improvement activities was not linked to the TCM activities. Thus, in order to make the selling price of Model X1 more competitive, instead of conducting Kaizen Costing or Cost Maintenance activities in the production stage, Company A re-conduct the TCM activities by introducing a new project code, which was Model X2. This special cost reduction project was anchored by the Cost Planning Department and started two months after Model X1 had been launched. The cost results of Model X1 reported during the Target Profit and Cost Achievement meeting were used as the base cost for Model X2. In order to make the selling price of Model X2 more competitive, a certain percentage of cost reduction was imposed on all cost items except the tax and duty cost. Then, a task force committee was set up to conduct the cost reduction activities. This task force consisted of a few departments, which were responsible for each cost element. For example, for the in-house costs, Product Engineering was responsible to set the cost reduction activities for all the production shops and their cost elements, such as raw materials, main materials, direct labour, consumables, transportation costs, energy and reject costs. A cost achievement progress meeting was conducted on a monthly basis to monitor and present the cost achievement to the top management. In this meeting, each group presented their cost achievement status. The Cost Planning Department compiled and summarized the overall cost achievement results to reflect the per unit vehicle cost reduction result of the representative variant.

b) Differences compared to the conceptual framework

In general, this case study supports the previous literature findings in terms of reporting the actual cost and profit after mass production stage started (Kato et al., 1995; Monden & Hamada, 1991). Nevertheless, this case study found several differences compared with what had been highlighted in the literature. First, the previous literature did not highlight the continuous profit monitoring after the mass production stage until the end of the product model life cycle. At Company A, after the mass production stage, the profit level was continuously monitored on a quarterly basis until the end of the product life. A periodic meeting was conducted to report to the top management the cost movement compared with the previous quarter, and the total accumulated actual profit started from its launching time against its total accumulated target profit, which was set during the project planning stage.

Second, as Company A used actual costing method for its financial reporting purpose, there was no comparison made to analyse the differences between the standard cost and target cost. Thus, there were no activities conducted to meet the target cost at the mass production stage. Third, even though the cost improvement activities and lean manufacturing activities were conducted in the mass production stage, there was no clear evidence that the target cost of the TCM was linked with these systems. Additionally, due to the absence of Kaizen Costing, the in-house target cost, which was set during the design stage, was hardly followed after the mass production stage. Since Company A did not continue the cost reduction activities in the mass production stage by using Kaizen Costing or Cost Maintenance activities, Company A re-conduct the TCM activities by introducing Model X2, a new project code for the model X1, as the cost reduction project to make the product cost more competitive.

5.4.5 Summary of the TCM implementation process

Generally, the stages and steps of the TCM practices in the case company were similar to the conceptual model. The findings showed that the TCM fundamental practice at Company A was almost similar to the Japanese theoretical model. Nevertheless, this study found that there were some differences in the details of the process under each step. Furthermore, this research also found several new items that were not highlighted in the previous literature. This findings help to strengthen the previous literature on TCM practices.

From the findings highlighted in the above sub-sections, Table 5-2 summarizes the findings of the TCM implementation process compared to the conceptual framework. On the right side of each item, the findings of the case study are categorized into similar or different compared to the conceptual framework. The possible reasons for the differences in the process features found in the case study will be discussed in detail in Chapter 7.4.

Table 5-2: Comparison summary between the TCM conceptual model and TCM practice at Company A

PDCA Stage	Step	Conceptual Framework	Case study findings	Similar/ Different
PLAN	**STEP 1: Set the target-selling Price**	• Set selling price	• Set selling price (tentative)	Similar
		• Consider the internal and external factors	• Consider internal and external factors	Similar
		• Overall business plan as guidelines for new product introduction timing	• Overall business corporate plan as guidelines for new product introduction timing	Similar
		• Thorough market research	• Various and continuous market research	Similar
			• ***New product market survey to confirm the specifications and features assumptions only and not to find out what the customers want in the new product***	***Different***
	STEP 2: Set the Target Profit	• Set realistic desired profit margin by considering external and internal factors	• Set realistic desired profit margin by considered external and internal factors	Similar
		• Various methods exist from simple to advance methods	• Used simple method. Due to the lack of information, the target profit was set based on the predecessor product profit ratio. The yearly average of predecessor product profit level and business plan profit level were used as a justification reference	Similar
	STEP 3: Set the Target Cost	• Allowable cost = Selling price – target profit	• ***Target cost = Selling price - target profit***	***Different***
		• Target cost is set with some adjustment to the allowable cost	• ***Target cost = Allowable cost***	***Different***
		• Distinguish the allowable cost and target cost	• ***Did not distinguish the allowable cost and target cost***	***Different***

Table 5-2, continued

PDCA Stage	Step	Conceptual Framework	Case study findings	Similar/ Different
		• Cost estimation involved many departments	• Cost estimation involved many departments	Similar
		• Cost estimation based on project assumptions setting	• Cost estimation based on project assumptions setting	Similar
		• Use differential cost estimation method if the part has predecessor part and time limitation exists	• Use differential cost estimation method if the part has predecessor part and time limitation exists	Similar
			• ***Cost estimation method based on information availability***	***Different***
		• Target cost set with some adjustment	• Target cost breakdown to each cost element was set with some adjustments	Similar
			• ***Cost reduction target was imposed on new exclusive controllable cost items only***	***Different***
		• Rely on supplier estimation	• ***Less reliant on supplier estimation. Target cost for exclusive part is calculated together by a few related depts. Estimation was based on existing product's supplier quotations (current cost level)***	***Different***
		• Target cost breakdown to functions/ groups/ parts	• ***Target cost breakdown of local purchased parts was up to R&D designer group level only. For exclusive new part, the estimated cost became the target cost.***	***Different***
	STEP 4: Conduct the Profitability Feasibility Study	• Profitability Feasibility Study compiles all the cost items including a reserve or risk budget to assess overall profitability	• Profitability Feasibility Study compiles all the cost items including reserve or risk budget to assess overall profitability	Similar
			• ***Profitability feasibility study continuously monitored to ensure the target profit attained until end of product model life***	***Different***
			• ***Initially focused on specific variant as model representative, later calculated overall profitability in weighted average***	***Different***
		• Decision tool to decide whether to drop or proceed with project.	• ***Achievement scenario planning as a set of strategies to cover the differences between the target cost and estimated cost***	***Different***

Table 5-2, continued

PDCA Stage	Step	Conceptual Framework	Case study findings	Similar/ Different
		• Calculated by Cost Management Department	• ***Calculated by Cost Planning Dept. by using Profitability Feasibility format sheet***	***Different***
			• ***Source of cost information came from various sources with some adjustment***	***Different***
		• Use project assumptions	• Use project assumptions, i.e. volume and foreign exchange rates for Profitability Feasibility study calculation	Similar
DO	**STEP 5: Achieving the target cost**	• Conduct cost reduction through engineering tools especially VE	• Conduct cost reduction through VE, etc.	Similar
			• ***More focused on local purchased parts to achieve the target cost by negotiation rather than VE***	***Different***
		• Information from previous VE database, cost table, tier down	• Information from previous VE database, cost table, tier down, previous suppliers' quotations	Similar
		• Teamwork in achieving the target cost	• Teamwork in achieving the target	Similar
		• Involvement of suppliers' cooperation	• ***Limited suppliers cooperation for cost reduction ideas***	***Different***
			• ***Challenge meetings to challenge the suppliers' estimation.***	***Different***
			• ***Top management involvement at the final negotiation stage***	***Different***
			• ***Attaining target cost is the main criteria for supplier selection***	***Different***
		• Fine tune the functionality and quality from continuous market feedback	• ***Did not integrate the market feedback to fine tune the functionality and quality of the product at this stage.***	***Different***
CHECK	**STEP 6: Continuous monitoring and reporting**	• Monitor the results and report the achievement continuously until mass production through periodic meetings	• Monitor the result and report the achievement continuously until mass production through periodic meetings	Similar
			• ***High frequency of TCM related monitoring meetings. Some of these meetings related to NPD***	***Different***
			• ***Higher frequency of cost monitoring and reporting of local purchased parts compared with other cost elements.***	***Different***

Table 5-2, continued

PDCA Stage	Step	Conceptual Framework	Case study findings	Similar/ Different
			• ***Due to confidentiality issues, the results of cost and profit achievement level only known to certain departments***	***Different***
		• Focus on specific variant as model representative	• Focus on specific variant but also calculate other variants and overall cost in weighted average.	Similar
		• Cost finalization	• Cost finalization before the Mass Production starts.	Similar
			• Based on Target Profit/Cost Achievement meeting report, the selling price is reviewed and reset	Similar
ACTION	**STEP 7: Cost Improvement stage**	• Analyse the actual profit and cost	• Analyse the actual profit and cost	Similar
		• Use the lowest cost (actual cost vs. target cost) as new standard cost	• ***Did not implement standard costing. Thus, no comparison made on standard cost and target cost variance.***	***Different***
		• Continuous Cost Improvement & conduct Kaizen Costing. Use this cost info for future new product base cost	• ***Did not attain the target cost at mass production through Kaizen Costing or Cost Maintenance. Instead a new model project code was introduced to reduce the cost at the mass production stage***	***Different***
			• ***A particular month of predecessor product's historical accounting statement with some adjustment was used as base cost for future model***	***Different***
			• ***Continue to report the actual achievement quarterly until end of product model life.***	***Different***

5.5 Assessing the enablers of TCM practice at Company A

In statistically assessing the key enablers that positively associated with successful implementation of TCM, the factors were first identified from the qualitative data obtained from interviews; company internal documents, such as operation procedures, presentation materials and reports; external documents, such as newspapers and magazine articles; and observations through several TCM related meetings attended by the researcher, such as cost reduction challenge meetings, supplier monthly meetings, morning meetings, and TCM quality gates meetings. The following section focuses on nine factors that were identified. These nine factors are: Advanced Manufacturing Technologies (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training. These nine factors were later tested statistically to determine the critical factors that positively associated with the successful implementation of TCM in Company A's context.

5.5.1 Advanced manufacturing technologies

Company A used AMT in its designing, manufacturing, parts ordering, product delivery and cost monitoring. In the design and development stage, several computer programmes, such as Computer Aided Design (CAD) and Computer Aided Engineering (CAE) were used by the engineers. CAD was used to make the engineering drawings, while CAE was used to verify the design of the material characteristics, performance and interference by simulation and as the first level of judgement to evaluate whether the VE was acceptable or not.

As for the material and parts ordering, Company A made the ordering through computer systems. For example, for the local purchased parts, Company A established a customized supplier online system for the ordering of parts and disseminating the production and procurement related information to the suppliers using this system. While for the product delivery, Company A used an online computer system for the car registration and payment of excise duty. This system helped to expedite the product delivery to the customers.

For the TCM activities, Cost Planning Department also used a customized online cost database system for cost monitoring of the purchased parts. This cost database system is a real-time system, which was shared by Company A and Company M. Through this system, information on the part list, target cost, suppliers' price and cost estimation was shared with the related parties. From this system, the Cost Planning Department extracted information for preparation of the monthly cost monitoring report. However, this cost database system was limited to certain products and the usage was limited to certain departments.

For the production side, the Production Planning Control Department used a computerized shop floor system to control the production operations. Robot technology and manual robots were used to assist the production operation. However, the usage of these robotic systems was limited to certain processes, such as the parts stamping process and painting process. Company A still relied on humans for most of its manufacturing process. Around 8000 direct manpower (as per 2012) were involved with the manufacturing operation. This represented almost 80 per cent of the total manpower of Company A.

From the above qualitative findings it can be concluded that the AMT was observed to some extent in the TCM implementation process.

5.5.2 Confrontational strategy

Company A gave priority to the quality, cost and functionality simultaneously in strategizing its strategies. As quoted from a newspaper interview, Company A's top management emphasized the company mission to sell its products with high quality and at an affordable price:

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> *... What matters most is to manufacture and sell quality compact and affordable cars to Malaysians.* [1]

In addition, quality is one of Company's A corporate values. This was reflected through the case company's daily activities. For example, the Defect Per Unit (DPU) index, an index that indicates the defects found per unit of production, was monitored daily and reported to the management by Production Planning. Furthermore, at the premises of Company A, there were posters quoting the clear message of the Managing Director concerning quality to all of Company A's employees:

> *Quality conscious starts with you. You can make that difference to exceed customer satisfaction! (Source: Internal documents).*

Regarding the product design, even though Company A used Company M's model base platform, Company A customized the upper body of the product to suit the local market. The changes from its predecessor product involved styling, features and also ride comfort. As demonstrated by the top management in the newspaper interview:

> *Since day one, we have collaborated with them (Company M) as our technology and technical partner, tapping into their R&D, technology, technical and engineering expertise. Our company's collaboration with Company M includes sharing common platforms and technical expertise. Be mindful that our company does not blatantly copy and paste new products but we develop new products to suit local tastes, in the areas of styling, features and also ride comfort. Our company's models use up to 90% local parts.* [2]

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[1] Your 10 questions with Datuk, The Star, 11 June 2011

[2] Your 10 questions with Datuk, The Star, 11 June 2011

Nevertheless, even though design modifications were made on the upper body, the uniqueness of Company A’s products were not so obvious. As remarked by one of the survey respondents,

> *Company A products are mainly carry over products from Company M with some improvement. Overall uniqueness can't easily be identified (Survey respondent 54).*

Additionally, the high cost of local purchased parts meant that the prices of Company A’s products were not competitive globally. Among the reasons for the high cost of the purchased parts was the high tooling cost due to the dies or moulds used to produce the parts and components being imported from Japan or other overseas makers. Even though the tooling cost was calculated using the payback period method, the low amortization volume resulted in a high tooling cost per unit. This was one of the constraints to achieve the target cost of the local purchased parts. As commented by the survey respondent concerning the constraints of the confrontational strategy:

> *The moulds or dies (copy mould or die) are from Japan. Too expensive and not possible to achieve the target cost. And use “old” technology (Survey respondent 48).*

In terms of cost reduction activities, the activities only focused on certain departments. Even though many meetings were conducted under TCM activities, due to the confidentiality of cost and profit information, only middle to top management of certain departments were informed concerning the total cost and profit status. Furthermore, Company

A had a vertical organizational structure with a hierarchical relationship within each division. The barrier of the horizontal relationship somehow limits the cost related information flow and communication. Consequently, one of the respondents commented that certain departments had a lack of awareness concerning how their decision would impact the total cost of the product:

> *We don't have good cooperation with some of the departments. Of course, R&D and CP (department) are in close relationship. I think we have no problem in that, but some other department QRE, QC, production people they lack this (cost) conscious. So, they do as they please… their judgement or decision in terms of design, their checking features jigs, and their choice of suppliers actually don't put cost as the priority (Informant 4, Middle management, R&D Dept.).*

From the above qualitative findings, to some extent, it can be concluded that the implementation of a confrontational strategy was observed in the implementation process of TCM at Company A.

5.5.3 Customer orientation

Customer orientation is considered as an enabler as customer centric is one of Company's A corporate values. According to the definition of customer centric by Company A, "being customer centric means understanding our customer needs, meeting or exceeding their needs and improving every customer experience with us. This is to ensure highest customer satisfaction is our top priority". The importance of satisfying customers to achieve the company's profit was well understood by the TCM related members:

> *In producing cars, we give priority to customer requirements and at the same time we are concerned about the cost to get our profit… we create a product*

that can satisfy the customer and also give profit to the company. .. We call it "Shohin", create product that brings value to the manufacturer and benefits the customer (Informant 3, Lower management, Product Marketing Dept.).

…in a manufacturing company… any company has to understand customer requirements... How to satisfy customers? This is the most important… not only internal and outside… (Informant 6, Middle management, Cost Planning Dept.).

The case company took appropriate measures in respect of quality related complaints from its customers. For example, as emphasized by Informant 5, compared to other competitors in the same field, Company A even sends the customers' complaints to the R&D Department for further investigation and countermeasures:

This is where this company (Company A) excels compared to its competitors. This company tries to fulfil the needs to an extent… any complaints from customers reach the R&D side. This is not happening at competitors. Complaints just die off at service centre mechanics! It is up to the mechanics to serve the complaints (Informant 5, Technical staff, Purchasing and Vendor Development Dept.).

Customer orientation priority was reflected in the mission statement of Company A. It aimed to be in the top three ranking in the Customer Satisfaction Index (CSI). The Customer Satisfaction Index is an index to measure customer satisfaction according to seven elements: service delivery, service initiation, service advisor, in-service experience, user-friendly service, problems experienced and service quality. The sales operation under Company A1 was responsible for the sales, marketing, and distribution including customer satisfaction. However, as the TCM team members were under Company A4, which was responsible for the manufacturing operation, the detailed targets of the CSI were not known by the non-sales operation related members, as commented by the TCM survey respondent 20:

The CSI targets were no specified in detail (Survey respondent 20).

From the above qualitative findings, it can be concluded that, to a certain extent, the customer orientation was observed in the TCM implementation process of Company A.

5.5.4 Organizational information-sharing network

The researcher observed the positive and open practice of information sharing between the case company and its value chain. For example, in terms of information sharing with Company M, the researcher observed frequent meetings including TV meetings conducted by R&D members with its Company M counterparts to discuss technical related issues. Company A's R&D members also had frequent business trips to Company M in Japan to discuss the design and development related issues. In terms of information sharing with its suppliers, a customized online suppliers system was used to share the production and purchase information. Besides that, Company A also conducted monthly supplier meetings to brief all its suppliers on production and purchasing related issues. Frequent discussions between suppliers and TCM members were also conducted to discuss the technical issues and countermeasures.

Regarding the cost estimation of parts, besides referring to the cost tables, the case company also referred to previous quotations of suppliers for cost information. Most of the suppliers' quotations had a detailed cost breakdown, such as material cost per kilogram, cycle time of each manufacturing process and the tooling cost. This information helped the TCM members to estimate the cost of the new purchased parts or any engineering design changes. As admitted by the Purchasing and Vendor Development Department middle management, the existing product suppliers' quotations were utilized for cost estimation:

> *If the suppliers can submit the quotation in detailed breakdown...for next project, we can estimate the part and set the target cost (Informant 1, Middle management, Purchasing and Vendor Development Dept.)*

However, some of the suppliers only submitted the total purchased part price and refused to reveal the breakdown of the part cost. Company A faced this problem with suppliers who had a high supplier power position, especially for the parts related to the functional and under outsourced drawings, which were developed by the multinational suppliers. Due to the company policy of the suppliers and the issue of confidentiality, the cost information on these purchased parts was very limited. As highlighted by the TCM members:

> *In general, our company and suppliers share information. However, in certain cases, it is not open or easy to access. No detail breakdown (of the supplier quotation's contents) (Survey respondent 79).*
>
> *For functional parts, suppliers do not give the breakdown. So, our members cannot learn from the breakdown, cannot figure how the suppliers derive the price because the quotation is in one figure only. For those parts, yes, we cannot study. (Informant 1, Middle management, Purchasing and Vendor Development Dept.).*

Nevertheless, regarding this limited information issue, Company M assisted Company A with the cost information for target cost setting.

> *We have a base product of Company M. That's why we can take the base cost and work backward. If we work from zero, I don't think we are capable. If from scratch without a base product, in which we have to develop and set the target cost, I think this company is still incapable. We are still not at that level yet (Informant 1, Middle management, Purchasing and Vendor Development Dept.).*

However, the information received from Company M was very limited. As admitted by the Middle Management of the Cost Planning Department,

> *Another way to set the target cost is to look at cost competitiveness. However, we don't have enough information. We just rely on Company M information. But Company M information is also very limited, which is only for the domestic model (Japan basis cost information) (Informant 6, Middle management, Cost Planning Dept.).*

The confidentiality and legal issues related to Company M' suppliers information hindered the open information sharing between Company M and Company A. As commented by the respondents:

> *Company policy and confidentiality hindered the information exchange (Survey respondent 18).*
>
> *Some information not freely shared and difficult to access (Survey respondent 48).*
>
> *Some suppliers cannot disclose their detailed quotations, especially Japanese suppliers. Our company partner (Company M) is also reluctant to share their detailed cost study results (Survey respondent 44).*

The lack of detailed cost information on the parts and the lack of knowhow concerning the cost estimation of functional parts were among the constraints in the TCM practice. This meant the TCM members were unable to justify the accuracy of parts' target cost to its suppliers. As commented by the respondent:

> *When people ask how we derived the target cost, we cannot answer, we cannot justify whether or not our target cost is correct. We cannot answer back (the target cost in detail) when we were asked (by suppliers). I think because we don't have the detailed breakdown (of the target cost). This is my observation of the current status (Informant 1, Middle management, Purchasing and Vendor Development Dept.).*

The case company acknowledged that the cost information was one of the major constraints in TCM practice. In one of the management reports, the cost information issue was summarized as, "cost data for the financial does exist, but cost data for the cost management does not exist". For example, even though the case company had cost tables, the cost tables were limited to certain processes only, such as plastic injection, stamping parts and machining. Thus, the case company lacked a standard cost level to advise the suppliers or benchmark cost level to refer to for verification of supplier's costs. Additionally, in terms of in-house cost information, the case company still relied on historical accounting statements as its base cost to estimate the new product. This historical accounting result was derived from financial accounting data, which was originally used for the purpose of financial reporting. Since Company A practiced the actual costing method, some of the actual in-house costs were allocated to each existing product based on the production volume and standard time allocation, such as energy cost, direct manpower cost and consumable cost. This allocation ignored the actual cost incurred, such as reject cost, for a particular product. Furthermore, the actual payment made at a particular month would not reflect the actual cost incurred. Thus, these cost information were not accurate to be used as the base cost of the new product.

The case company also recognized that its cost information was based on the existing cost level and was not competitive. In order to survive in a competitive market, the global level cost benchmarking was important for TCM. For example, in terms of target cost setting for the exclusive parts, the cost information from various countries was important to judge the level of competitiveness of the target cost. Nevertheless, due to the inaccessibility of the information, the case company still did not have the knowhow to retrieve it. As highlighted by the middle management of the Cost Planning Department:

> *We don't have cost data for Thailand and other countries like Indonesia and the Philippines. At this time, I don't have any idea how to get information for other countries. But, in order to survive worldwide, we have to have such information, how to collect, how to get. That portion is very difficult and important (Informant 6, Middle management, Cost Planning Dept.).*

The case company recognized that information sharing with its business partners was important for the TCM practice. From the above qualitative findings, it can be concluded that information sharing was observed to some extent in the TCM implementation process of Company A. However, cost related information due to the lack of information and confidentiality issues were the major constraints in the TCM practice.

5.5.5 Lean manufacturing implementation

At Company A, the lean manufacturing was known as the Toyota Production System (TPS). The lean manufacturing implementation at Company A was reflected through the shop floor visualization concept and 5S. As quoted from a newspaper interview with Company A's customer, the respondent remarked:

> *I was impressed with the Japanese production methodologies being carried out so well. The shop floor areas were clean and tidy, charts pinned up in the neat rows along the various set manufacturing process sections and safety measures strictly enforced.*[3]

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[3] Nostalgic feeling, New Sunday Times, 30 August 2009

Generally, Company A implemented TPS in seven areas with the ultimate objective being to reduce the waste arising from waste of excessive inventory, waste of motion, waste of transportation, waste of over processing, waste of waiting time, waste of overproduction and waste due to product defect or rework. For example, to eliminate the waste in inventory, Company A implemented the Kanban system to supply the parts to the production lines. The implementation of the Kanban system managed to reduce the stock holding from 3 days to 0.5 days. Other examples of waste elimination in product defects and reworks were the implementation of Pokayoke and Andon. Pokayoke was an error proofing method to reduce the human error in assembling the parts, which, ultimately, increases quality. Whereas, the implementation of Andon allowed the line to be stopped and operators to call their immediate superior if any line abnormality happened. With the implementation of the Andon and Pokayoke system, Company A managed to reduce its defects from 1.5 to 0.2 per unit (as of year 2012). Furthermore, Company A also implemented JIT delivery for some big parts, such as seats, tyres and bumpers.

The concept of Kaizen and the Quality Control Circle was also well known among the employees. Company A also conducted a monthly Kaizen Suggestion Scheme competition and a yearly Quality Control Cycle competition to encourage its employees to give ideas for cost reduction. However, these activities were hardly linked to achieving the TCM target cost at the mass production stage.

Among the engineering tools, VE was the main tool used in TCM. It was widely used at Company A from planning until the mass production stage. In Company A, the second look VE, VE activities after the mass production started, was also known as Value Analysis (VA). As commented on by a survey respondent,

As of today, no proper TCM (as cost reduction activities) has been implemented, except VAVE (Survey respondent 49).

From the above qualitative findings, it can be concluded that the lean manufacturing, such as VE, JIT, and Kanban and Kaizen activities, was observed to some extent in Company A.

5.5.6 Supplier relationship

Company A recognized that suppliers have important roles to make TCM activities successful. As commented on by the middle management of the Cost Planning Department:

Cost planning (TCM activities) cannot be done only by us, only by one company, some cooperation is necessary from other companies. The suppliers! (Informant 6, Middle Management, Cost Planning Dept.).

Company A shared related information with its suppliers through the monthly supplier meeting. In this meeting, production related information and issues related to the suppliers were highlighted by the representatives from all the related departments. The objectives of this meeting were to make all the suppliers aware of production related issues and take the necessary actions related to their parts supply to Company A. Besides that, Company A also shared the production information through the online supplier information system. Company A also established a special department, the Vendor Improvement Department (VID) to support the suppliers. The main responsibility of this department was to verify the new product production preparation at the suppliers' plant and support the suppliers in terms of production related issues. These activities were in line with the stance of Company A to support the suppliers and make them more competent and competitive. As remarked by the Managing Director of Company A in one of his newspaper interviews:

> *What is important now is for Company A to work even more closely with local suppliers and help them to be globally competent and competitive and not just be suppliers for Company A alone.*[4]

The information received from the suppliers, i.e. supplier quotations, helped the case company to set the target cost. In estimating the target cost, the details of the processes and the basis of the cost charged for each process need to be understood. One of the methods to understand the process and cost was through the analysis of the suppliers' quotations. However, when submitting a tender for the project, not all the suppliers give their detailed quotation breakdown. Among the reasons given by the suppliers were against the company policy to reveal cost information and confidentiality. As there is no breakdown of the quotation from these suppliers, the TCM related members do not know the detailed costs. Furthermore, without detailed cost information, the tendency for opportunism was likely to happen after these suppliers had been selected. The suppliers might increase the cost unrealistically under small engineering changes along the development stage. As commented by the respondent:

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[4] Your 10 questions with Datuk ,The Star, 2011, June 11th

Information is very limited… the suppliers do not disclose their real costs. The cost is hidden somewhere. So, we do not know the actual cost (Informant 17, Lower Management, R&D Dept.).

Basically, when a large proportion of the suppliers' volume depended on the production of Company A, the suppliers were likely to share the detailed cost information with Company A. However, if the value of the suppliers' sales to Company A was small or there were few competitors to produce the same parts, the suppliers had a high supplier power against Company A. In this case, it was very difficult to get detailed cost information, especially for functional parts, such as headlamp, wire harness and meter instruments, which the drawings and part development were totally under the responsibility of the suppliers. Some suppliers were reluctant to reveal their cost information in detail because they were afraid Company A would use it as a battleground for future cost reduction. As commented by the middle management from the Purchasing and Vendor Development Department:

Basically, for local suppliers we have no problem getting the support to get the detailed quotation. No problem at all. But for the international suppliers (we do have problems), they know if they submit the details, we can utilize that detail for future (Informant 1, Middle Management, Purchasing and Vendor Development Dept.).

Since TCM is highly related to the suppliers, the suppliers' capability, understanding, commitment and level of cooperation determine the success of TCM. Generally, it seemed that the level of supplier relationship still did not meet the expectations of the TCM members. One of the respondents highlighted that the local suppliers still did not understand the pressure of globalization, which made them less competitive, and ultimately, prevented the successful implementation of TCM:

I think the biggest problem is because we are not at par with (local) suppliers... imbalance. We are into this globalization, meaning everybody has to grow together. But, I think only Company A is growing, the suppliers are not. So, because of this imbalance, some suppliers take things for granted. Probably they're not doing their best, they're not offering the same quality, and they cannot think the way we think. Some suppliers do not actually feel like they want to challenge their own quotation, so what they have from the accounts department is what they will submit rather than going through (the cost)... they are not trying to be competitive. They don't understand about globalization. By rights, they should be looking at their own quotation and asking themselves is this quotation competitive? Because we are into globalization, they (the suppliers) don't have the same understanding, that's why they are not at par (Informant 4, Middle Management, R&D Dept.).

However, on the other hand, it seemed that local suppliers perceived that the cost reduction activities requested by Company A were cutting their profit margin not through cutting their own unnecessary or wasteful cost. This was because most of the materials were imported and uncontrollable by the suppliers. Therefore, the suppliers could only control their manufacturing or assembly cost. However, this assembly cost only covered a small portion of the total product cost compared to the material cost. As commented by the suppliers on the cost reduction activities by Company A:

Most of the cost belongs to the material or purchased parts, almost 80-90%. The balance is our manufacturing cost. How do you expect us to reduce more cost? (Informant 19, Top management, Supplier P).

They (Company A) asked us to reduce the cost, but you can see there is no more room for us to reduce the cost (Informant 23, Middle Management, Supplier S).

Besides that, the suppliers also had a constraint on the technology, such as in-house tooling development. This made them reliant on their second tier knowhow, which limited their capacity to conduct the cost reduction activities. As commented by the TCM members:

> *The suppliers rely on their toolmakers. We have to educate the suppliers. So they can educate their toolmakers (Informant 17, Lower Management, R&D Dept.).*

In spite of all the cost reduction pressure imposed by Company A on their suppliers, Company A acknowledged the constraints faced by the suppliers in terms of knowhow, capabilities and the limitation of design changes that could be conducted by the suppliers to reduce the cost:

> *We would like to have some cost reduction to meet the target cost. But, at the same time, we have to understand the constraints on the supplier side… we can push for the cost reduction but if the supplier ceases to exist, this will also become a problem for Company A (Informant 1, Middle management, Purchasing and Vendor Development Dept.).*

> *The suppliers have a very limited area to do cost reduction because they cannot touch or change the design. Change of the design not only involves their part but is also related to the parts of other suppliers…which involve many things (Informant 22, Technical staff, Purchasing and Vendor Development Dept.).*

Based on the above qualitative findings it can be concluded that, to some extent, the supplier relationship was observed in the TCM implementation process of Company A. Nevertheless, the level of cooperation from the suppliers in terms of cooperation in joint development, cost reduction activities, information and knowledge sharing, still did not meet the Company A's expectation.

5.5.7 A teamwork orientation culture

Company A promotes teamwork by promoting respect as one of its company values. In Company A's training documents, the value of respect was defined as being courteous, humble, exercising good emotional management in daily interactions, embracing and appreciating diversity, cooperating and supporting one another at all levels. In one of the newspaper interviews, Company A's top management proudly admitted the value of teamwork at Company A:

> *Without teamwork, Company A would not be able to achieve what it has in such a short span – less than two decades. I am blessed to have a team of dedicated management and staff.*[5]

As commented by one of the TCM members, teamwork played an important role in which each department performed their role and accepted responsibility through various means to accomplish the TCM targets:

> *How each department plays their role (is important for TCM success)... for example PVD (Purchasing and Vendor Development Department), even though we have our own cost tables, we have to enhance the cost tables, we get the latest data, we get the new calculations, we try to see our weakness in terms of the cost comparison between the Malaysian level, Indonesian level and the Japanese level. From the study, we can come out with proper new ideas how to make a better target cost. Sometimes, you cannot calculate the part cost itself because there is no cooperation from the suppliers, then you have to reverse calculate and see how you can tackle the problem of the target cost (Informant 5, Technical staff, Purchasing and Vendor Development Dept.).*

[5] Your 10 questions with Datuk ,The Star, 11 June 2011

The respondent further added that the age level range of Company A's employees has also played a role in promoting a culture of cooperation. Most of the working level was between 30 to 40 years old:

> *We can see the age level of Company A's employees. Everybody is much younger. The working level is much faster. We want to get fast result, fast data, everything is fast. If the culture is moving very slow, it is very hard for us to work and cooperate (Informant 5, Technical staff, Purchasing and Vendor Development Dept.).*

Unlike the Japanese companies, Company A did not implement Cross-Functional Management (CFM). Generally, the tasks were highly segregated by department and division with the TCM activities anchored by the Cost Planning Department. Nevertheless, even though there was no cross-functional team in the case company, the TCM activities were not conducted in isolation by the Cost Planning Department. The TCM activities mainly involved the Purchasing and Vendor Development, R&D, Cost Planning, Product Marketing and Product Planning Departments. Other departments, such as Vendor Improvement, Production Planning, Product Engineering, Cost Control and Account Department were involved indirectly in supporting the TCM implementation process. Each department had their specific task in TCM; for example, the Marketing Department proposed the new products supported by the market survey results, the Product Planning Department studied the overall new product specifications, the R&D Department studied the feasibility of how to make the parts, the Cost Planning Department compiled the cost and calculated the profitability feasibility study, the Accounting Department provided the existing product cost information, Product Engineering studied the production line feasibility and studied the in-house cost, the Purchasing and Vendor Development Department negotiated with suppliers on the pricing of parts, and the Vendor Improvement Department supported and developed the suppliers on production related issues.

The TCM activities indirectly increased the communication and cooperation among the departments involved. For example, during the early stage of TCM implementation, the target cost was set solely by the Cost Planning Department. At that time, Purchasing and Vendor Development Department and the R&D Department did not get involved in the process of the target cost setting. However, in order to get a more realistic target cost for the model X1 project, these departments started to become involved in target cost setting. The exclusive parts' target costs were set together with the agreement of the Cost Planning, R&D and, Purchasing and Vendor Development Departments. This process increased the accuracy, reliability and achievability of the target cost. One of the R&D middle management commented that the R&D Department gradually became involved in the TCM activities:

> *During the earliest stages, R&D was not involved so much in cost planning activities (TCM)… it actually gradually increased for example like now, we are strongly involved (Informant 4, Middle Manager, R&D Dept.).*

Nevertheless, the TCM activities were more focused on the design and development stage and not yet integrated as a companywide activity. As remarked by the survey respondents, TCM was still not companywide, especially on the production side:

> *TCM implementation in Company A is still not overall, especially for the production plant (Survey respondent 3).*

Next, activities need involvement from PE (Production Engineering) and Assembly (Manufacturing) members. Most of the price increase of parts is due to additional requirements by these departments during the KWTA (initial trial stage) activity onwards (Survey respondent 44).

Furthermore, in the case company, the TCM was a part of NPD. Thus, even though some of the departments were not involved directly with TCM activities, all of these departments had different responsibilities and contributed their own expertise in NPD. During the NPD related meetings, the representatives of all the departments reported their status progress, which mainly related to quality and delivery. These meetings created interaction and cooperation among members.

From the above qualitative findings it can be concluded that even though the TCM practices at the case company were not companywide integrated activities, the teamwork orientation culture was positively observed to exist in the TCM implementation process of Company A.

5.5.8 Top management support and commitment

Company A's top management played an active role in preparing the company towards market liberalization. For example, since 2002, the management of Company A started to introduce the long-term vision, "Triple T" Vision (pseudonym), which covered the customer satisfaction, market and cost reduction aspects. Under this vision, Company A targeted to be in the Top three in the Customer Satisfaction Index (CSI) ranking, to have a cost reduction of 30 per cent and to have a 30 per cent market share. These objectives were pasted everywhere in the company's premises. A small printed card with the "Triple T" vision was also distributed to all employees to increase their awareness. Accordingly, the

TCM members recognized that the TCM practice was one of the tools to achieve the "Triple T" vision. As commented by Informant 4 regarding the relationship between the company vision and TCM practice:

> *... the end objectives drive thing (activities). Meaning that we know that we have to achieve a certain target, earlier we have this 'Triple T' Vision (pseudonym), then we have 4% target reduction target every year. We know that we have to achieve the target in order to achieve a certain profit target profitability (Informant 4, Middle management, R&D Dept.).*

Inasmuch as the case company was a manufacturing company with a vertical and hierarchical organization, the department heads played an important role in smoothing the communication among the departments. For example, the heads of department actively communicated with the management of other departments to assist their subordinates to solve the tough issues. As remarked by the R& D middle management on their top management support:

> *In terms of R&D, we don't have that problem... Usually R&D management will also be involved when we are stuck or hit the wall. They will actually actively get involved with other (department) management ... our own management actually assists a lot (Informant 4, Middle management, R&D Dept.).*

In terms of the TCM implementation process at the case company, even though the case company did not practice the CFM, the CE was the leader for new product development. Generally, the main role of the CE was to determine the project direction and to ensure the targets were achieved. Accordingly, all the related departments reported the necessary information to the CE. For example, the Product Marketing Department reported the market survey results and Product Marketing concept, the Cost Planning Department reported the necessary cost information and project cost achievement status at each development stage, and the R&D Department reported the technical related issues and overall product development status. Besides that, the CE also helped to enhance the cooperation with Company M's top management in relation to TCM activities. As commented by the technical staff on the CE roles in the TCM activities of Model X1:

> *First, it (the direction) comes from top management itself. In the case of Model X1, the CE was concerned about the price level in Malaysia. He personally pushed Company M to cooperate with our company. They (top management) wanted Company A's people (TCM members) to go to Japan (Company M) to study the target cost, get the agreement (on the target cost)... (Informant 5, Technical staff, Purchasing and Vendor Development Dept.).*

In each NPD quality gate meeting, the status of the project was also presented to the top management for their approval including the General Managers (GM) of the related departments, Executive Directors and Managing Director. Only with the top management approval, was the project allowed to proceed to the next stage. As commented by Informant 2, the top management gave support to the TCM activities in terms of providing the resources, monitoring and reviewing the overall cost achievement status and approving the overall result in each NPD quality gate meeting:

> *The GM level will monitor in terms of overall vehicle profit…meaning cost of local parts, development cost, investment cost, everything. They don't have to know the part by part target cost like … this part RM5… But our activity (TCM), at the end of the day, we produce an overall vehicle profit or vehicle costing, and then we present to the management, and management see, review and agreed. I think that is the involvement of the management. Management level reviews what we did, they approved. So if you ask about management commitment, yes! They do give commitment (Informant 2, Middle management, R&D Dept.).*

At the end of 2012, in order to fully prepare for the challenges of AFTA, Company A's top management introduced a new transformation philosophy. One of the new transformation philosophies that related to TCM was "Good Product Design" through "Practicability Design". The objectives were to produce a high quality and low cost product. This clear target drove all the employees in one direction, which was to ensure the company achieved its target profit and remained competitive. This transformation included the organizational re-structuring of the TCM related departments and also the methods of conducting the TCM, especially in terms of setting the target cost. As commented by Informant 17,

> *Now we are venturing into a new organization. We are doing the 'Axis method' (pseudonym). With this (TCM) method (of purchased part target cost setting), the engineer can see the whole process not only the design stage. However, it is too early to see the result (Informant 17, Lower Management, R &D Dept.).*

The case company's top management had a clear vision and played an active management role in supporting the TCM practice. From the above qualitative findings, it can be concluded that the top management support and commitment was positively observed in the TCM implementation process of Company A.

5.5.9 Training

In general, Company A shared information with its employees through the employees website, email public folder, periodic company magazines and notice boards. Furthermore, Company A also implemented "*mieruka*" or the visualization concept to create a common understanding through information visualization. In the factory visits, the researcher saw that various materials were pasted on the notice boards including training materials, production related status progress and production related issues. Besides that, every morning, each department conducted a fifteen minutes briefing to brief and share the latest issues with their group members. Some departments; for example, the Cost Planning Department conducted a one hour meeting each morning. In this meeting, the Cost Planning members shared and discussed their project status progress, issues and planned countermeasures with the members and the superiors. After the briefing, a short training was also conducted in turn by each member to educate the new members.

The case company's commitment towards training was proven by the establishment of the Learning Centre and Plant training centre. Besides conducting internal training, the case company also trained its employees through external training including overseas training at Company M. However, such training was more general and not specific to the TCM practice. For the TCM, most of the training was conducted through the OJT. As highlighted by Informant 4 and Survey Respondent 54, the R&D engineers acquired the TCM knowhow, such as parts cost estimation knowledge through the OJT.

> *... I think we learnt through OJT, we don't have proper training in terms of this cost calculation. But through (doing) projects, the same individual or some groups of people are going through the same procedures. So, eventually they acquired the knowledge, the right knowledge on the calculations and then on the scenarios. If let us say, we are stuck in a certain situation we create certain scenarios and then the countermeasures. Usually we work together with CP (Cost Planning Department) very closely… I think most of the time all these are learnt through OJT (Informant 4, Middle management, R&D Dept.).*
>
> *TCM experience only gained from on job (training) or daily job. No specific training (Survey respondent 54).*

Even though the Cost Planning Department was established in 2001, due to the high turnover in this department, the most senior local members of Cost Planning at Company A only had 4 years' experience. Due to the difficulty in retaining the expertise, Company A still relied on the expatriates of Company M to lead and train members on the TCM practices. The expatriates from the Cost Planning Department also conducted specific TCM internal training to the TCM members to enhance the TCM knowledge, especially concerning cost estimation methods. As commented by Informant 5, the expatriates taught the TCM members many new things related to the TCM activities:

> *...We are lucky because we have a good teacher from Company M. Even sometimes, Company M teaches certain items that we cannot see in Malaysia itself (Informant 5, Technical staff, Purchasing and Vendor Development Dept.).*

Nevertheless, most of the TCM members felt that more specialized training on TCM was necessary to enhance the knowledge and skills.

> *TCM related training can be considered as not yet sufficient and fully established in this company, for some of the technical staff, designers and purchasing staff (Survey respondent 48).*
>
> *No specialist identified or capable to plan specific training for TCM (Survey respondent 3).*

Besides that, management also encouraged TCM members to learn the actual parts manufacturing processes at the suppliers' factories. The familiarization of the parts manufacturing processes assisted the TCM members to estimate the cost of parts accurately and set a realistic target cost. For example, the Cost Planning Department conducted monthly supplier visits to expose the members to the parts manufacturing processes.

Company A invested in human capital development by conducting various training. Nevertheless, regarding specific TCM training, most of the training was conducted through OJT. From the above qualitative findings it can be concluded that training was positively observed in the TCM implementation process of Company A.

In sum, AMT implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training, were observed to a certain extent at Company A.

5.6 Summary

This chapter described the background of Company A, the history of TCM development and what triggered Company A to fully implement TCM. Based on the qualitative findings, this chapter depicted the TCM implementation process, the enablers that support the implementation and the perceived benefits to the case company of TCM implementation. The findings demonstrated that the TCM implementation process at Company A was not a rigid technique but more of an adaptive technique. Furthermore, even though Company A already started to implement the TCM since 10 years ago, the TCM level was still in the infant stage. This was because the TCM implementation only focused on the design stage, involved certain departments and was not yet integrated as a companywide activity. In terms of the TCM implementation process, the qualitative evidence showed that the fundamental concept of TCM, such as target cost, target profit, target-selling price was similar to the Japanese TCM model. However, due to the environmental constraints, mainly suppliers and information sharing, some adaptations were made to the TCM implementation process.

This section also assessed the nine proposed enablers: (1) Advanced Manufacturing Technologies (AMT) implementation, (2) confrontational strategy, (3) a customer orientation, (4) an information-sharing network, (5) lean manufacturing implementation, (6) supplier relationships, (7) a teamwork oriented organizational culture, (8) top management support and commitment and (9) training. The assessment showed that the enablers existed and were likely to support the TCM implementation process. Nevertheless, the degrees of existence of these enablers need to be confirmed with a statistical approach. This chapter also assessed the perceived successful implementation of TCM from the TCM members. Generally, the TCM members recognized that the TCM implementation helped to improve the case company's efficiency, marketability and cost reduction. Nevertheless, similar to the proposed enablers, the degree of these dimensions needs to be confirmed using a statistical approach.

The next chapter will discuss the statistical analysis of TCM enablers. From the feedback of the survey questionnaires, the enablers that support the successful implementation of TCM will be analysed statistically using PLS. Then, the results from the quantitative evidence will be triangulated with the qualitative evidence for a comprehensive conclusion concerning the enablers that support the successful implementation of TCM at Company A.

CHAPTER 6: QUANTITATIVE FINDINGS

6.1 Introduction

This chapter discusses the quantitative findings of this research to answer the research question number three – among the nine factor identified, which factors that have a positive association with the successful implementation of TCM at Company A? Accordingly, the questionnaire surveys were distributed to the Company A's employees to statistically examine the factors that have a positive association with the successful implementation of TCM in Company A.

The first section discusses and analyses the response rate and the profile of the respondents. This demographic analysis is analysed using the Statistical Package for Social Sciences (SPSS 18.0). The second section explains the data screening process in terms of data cleaning and data coding. The last section discusses the results of the Smart Partial Least Squares (Smart PLS 2.0) analysis. In this section, the PLS results will be explained in two stages, the measurement model and the structural model.

6.2 Survey results

This section explains the analysis of the response rate and the profile of the respondents. The data were analysed using SPSS.

6.2.1 Response rate analysis

A total of 100 questionnaires were distributed randomly to selected participants from six departments. All the participants were either TCM direct users or indirect users. Eighty-nine responses were returned with a response rate of 89 per cent. However, two questionnaires were discarded from the analysis as (1) the pattern of response indicated that they did not understand the contents and did not give satisfactory feedback, (2) the respondent declared that he did not know anything about TCM. Malhotra (2007) suggests that included among the considerations for discarding unsatisfactory questionnaires is when the proportion of unsatisfactory respondents is small. Since the unsatisfactory questionnaires only amounted to 2 per cent of the total responses, the researcher decided to discard the questionnaires. Therefore, only 87 completed questionnaires were used for the data analysis. Table 6-1 summarizes the response rate status.

Table 6-1: Response rate

Item	Total	Percentage
Total questionnaires distributed	100	100%
Non response	11	11%
Number of returned questionnaires	89	89%
Less: Unusable responses	2	2%
Total useable responses	87	87%

6.2.2 Respondents' profile

From the Excel spreadsheet, the data were transferred to the SPSS for further analysis. SPSS version 18 was used to analyse the respondents' demographic profile and the items' characteristics. The frequency and distribution statistics were used for data screening to detect any mistakes in the data entry and missing data.

Table 6-2: Profile of the respondents

Type	Frequency	Percentage
Gender		
Male	**72**	**82.8**
Female	15	17.2
Total	87	100
Age		
Less than 30	24	27.6
Between 31 and 39	**52**	**59.8**
Between 40 and 49	10	11.5
More than 50	1	1.1
Total	87	100
Qualification		
High school and below	0	0.0
Certificate	2	2.3
Diploma	5	5.7
Bachelor degree	**75**	**86.2**
Master degree	5	5.7
PhD	0	0.0
Total	87	100
Department		
Cost planning	8	9.2
Product marketing	6	6.9
Research and Development (R&D)	**38**	**43.7**
Purchasing and Vendor Development	18	20.7
Product planning	7	8.0
Vendor improvement	10	11.5
Total	87	100
Present job position		
Top management	0	0.0
Middle management	17	19.5
Lower management	29	33.3
Technical staff	**41**	**47.1**
Total	87	100
Experience		
Less than 1 year	2	2.3
Between 1 and 2 year	7	8.0
Between 3 and 5 years	23	26.4
Between 6 to 10 years	23	26.4
Between 11 to 20 years	**32**	**36.8**
Total	87	100

Table 6-2 represents the demographic characteristics of the respondents. The respondents of the study consisted of 82.8 per cent male and 17.2 per cent female. The gender was skewed towards male because the majority of the employees of Company A were male, which is a normal phenomenon for an automotive manufacturing company. From the 87 respondents, the majority of the respondents (59.8 per cent) were in the age range between 31 and 39 years old. Most of the respondents (86.2 per cent) hold a bachelor degree. The questionnaires were distributed to six departments, with the majority of respondents (43.7 per cent) from the Research and Development Department.

The respondents' present job is categorized into five categories: Top level management (i.e. General Manager, Executive Director and Managing Director), Middle level management (i.e. Deputy General Manager, Senior Manager and Department Manager), Lower level management (i.e. Specialist engineer and Assistant Manager), and Technical staff (i.e. Engineer and Executive). The questionnaire was also distributed to the Top level management, however no reply was received. The highest position of the respondents was Deputy General Manager. The majority of the respondents were technical staff, which covered 47 per cent of the respondents. Almost 90 per cent of the respondents had been working for more than 3 years.

6.3 Data screening

The 87 responses were codified and transferred to quantitative factors and entered into the Excel spreadsheet, which served as a codebook. Appendix I shows the coding of the variables. At this stage, the data were cleaned by substituting the missing responses with a neutral value, which was 4. This treatment allowed the mean of the variable to remain the same and the results of the statistics, such as regression, were not much affected

(Malhotra, 2007). Table 6-3 shows the aggregate mean and standard deviation score for each variable. The detailed results are attached in Appendix J.

Table 6-3: Descriptive statistics for each construct.

Variable	Number of items	Max and Min Range	Mean	SD
Advanced Manufacturing Technologies	7	1-7	4.85	1.31
Confrontational Strategy	8	1-7	5.07	1.12
Customer Orientation	6	1-7	5.49	1.10
Information-sharing network	7	1-7	4.93	1.78
Lean Manufacturing	7	1-7	5.12	1.17
Supplier Relationship	8	1-7	5.37	1.04
Teamwork	10	2-7	5.12	1.04
Top Management Support and Commitment	6	1-7	4.89	1.15
Training	7	1-7	4.74	1.25
TCM Successful Implementation	13	1-7	5.03	1.10

Scale "1= Strongly Disagree/ Not at all" to "7=Strongly Agree/To a great extent"

In order to ensure a suitable methodology was adopted for the structural model analysis, a normality test was also conducted. In Appendix J, the result showed that the measurement items did not have a normal distribution. Normal distribution refers to the distribution of a set of data which follows a symmetrical bell shaped curve where the mean, mode and median are identical (Malhotra, 2007). The skewness result indicated skewed distribution with most of the data values showed a slight negative skew (Malhotra, 2007). The kurtosis also showed mixed results. Positive value of the kurtosis indicated a relatively peaked distribution and negative value of the kurtosis showed a relatively flat distribution (Hair et al., 2006). Malhotra (2007) suggested that for the distribution with highly skewed and peaked or flat, the statistical procedures that assume normality should be used with caution. Hence the data did not have a normal distribution, it was necessary to select an analysis method with higher tolerance of normality like Partial Least Square (PLS) (Chin &

Newsted, 1999).

6.4 Assessing the TCM enablers

Structural Equation Model (SEM) analysis can handle complicated constructs, indicators and relationships among the dependent and independent variables simultaneously. This allows the relationship among the constructs to be corrected automatically for measurement error (Chin & Newsted, 1999). Partial Least Squares (PLS) is a soft modelling technique of SEM, which was originally designed by Herman Wold in the 1970s. PLS is used to predict the proposed theoretical model by analysing the relationship between the latent variables. Nevertheless, PLS does not explain the causal relationships between variables. The basic concept of PLS is to try to extract the latent factors or measurement items that explain most of the variation in the response to predict the model.

There are several reasons why PLS is ideal for this research data analysis. First, PLS is appropriate for exploring a large number of variables to find a set of variables that can predict the outcome variables. Second, PLS can be used to estimate the path model with a small sample size. Third, good characteristic measurement, i.e. strict requirement of data distribution, is not critical requirement for PLS to produce its result (Chin & Newsted 1999). Because of the above reasons, this research used PLS (Smart PLS 2.0) to perform the data analysis.

The next sub-sections are divided into three categories. The first sub-section explains the construct type used in the measurement model. Then, the second sub-section explains the measurement model result in terms of reliability and validity of the reflective constructs. Finally, the last sub-section explains the structural model result in terms of the relationship between the exogenous and endogenous constructs.

6.4.1. Construct type

In this research model, all the constructs were measured by multiple indicators or items. Before starting the PLS analysis, the constructs need to be classified as formative or reflective. Jarvis et al. (2003) outline four criteria to distinguish whether the construct is formative or reflective. First, the direction of causality between the construct and indicator. For a reflective construct, the direction of causality flows from the construct to the indicators, and it flows from the indicators to the construct for the formative construct. Second, the interchangeability of the indicators. For a reflective construct, the indicators should be interchangeable, but they should not be interchangeable for the formative construct. Third, the covariation among indicators. Covariation refers to the condition in which the change in one indicator is associated with changes in other indicators. For a reflective construct, the indicators must covary with each other; however, this is not necessary for the formative construct. Forth, the antecedents or consequences of all the indicators. For the reflective construct, the indicators should have the same antecedents or consequences because the underlying construct is the same. However for the formative construct, the indicators should not have the same antecedents and consequences because it represents a different aspect of the construct (Jarvis, Mackenzie, & Podsakoff, 2003). Based on these criteria, all the constructs were conceptualized as reflective. The types of construct are summarized in Table 6-4.

Table 6-4: Construct summary

Construct	Type of construct
AMT	Reflective
Confrontational Strategy	Reflective
Customer Orientation	Reflective
Information Network	Reflective
Lean Manufacturing	Reflective
Supplier Relationship	Reflective
Teamwork	Reflective
Top Management Support & Commitment	Reflective
Training	Reflective
TCM Successful Implementation	Reflective

6.4.2 The measurement model

The objective of the measurement model is to assess the reliability and validity of the constructs and indicators (Henseler, Ringle, & Sinkovics, 2009). The reliability checks how consistently the indicators measure a particular construct (Cavana, 2001). In terms of a reflective construct, the reliability can be measured by the composite reliability and Cronbach's alpha (Imam, 2006). Whereas, the validity is the extent to which a set of measures and scales correctly represent the concept of interest. The validity of the correlation between a theoretically defined set of variables is measured by convergent validity and discriminant validity (Imam, 2006; Hair et al., 2006).

6.4.2.1 Reliability

Cronbach's Alpha and composite reliability are used to assess the reliability of the reflective construct. The construct is considered reliable if the Cronbach's alpha or composite reliability is above 0.7. However, compared to the Cronbach's alpha, composite reliability is more rigorous in estimating the reliability (Chin & Newstead, 1999). This is because composite reliability considers the different indicator loading, which is consistent with the PLS algorithm (Henseler, Ringle, & Sinkovics, 2009). As shown in Table 6-5, both Cronbach's alpha and composite reliability are more than 0.8 with the composite reliability higher than the Cronbach's alpha. Accordingly, both results showed that the internal consistency of indicators measuring each construct is high. Therefore, the constructs had good reliability.

Table 6-5: Reliability assessment (Cronbach's Alpha and Composite Reliability Index, n=87)

Construct	**Cronbach's Alpha**	**Composite Reliability**
AMT	0.91	0.93
CONFRONTATIONAL STRATEGY	0.86	0.89
CUSTOMER ORIENTATION	0.95	0.96
INFORMATION NETWORK	0.87	0.89
LEAN MANUFACTURING	0.89	0.91
TCM SUCCESSFUL IMPLEMENTATION	0.92	0.93
SUPPLIER RELATIONSHIP	0.83	0.87
TEAMWORK	0.94	0.95
TOP MGMT SUPPORT & COMMITMENT	0.89	0.92
TRAINING	0.88	0.91

6.4.2.2 Validity

a) Convergent validity

Convergent validity indicates the extent to which the blocks of indicators strongly converge in their representation of the underlying construct they were created to measure (Chin, 2010). The convergent validity of the measurement model can be seen from the correlation between the items and its construct. High convergent validity has the highest factor loading. The ideal factor loading should be 0.7 or higher. However, 0.5 or higher is still acceptable (Hair et al., 2006). Table 6-6 shows the outer model loadings for the theoretical model. All the T values are greater than 1.96 indicating convergent validity. The loading factors for all items are above 0.6 except for two items under Supplier Relationship.

Table 6-6: Outer loadings (Mean, STDEV, T-Values, n=87)

Item loading	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
AMT					
AMT1	0.70	0.68	0.15	0.15	4.66
AMT2	0.74	0.72	0.12	0.12	6.08
AMT3	0.84	0.80	0.16	0.16	5.28
AMT4	0.86	0.82	0.16	0.16	5.48
AMT5	0.84	0.81	0.14	0.14	6.10
AMT6	0.83	0.80	0.12	0.12	6.98
AMT7	0.87	0.83	0.13	0.13	6.84
CUSTOMER ORIENTATION					
CO1	0.79	0.78	0.13	0.13	5.96
CO2	0.91	0.89	0.11	0.11	8.03
CO3	0.91	0.88	0.12	0.12	7.36
CO4	0.92	0.89	0.12	0.12	7.72
CO5	0.91	0.88	0.13	0.13	6.85
CO6	0.87	0.83	0.13	0.13	6.88
CONFRONTATIONAL STRA.					
CS1	0.61	0.58	0.13	0.13	4.52
CS2	0.79	0.78	0.07	0.07	11.66
CS3	0.65	0.66	0.08	0.08	7.79
CS4	0.82	0.82	0.04	0.04	19.48
CS5	0.67	0.65	0.09	0.09	7.78
CS6	0.81	0.79	0.06	0.06	12.57
CS7	0.63	0.61	0.11	0.11	5.68
CS8	0.69	0.65	0.13	0.13	5.37
INFORMSHARING NET-WORK					
IS1	0.61	0.61	0.16	0.16	3.89
IS2	0.82	0.80	0.12	0.12	7.09
IS3	0.82	0.79	0.12	0.12	7.05
IS4	0.76	0.73	0.12	0.12	6.51
IS5	0.72	0.70	0.12	0.12	5.82
IS6	0.70	0.68	0.14	0.14	5.10
IS7	0.74	0.71	0.13	0.13	5.57
LEAN MANUFACTURING					
LM1	0.76	0.76	0.09	0.09	8.12
LM2	0.65	0.65	0.13	0.13	5.03
LM3	0.82	0.81	0.07	0.07	12.11
LM4	0.79	0.79	0.06	0.06	13.82
LM5	0.80	0.79	0.08	0.08	10.48
LM6	0.83	0.82	0.06	0.06	14.37
LM7	0.76	0.76	0.08	0.08	9.84
SUPPPLIER RELATIONSHIP					
SR1	0.74	0.73	0.06	0.06	12.17
SR2	**0.52**	0.52	0.10	0.10	5.26
SR3	0.76	0.75	0.07	0.07	11.03

Table 6-6, continued

Item loading	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
SR4	0.70	0.70	0.07	0.07	9.52
SR5	**0.44**	0.43	0.12	0.12	3.67
SR6	0.62	0.61	0.08	0.08	7.36
SR7	0.80	0.81	0.04	0.04	17.87
SR8	0.70	0.70	0.07	0.07	10.57
TRAINING					
T1	0.64	0.61	0.11	0.11	5.61
T2	0.62	0.61	0.11	0.11	5.80
T3	0.73	0.72	0.08	0.08	9.44
T4	0.69	0.69	0.10	0.10	7.23
T5	0.86	0.84	0.09	0.09	9.89
T6	0.88	0.86	0.09	0.09	10.05
T7	0.88	0.87	0.08	0.08	10.68
TOP MGMT SUPPORT & COMMITMENT					
TSC1	0.81	0.79	0.09	0.09	8.75
TSC2	0.86	0.85	0.08	0.08	11.02
TSC3	0.75	0.73	0.11	0.11	7.07
TSC4	0.88	0.87	0.07	0.07	12.28
TSC5	0.74	0.74	0.08	0.08	9.38
TSC6	0.80	0.80	0.07	0.07	11.06
TEAMWORK					
TW1	0.77	0.76	0.07	0.07	11.08
TW2	0.83	0.82	0.04	0.04	18.62
TW3	0.82	0.82	0.05	0.05	15.52
TW4	0.83	0.83	0.04	0.04	19.56
TW5	0.83	0.82	0.05	0.05	17.88
TW6	0.75	0.75	0.07	0.07	11.47
TW7	0.75	0.74	0.05	0.05	15.89
TW8	0.87	0.86	0.04	0.04	23.10
TW9	0.77	0.76	0.06	0.06	12.52
TW10	0.80	0.80	0.05	0.05	17.19
TW11	0.74	0.75	0.06	0.06	11.46
TCM SUCCESSFUL IMPLEMENTATION					
TSIE1	0.64	0.64	0.11	0.11	5.62
TSIE2	0.77	0.77	0.05	0.05	14.41
TSIE3	0.74	0.74	0.08	0.08	9.19
TSIE4	0.75	0.75	0.05	0.05	14.76
TSIE5	0.80	0.81	0.03	0.03	24.72
TSIM1	0.68	0.66	0.14	0.14	5.01
TSIM2	0.68	0.66	0.14	0.14	4.90
TSIM3	0.68	0.66	0.14	0.14	5.03
TSIM4	0.73	0.71	0.14	0.14	5.18
TSICR1	0.73	0.72	0.09	0.09	7.97
TSICR2	0.72	0.71	0.10	0.10	6.93
TSICR3	0.71	*0.71*	0.07	0.07	9.99
TSICR4	0.75	0.74	0.06	0.06	12.52

Table 6-7 shows two measurement items, which are SR2 and SR5, which have 0.52

and 0.44 factor loadings, respectively. Chin (2010) suggests that blocks of indicators have more convergent validity if the lowest loading is higher and the range of loadings is narrower. In order to increase the convergent validity of the supplier relationship, the SR2 and SR5 measurements were removed. Then, the re-estimation was made. All the remaining items were significantly loaded with a loading factor above 0.6.

Table 6-7: Measurement items with weak factor loading

Variables	**Deleted items**	**Indicated factor loading**
Supplier Relationship	SR2- Supplier Relationship	0.52
	SR5- Supplier Relationship 5	0.44

Convergent validity can also be validated using the Average Variance Extracted (AVE) (Henseler, Ringle, & Sinkovics, 2009). The AVE is the average squared of the factor loading. It is a summary indicator of the convergent validity among a set of items that represent the construct. An AVE of 0.5 indicates adequate convergent validity (Hair et al, 2006). This means that a construct is able to explain half of the variance of its indicators on average (Henseler, Ringle, & Sinkovics, 2009). Table 6-8 shows that all the constructs have an AVE above 0.5. Thus, all the constructs have adequate convergent validity.

Table 6-8: **Convergent Validity and AVE of the measurement model construct**

Item Loading	Original Sample (O)	Sample Mean (M)	Standard Devia-tion (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)	AVE
AMT						0.66
AMT1	0.70	0.68	0.15	0.15	4.57	
AMT2	0.74	0.71	0.14	0.14	5.31	
AMT3	0.84	0.78	0.19	0.19	4.56	
AMT4	0.86	0.81	0.19	0.19	4.59	
AMT5	0.84	0.79	0.17	0.17	4.83	
AMT6	0.83	0.79	0.15	0.15	5.64	
AMT7	0.87	0.82	0.16	0.16	5.46	
CUSTOMER ORIENTATION (CO)						0.78
CO1	0.79	0.77	0.15	0.15	5.34	
CO2	0.91	0.88	0.12	0.12	7.48	
CO3	0.91	0.88	0.13	0.13	7.17	
CO4	0.92	0.90	0.11	0.11	8.32	
CO5	0.91	0.89	0.13	0.13	7.25	
CO6	0.87	0.84	0.11	0.11	7.75	
CONFR. STARTEGY(CS)						0.51
CS1	0.61	0.58	0.14	0.14	4.38	
CS2	0.79	0.78	0.07	0.07	11.25	
CS3	0.65	0.66	0.08	0.08	7.88	
CS4	0.82	0.81	0.04	0.04	18.58	
CS5	0.67	0.66	0.08	0.08	8.31	
CS6	0.81	0.79	0.06	0.06	12.48	
CS7	0.63	0.61	0.11	0.11	5.68	
CS8	0.69	0.65	0.12	0.12	5.50	
INFORMATION-SHARING NETWORK (IS)						0.55
IS1	0.61	0.59	0.18	0.18	3.38	
IS2	0.82	0.79	0.13	0.13	6.18	
IS3	0.82	0.79	0.11	0.11	7.28	
IS4	0.76	0.73	0.12	0.12	6.44	
IS5	0.72	0.70	0.12	0.12	6.24	
IS6	0.70	0.67	0.15	0.15	4.72	
IS7	0.74	0.71	0.12	0.12	6.18	
LEAN MANUFACTURING (LM)						0.60
LM1	0.76	0.76	0.09	0.09	8.13	
LM2	0.65	0.64	0.13	0.13	5.10	
LM3	0.82	0.81	0.06	0.06	12.75	
LM4	0.79	0.79	0.06	0.06	13.54	
LM5	0.80	0.79	0.07	0.07	11.21	
LM6	0.83	0.82	0.05	0.05	17.11	
LM7	0.76	0.76	0.08	0.08	9.89	
SUPPLIER RELATIONSHIP (SR)						0.54
SR1	0.71	0.71	0.07	0.07	10.54	
SR3	0.77	0.75	0.07	0.07	10.88	
SR4	0.69	0.69	0.07	0.07	9.56	
SR6	0.66	0.65	0.08	0.08	8.39	
SR7	0.84	0.84	0.04	0.04	22.77	
SR8	0.72	0.72	0.07	0.07	11.03	

Table 6-8, continued

Item Loading	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)	AVE
TRAINING (T)						0.58
T1	0.64	0.61	0.12	0.12	5.36	
T2	0.62	0.61	0.11	0.11	5.54	
T3	0.73	0.73	0.08	0.08	8.63	
T4	0.69	0.69	0.09	0.09	7.55	
T5	0.86	0.84	0.08	0.08	10.28	
T6	0.88	0.86	0.08	0.08	10.56	
T7	0.88	0.86	0.08	0.08	11.10	
TOP MGMT SUPPORT & COMMITMENT (TSC)						0.65
TSC1	0.81	0.79	0.10	0.10	7.85	
TSC2	0.86	0.84	0.09	0.09	9.97	
TSC3	0.75	0.73	0.11	0.11	6.65	
TSC4	0.88	0.87	0.08	0.08	11.29	
TSC5	0.74	0.74	0.10	0.10	7.71	
TSC6	0.80	0.80	0.09	0.09	8.84	
TEAMWORK (TM)						0.63
TW1	0.77	0.76	0.06	0.06	11.96	
TW2	0.83	0.82	0.04	0.04	18.41	
TW3	0.82	0.82	0.05	0.05	16.22	
TW4	0.83	0.83	0.04	0.04	20.75	
TW5	0.83	0.82	0.04	0.04	19.46	
TW6	0.75	0.75	0.07	0.07	11.19	
TW7	0.75	0.74	0.05	0.05	15.92	
TW8	0.87	0.86	0.04	0.04	23.42	
TW9	0.77	0.76	0.06	0.06	12.30	
TW10	0.80	0.80	0.05	0.05	16.07	
TW11	0.74	0.75	0.07	0.07	11.24	
TCM SUCCESSFUL IMPLEMENTATION (TSI)						0.52
TSIE1	0.64	0.63	0.12	0.12	5.56	
TSIE2	0.77	0.77	0.06	0.06	13.85	
TSIE3	0.74	0.73	0.08	0.08	9.03	
TSIE4	0.75	0.76	0.05	0.05	15.08	
TSIE5	0.80	0.81	0.03	0.03	24.35	
TSIM1	0.68	0.67	0.13	0.13	5.19	
TSIM2	0.68	0.66	0.13	0.13	5.14	
TSIM3	0.68	0.67	0.13	0.13	5.28	
TSIM4	0.73	0.71	0.13	0.13	5.45	
TSICR1	0.73	0.72	0.10	0.10	7.67	
TSICR2	0.72	0.70	0.11	0.11	6.44	
TSICR3	0.71	0.71	0.08	0.08	9.43	
TSICR4	0.75	0.74	0.06	0.06	11.91	

b) Discriminant validity

Discriminant validity is the degree to which a construct is distinct from other constructs. High discriminant validity proves that the construct is unique and captures some phenomena that are not captured by other constructs (Hair et al, 2006). The discriminant validity can be assessed at the indicator level by cross loadings and at the construct level using the Fornell-Larker criterion (Henseler, Ringle, & Sinkovics, 2009).

The discriminant level at the indicator level is established if each indicator has greater loads related to its construct than the cross loading. Table 6-9 shows that each indicator loads the highest on its construct column rather than the column of other constructs. This shows that each indicator loads more highly on its construct than other constructs and the construct predicts the indicators in its block better than the indicators in other blocks (Chin, 2010; Iman, 2006; Henseler, Ringle, & Sinkovics, 2009).

Table 6-9: Outer model and Cross loading

	AMT	CS	CO	IS	LM	SR	TM	TSC	T	TSI
AMT1	**0.70**	0.32	0.50	0.27	0.40	0.11	0.10	0.36	0.16	0.17
AMT2	**0.74**	0.38	0.30	0.01	0.39	0.28	0.07	0.26	0.21	0.19
AMT3	**0.84**	0.23	0.24	0.17	0.31	0.09	-0.05	0.27	0.18	0.06
AMT4	**0.86**	0.21	0.10	0.11	0.30	0.13	0.11	0.31	0.21	0.21
AMT5	**0.84**	0.18	0.11	0.08	0.26	0.12	0.05	0.23	0.20	0.17
AMT6	**0.83**	0.30	0.27	0.18	0.39	0.18	0.13	0.42	0.17	0.14
AMT7	**0.87**	0.20	0.25	0.17	0.36	0.16	0.02	0.28	0.33	0.14
CS1	0.21	**0.61**	0.43	0.31	0.50	0.37	0.22	0.25	0.11	0.17
CS2	0.15	**0.79**	0.47	0.26	0.44	0.48	0.39	0.34	0.11	0.34
CS3	0.27	**0.65**	0.31	0.27	0.40	0.41	0.19	0.32	0.21	0.34
CS4	0.22	**0.82**	0.38	0.14	0.56	0.47	0.31	0.39	0.28	0.40
CS5	0.27	**0.67**	0.46	0.29	0.42	0.35	0.41	0.31	0.32	0.34
CS6	0.24	**0.81**	0.53	0.29	0.59	0.49	0.43	0.35	0.28	0.36
CS7	0.19	**0.63**	0.47	0.11	0.43	0.26	0.43	0.38	0.10	0.28
CS8	0.33	**0.69**	0.63	0.14	0.52	0.41	0.22	0.33	0.31	0.16
CO1	0.13	0.59	**0.79**	0.35	0.4	0.34	0.23	0.37	0.16	0.13
CO2	0.27	0.63	**0.91**	0.41	0.44	0.31	0.22	0.46	0.16	0.18
CO3	0.23	0.52	**0.91**	0.30	0.29	0.24	0.28	0.35	0.21	0.24
CO4	0.25	0.50	**0.92**	0.25	0.34	0.17	0.17	0.30	0.11	0.15
CO5	0.28	0.57	**0.91**	0.27	0.37	0.15	0.22	0.40	0.22	0.23
CO6	0.36	0.51	**0.87**	0.31	0.47	0.26	0.14	0.29	0.13	0.17
IS1	0.01	0.11	0.19	**0.61**	0.17	0.20	0.08	0.28	0.06	0.10
IS2	0.08	0.19	0.20	**0.82**	0.33	0.30	0.17	0.47	0.17	0.27
IS3	0.15	0.31	0.31	**0.82**	0.39	0.38	0.23	0.47	0.28	0.25
IS4	0.18	0.37	0.29	**0.76**	0.36	0.4	0.3	0.48	0.28	0.22
IS5	0.24	0.28	0.33	**0.72**	0.31	0.27	0.3	0.44	0.15	0.28
IS6	0.06	0.17	0.23	**0.70**	0.26	0.30	0.22	0.43	0.14	0.20
IS7	0.05	0.18	0.22	**0.74**	0.23	0.32	0.29	0.39	0.23	0.33
LM1	0.40	0.60	0.44	0.34	**0.76**	0.47	0.31	0.43	0.12	0.30
LM2	0.33	0.44	0.22	0.16	**0.65**	0.28	0.02	0.24	0.14	0.09
LM3	0.29	0.59	0.35	0.26	**0.82**	0.40	0.16	0.43	0.15	0.23
LM4	0.35	0.51	0.32	0.38	**0.79**	0.52	0.30	0.34	0.34	0.31
LM5	0.30	0.49	0.35	0.34	**0.80**	0.37	0.23	0.39	0.29	0.26
LM6	0.23	0.53	0.33	0.30	**0.83**	0.45	0.26	0.31	0.25	0.25
LM7	0.35	0.43	0.25	0.32	**0.76**	0.34	0.32	0.28	0.26	0.33
SR1	0.11	0.42	0.16	0.33	0.31	**0.71**	0.39	0.26	0.36	0.38
SR3	0.14	0.51	0.19	0.29	0.41	**0.77**	0.45	0.28	0.32	0.31
SR4	0.26	0.36	0.13	0.39	0.44	**0.69**	0.36	0.34	0.24	0.26
SR6	0.03	0.27	0.13	0.27	0.29	**0.66**	0.30	0.26	0.10	0.25
SR7	0.14	0.47	0.21	0.35	0.44	**0.84**	0.40	0.25	0.35	0.46
SR8	0.20	0.48	0.31	0.24	0.46	**0.72**	0.27	0.21	0.26	0.31
TW1	0.20	0.44	0.24	0.27	0.36	0.42	**0.77**	0.52	0.23	0.43
TW2	-0.10	0.38	0.19	0.30	0.29	0.47	**0.83**	0.43	0.25	0.43
TW3	0.04	0.36	0.23	0.34	0.27	0.42	**0.82**	0.52	0.15	0.44
TW4	0.14	0.49	0.25	0.25	0.4	0.44	**0.83**	0.37	0.31	0.49

Table 6-9, continued

	AMT	CS	CO	IS	LM	SR	TM	TSC	T	TSI
TW5	0.09	0.41	0.25	0.37	0.33	0.37	**0.83**	0.42	0.22	0.37
TW6	0.02	0.32	0.15	0.10	0.13	0.32	**0.75**	0.39	0.23	0.49
TW7	0.02	0.32	0.09	0.21	0.24	0.38	**0.75**	0.28	0.2	0.44
TW8	-0.01	0.24	0.12	0.20	0.12	0.38	**0.87**	0.25	0.17	0.41
TW9	0.03	0.40	0.25	0.29	0.22	0.43	**0.77**	0.26	0.24	0.41
TW10	0.15	0.39	0.24	0.33	0.26	0.42	**0.80**	0.40	0.19	0.53
TW11	0.09	0.34	0.07	0.20	0.19	0.26	**0.74**	0.30	0.12	0.53
TSC1	0.30	0.43	0.38	0.48	0.36	0.27	0.42	**0.81**	0.28	0.41
TSC2	0.35	0.48	0.36	0.48	0.40	0.35	0.40	**0.86**	0.32	0.46
TSC3	0.23	0.30	0.23	0.36	0.30	0.28	0.31	**0.75**	0.23	0.45
TSC4	0.34	0.40	0.29	0.5	0.39	0.30	0.47	**0.88**	0.29	0.50
TSC5	0.3	0.34	0.33	0.52	0.39	0.25	0.31	**0.74**	0.22	0.33
TSC6	0.29	0.34	0.37	0.49	0.36	0.28	0.38	**0.80**	0.17	0.45
T1	0.06	0.21	0.12	0.14	0.15	0.22	0.10	0.11	**0.64**	0.07
T2	0.16	0.28	0.15	0.15	0.27	0.31	0.11	0.08	**0.62**	0.19
T3	0.27	0.29	0.15	0.1	0.23	0.28	0.30	0.20	**0.73**	0.37
T4	0.19	0.16	0.04	0.01	0.14	0.29	0.14	0.07	**0.69**	0.30
T5	0.21	0.27	0.22	0.29	0.23	0.29	0.16	0.31	**0.86**	0.36
T6	0.19	0.25	0.18	0.35	0.26	0.31	0.23	0.35	**0.88**	0.36
T7	0.21	0.22	0.16	0.35	0.27	0.35	0.28	0.39	**0.88**	0.36
TSICR1	0.30	0.40	0.18	0.16	0.21	0.37	0.50	0.45	0.30	**0.73**
TSICR2	0.23	0.3	0.06	0.09	0.17	0.28	0.36	0.36	0.47	**0.72**
TSICR3	0.17	0.29	0.02	0.17	0.27	0.36	0.46	0.39	0.23	**0.71**
TSICR4	0.22	0.34	0.07	0.2	0.29	0.35	0.48	0.44	0.25	**0.75**
TSIE1	0.17	0.17	0.00	0.06	0.10	0.23	0.29	0.24	0.19	**0.64**
TSIE2	0.15	0.27	0.07	0.31	0.24	0.41	0.40	0.33	0.34	**0.77**
TSIE3	0.09	0.34	0.10	0.09	0.16	0.36	0.45	0.37	0.20	**0.74**
TSIE4	-0.02	0.31	0.09	0.14	0.22	0.35	0.47	0.19	0.28	**0.75**
TSIE5	0.07	0.36	0.11	0.25	0.36	0.43	0.51	0.37	0.25	**0.8**
TSIM1	0.14	0.34	0.35	0.45	0.29	0.24	0.40	0.51	0.31	**0.68**
TSIM2	0.16	0.36	0.33	0.41	0.27	0.26	0.29	0.46	0.40	**0.68**
TSIM3	0.03	0.28	0.32	0.43	0.28	0.32	0.36	0.40	0.37	**0.68**
TSIM4	0.13	0.41	0.35	0.45	0.36	0.35	0.40	0.52	0.34	**0.73**

The discriminant level at the construct level was assessed using the Fornell-Larker criterion. The Fornell-Larker criterion proposes that a construct shares more variance with its measured indicators than any other construct (Henseler, Ringle, & Sinkovics, 2009). The discriminant level at the construct level is confirmed when the AVE of each construct has a value higher than the squared correlations with other constructs. Alternatively, discriminant validity can be confirmed if the squared root of the AVE of each construct is higher than its inter-construct correlation (Chin, 2010; Imam, 2006). Table 6-10 shows that all the square roots of the AVE are larger than the inter-construct correlation. This indicates that the construct explains its item measures better than it explains another construct. Thus, the discriminant validity of the measurement model was confirmed.

Table 6-10: Intercorrelations, Average Variance Extracted (AVE), and Square root of AVE (n=87)

	AVE	AMT	CONFRONTATIONAL STRATEGY	CUSTOMER ORIENTATION	INFORMATION NETWORK	LEAN MANUFACTURING	TCM SUCCESSFUL IMPLEMENTION	SUPPPLIER RELATIONSHIP	TEAM WORK	TOP MGMT SUPPORT & COMMITMENT	TRAINING
AMT	0.66	**0.81**									
CONFRONTATIONAL STRATEGY	0.51	0.32	**0.71**								
CUSTOMER ORIENTATION	0.78	0.30	0.61	**0.89**							
INFORMATION NETWORK	0.55	0.16	0.32	0.34	**0.74**						
LEAN MANUFACTURING	0.60	0.42	0.67	0.42	0.40	**0.78**					
TCM SUCCESSFUL IMPLEMENTATION	0.52	0.2	0.45	0.22	0.34	0.35	**0.72**				
SUPPLIER RELATIONSHIP	0.54	0.2	0.57	0.26	0.43	0.54	0.46	**0.73**			
TEAMWORK	0.63	0.08	0.47	0.24	0.33	0.32	0.58	0.49	**0.8**		
TOP MGMT SUPPORT & COMMITMENT	0.65	0.37	0.47	0.40	0.58	0.45	0.54	0.36	0.48	**0.81**	
TRAINING	0.58	0.26	0.31	0.19	0.27	0.29	0.42	0.39	0.27	0.31	**0.76**

The diagonal elements (value in bold) are the square root of the average variance extracted (AVE) between the measures and their constructs.

6.4.3 The structural model

Based on the above test, it was concluded that all the scales were reliable and valid for the evaluation of the structural model estimates. Next, the structural model testing was conducted to test the theoretical model. For the analysis, bootstrapping was conducted to provide the confidence interval for all estimated parameters. The bootstrapping treats the observed sample as if it represents the population by creating a large pre-specified number of bootstrap samples (Henseler et al., 2009). As suggested by Henseler et al. (2009), the number of cases for running the bootstrap analysis should be equal to the original sample but the number of resamples should be large to generate a stable estimate. Imam (2006) suggests 500 samples as a minimum sample for the bootstrapping. In this research, 1000 samples were used to evaluate the significance of the path coefficients.

The objective of the structural model testing was to visualize the relationship between the nine exogenous and endogenous variables by using the path diagram (Henseler, Ringle, & Sinkovics, 2009). The structural measurement model can be assessed by the coefficient of determination (R^2) measures, and the level and significance of the path coefficients (Hair, Ringle, & Sarstedt, 2011).

The R^2 results represent the amount of the explained variance in the endogenous construct (Chin, 2003). Generally, the target of R^2 should be high but its high level depends on the specific research (Hair, Ringle, & Sarstedt, 2011). Hinckle et al. (1998) classify the R^2 results into five categories of correlation level: weak is between 0.00 to 0.29, low is between 0.30 to 0.49, moderate is between 0.50 to 0.69, strong is between 0.70 to 0.89, and very strong is between 0.90 to 1.00. On the other hand, Chin (1998) classify R^2 values of

0.67 as substantial, 0.33 as moderate and 0.19 as weak (Henseler, Ringle, & Sinkovics, 2009).

Table 6-11 shows that the R^2 of the structural model is 0.49, which is between substantial and moderate (Henseler, Ringle, & Sinkovics, 2009). The R^2 value of the TCM successful implementation construct indicates that this variable can be explained by the Advanced Manufacturing Technology (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment and training by 49.22 per cent.

Table 6-11: Structural model R^2

CONSTRUCT	**R^2**
TCM SUCCESSFUL IMPLEMENTATION	0.492275
AMT	
CONFRONTATIONAL STRATEGY	
CUSTOMER ORIENTATION	
INFORMATION NETWORK	
LEAN MANUFACTURING	
SUPPLIER RELATIONSHIP	
TEAMWORK	
TOP MGMT SUPPORT & COMMITMENT	
TRAINING	

The second assessment of the structural model is the level and significance of the path coefficients. The individual path coefficients of the structural model can be explained as standardized beta coefficients of the ordinary least squares regression. Paths that are significant and show hypothesized direction support the proposed causal relationship, whereas insignificant paths or where the signs are contrary to the hypothesized direction do not support the hypotheses (Hair et al., 2011).

As presented in Table 6-12, the T-values of the AMT, confrontational strategy, customer orientation, information-sharing network, lean manufacturing, and supplier relationship construct were less than 1.96. Thus, the path was insignificant and there was no correlation between these variables with the successful implementation of TCM. On the other hand, training and top management support and commitment construct had a T-value of more than 1.96 with a 95% significance level. Among all, the teamwork construct had a T-value more than 2.56 with a 99% significance level. Accordingly, teamwork training, and top management support and commitment constructs reject the hypothesis that there is no correlation or path coefficient in the population. Only three out of the nine independent variables proved to be significant to the TCM successful implementation dependent variable, which were teamwork (ß=0.31, $P< 0.01$), training (ß=0.20, $p<0.05$), and top management support and commitment (ß=0.31, $p< 0.05$). Thus, teamwork, training, and top management support and commitment have positive association with the successful implementation of TCM.

Table 6-12: Path coefficient (Mean, STDEV, T-Values, n=87, Re- samples=1000)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
AMT → TCM SUCCESSFUL IMPLEMENTATION	-0.01	-0.01	0.10	0.10	0.06
CONFRONTATIONAL STRATEGY → TCM SUCCESSFUL IMPLEMENTATION	0.13	0.16	0.15	0.15	0.88
CUSTOMER ORIENTATION→ TCM SUCCESSFUL IMPLEMENTATION	-0.10	-0.09	0.14	0.14	0.68
INFORMATION NETWORK → TCM SUCCESSFUL IMPLEMENTATION	-0.03	0.02	0.12	0.12	0.24
LEAN MANUFACTURING → TCM SUCCESSFUL IMPLEMENTATION	-0.04	-0.04	0.13	0.13	0.33
SUPPLIER RELATIONSHIP →TCM SUCCESSFUL IMPLEMENTATION	0.11	0.12	0.13	0.13	0.83
TEAMWORK →TCM SUCCESSFUL IMPLEMENTATION	0.31	0.28	0.12	0.12	**2.57**
TOP MGMT SUPPORT & COMMITMENT →TCM SUCCESSFUL IMPLEMENTATION	0.31	0.26	0.15	0.15	**2.11**
TRAINING → TCM SUCCESSFUL IMPLEMENTATION	0.20	0.20	0.09	0.09	**2.31**

Figure 6-1 illustrates the full structural model path coefficients of the conceptual models of the TCM enablers. The value next to the construct shows the hypothesis number and the path coefficient value. The asterisk (*) indicates the significant paths. The results of the path coefficients are summarized as below:

1) AMT and the successful implementation of TCM have negative correlation between but not at a significant level.
2) Confrontational strategy does not have a significant relationship with the successful implementation of TCM.
3) Customer orientation and the successful implementation of TCM have negative correlation between but not at a significant level.
4) Information sharing network and the successful implementation of TCM have negative correlation between but not at a significant level.

5) Lean system manufacturing and the successful implementation of TCM have negative correlation between but not at a significant level.
6) Supplier relationship does not have a significant relationship with the successful implementation of TCM.
7) Teamwork has a significant relationship with the successful implementation of TCM. The path shows a strong coefficient in the model with a path coefficient of $p<0.01$ ($ß=0.31$) with the TCM successful implementation. This would indicate that if actions were taken to increase the environment of teamwork, specifically in terms of creating a sense of trustworthy among TCM members, then the level of the successful implementation of TCM would increase.
8) Top management support and commitment has a significant relationship to the successful implementation of TCM. The path shows a strong coefficient in the model with a path coefficient of $p< 0.05$($ß=0.31$). This would indicate that if top management gives more support and commitment, specifically in terms of providing the visible support for the TCM initiatives, then the level of the successful implementation of TCM would increase.
9) Training has a significant relationship to the successful implementation of TCM with a path coefficient of $p< 0.05$ ($ß=0.20$). This would indicate that if more training was conducted, specifically training for designing, implementing and using TCM, then the level of the successful implementation of TCM would increase.

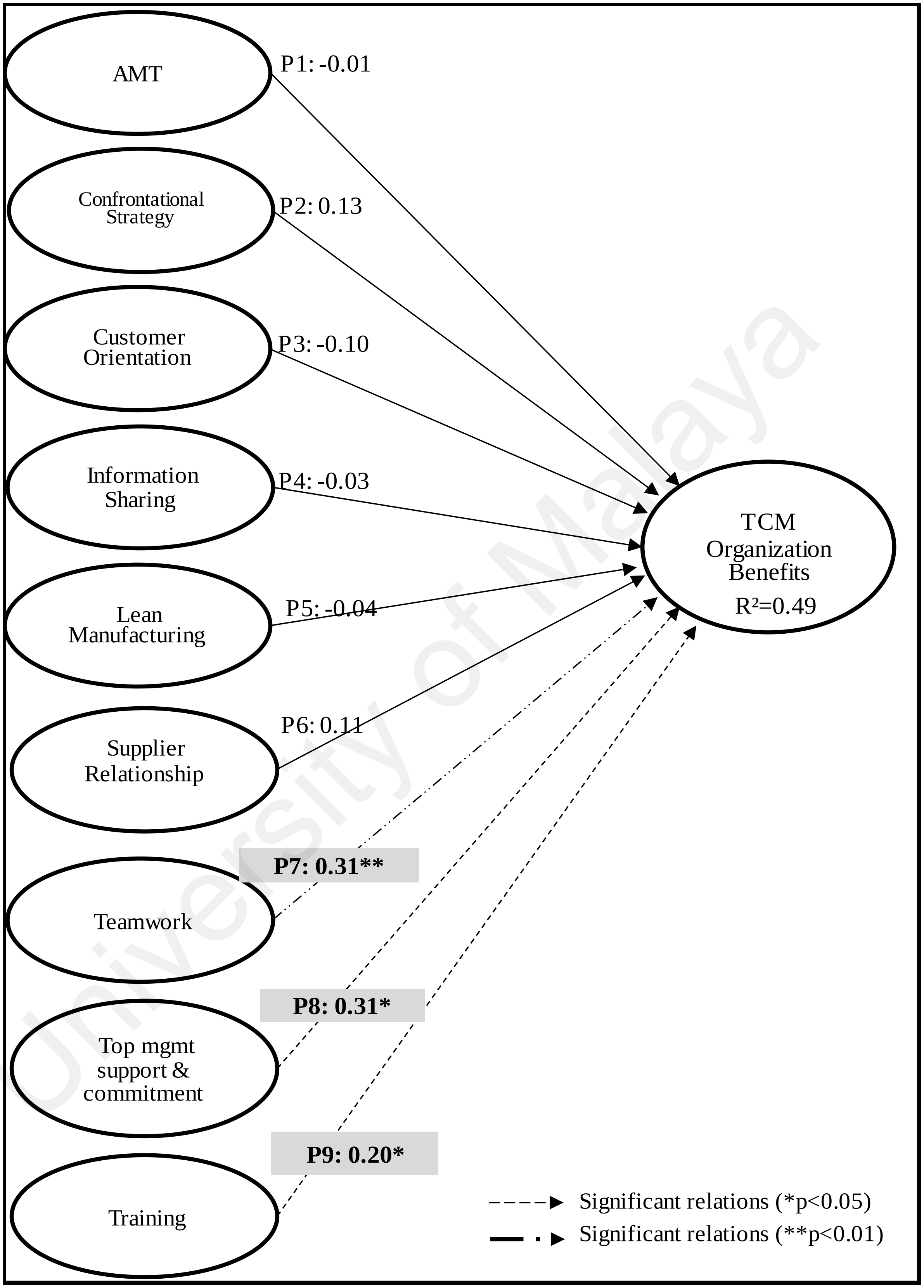

Figure 6-1: Full structural model with path coefficients

Table 6-13 summarizes the path coefficient results. Accordingly, the results show that among all the variables, only teamwork, training, and top management support and commitment have a positive association with the successful implementation of TCM. However, contrast to the propositions, the statistical analysis shows there are four factors- AMT implementation, customer orientation, information –sharing network and lean manufacturing- have a negative correlation with the successful implementation of TCM but not at a significant level to conclude a definite conclusion. Chapter 7 will discuss relationship of these factors with the successful implementation of TCM by triangulating it with qualitative findings.

Table 6-13: Summary of path coefficient results

Propositions	Path From	Path To	Coefficient	T-value	Significant level	Supported/ Not
P1	Advance Manufacturing Technologies	TCM Successful Implementation	-0.01	0.06		Not supported
P2	Confrontational Strategy	TCM Successful Implementation	0.13	0.68		Not supported
P3	Customer Orientation	TCM Successful Implementation	-0.10	0.88		Not supported
P4	Information-sharing network	TCM Successful Implementation	-0.03	0.24		Not supported
P5	Lean Manufacturing	TCM Successful Implementation	-0.04	0.33		Not supported
P6	Supplier Relationship	TCM Successful Implementation	0.11	0.83		Not supported
P7	Teamwork	TCM Successful Implementation	**0.31**	**2.57**	**	**Supported**
P8	Top Management Support and Commitment	TCM Successful Implementation	**0.31**	**2.11**	*	**Supported**
P9	Training	TCM Successful Implementation	**0.20**	**2.31**	*	**Supported**

6.5 Summary

In this chapter, the quantitative study was depicted in detail, including survey response rate, respondents' data profile, and data screening method, instrument validations and full structural model testing using PLS. The statistical results showed that out of nine propositions, only three enablers had a positive association with the successful implementation of TCM in the case company's context.

The previous chapter analysed the qualitative evidence on the TCM implementation process and enablers that support the implementation process. Based on the qualitative findings it was concluded that, in general, all the enablers existed to a certain extent at Company A. However, the findings also found that the case company made some adjustment and adaptation to the TCM implementation process due to some constraints mainly in the supplier relationship and information sharing. This chapter statistically analysed the enablers using the quantitative evidence from the survey results. Both chapters depicted the enablers but from different points of view, which were from qualitative and quantitative evidence. In this chapter, it was concluded that from the results of the statistical analysis, among all the propositions only training, top management commitment and support, and teamwork were positively associated with the successful implementation of TCM at Company A. These quantitative findings helped to support and strengthen the qualitative findings by providing the statistical results of the enablers that support the TCM practice at Company A.

The next chapter discusses the case study findings on the TCM implementation process and the enablers that have a positive association with the successful implementation of

TCM by triangulating the findings from Chapter 5 and Chapter 6. By triangulating the results, the comprehensive findings of the enablers that support the successful implementation of TCM can be concluded. Then, it also proposes the TCM implementation process model under the contexts of information sharing and supplier relationship constraints.

CHAPTER 7: DISCUSSION AND CONCLUSION

7.1 Introduction

The previous two chapters discuss the qualitative and quantitative findings of the case study. Chapter 5 discusses the qualitative evidence of the TCM implementation process and the identification as well as assessment of the nine enablers for the successful implementation of TCM. Subsequently, Chapter 6 presents the statistical results using the PLS technique. The statistical findings showed that only three enablers – teamwork, top management support and commitment, and training – are positively associated with the successful implementation of TCM at Company A.

This chapter discusses the results from Chapter 5 and 6 by triangulating the qualitative and quantitative findings and relating them to the pertinent literature. It also discusses and relates the results explanation by linking it with the contingency theory and dynamic capabilities theory. The first section provides an overview of the research. It restates the research background, objectives, questions and the research approaches taken in this study. Then, the second section answers the first research question by summarizing the major significant differences between what Company A has implemented and what are stated in the conceptual framework under each TCM step. This section also proposes the new revised conceptual framework of TCM implementation process. Next, the following section answers the second research question by summarizing the possible reasons that might have caused the differences of TCM practice at Company A compared to the TCM conceptual model from the viewpoint of the contingency and dynamic capabilities theories. Then, the subsequent section answers the third research question by summarizing each proposed enablers relationship with the successful implementation of TCM. This explanation is made by triangulating the qualitative and quantitative findings from the perspective of the contingency theory. Finally, this chapter ends with a discussion on the research contribution and implications, which is followed by an explanation of the research limitations and recommendations for future research topics.

7.2 Overview of the study

It is widely known that the TCM practices give a competitive advantage to the Japanese companies (Ansari, Bell, & Okano, 2007). The Japanese companies manage to utilize the TCM as a competitive tool to increase their companies' competitiveness and long-term profitability (Ansari & Swenson, 2006; Cooper & Slagmulder, 1999). In terms of TCM practices in Malaysia, a survey study on management accounting practices in late 1990s by Tho et al. (1998) found that the TCM already being implemented by Malaysian companies. However, a focused survey study on TCM implementation at Japanese affiliated companies in Malaysia in 2005 by Nishimura (2005a) found that the implementation process, definition and characteristics of TCM practices at these companies are not same as being practiced by the Japanese companies in Japan.

Since TCM is potential competitive tool, it is necessary to investigate the differences of TCM practices and how to enhance the implementation in order to increase a company's competitiveness in a developing country like Malaysia. Accordingly, the objectives of this study are to examine in-depth the differences in TCM practices in a Malaysian company compared to the Japanese TCM theoretical model, to identify the cause of differences, and to determine the key enablers that positively associated with the successful implementation of TCM in non-Japanese environment context. Considering the significance of the automotive industry in the development of Malaysia economy, this study specifically focused on the TCM practices in the automotive industry. Thus, the research questions in this study are: (1) How do the TCM practices in a typical Malaysian automotive company differ from the Japanese automotive companies' TCM model?, (2) why do the differences in TCM occur?, and (3) which enablers: implementation of Advanced Manufacturing Technology (AMT), confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationship, a teamwork oriented organizational culture, top management support and commitment and training, are perceived by the TCM users of a typical Malaysian automotive company as the critical enablers that have a positive association with the successful implementation of TCM. A single embedded case study method using multi-sources of data collection (Yin, 2003) was designed to answer the research questions.

7.3 The major differences of TCM implementation process

In a nutshell, this case study found that the fundamental steps of TCM practice at Company A were similar like the Japanese TCM theoretical model. Nevertheless, there were some differences in the details of TCM implementation process. Next sub-sections summarize the major differences under each step of TCM implementation process.

7.3.1 Step1: Set the target-selling price

Previous studies argue that the Japanese companies conduct a thorough market survey to identify the customers' needs and preferences such as product specifications, features and prices, before starting development of the new product. From the market survey, they identify the product to be developed and the contents of the changes (Lee & Monden, 1996; Sakurai, 1989; Cooper & Slagmulder, 1999). Similarly, Company A conducted various market surveys such as annual market survey and future trend market survey. However, Company A only conducted the new product market survey after the new product features and specifications already been conceptualized. This new product concept was conceptualized based on the market survey results of its existing products and future market trend, competitors' products, and company's long-term business plan and product plan. Unlike the Japanese companies, the new product market survey was not conducted to identify all customers' needs and preferences concerning the specifications and features of the new product. Instead, the objective of the new product market survey was only to verify the customers' preferences based on Company A's pre-determined focused assumptions of new product specifications and features. Generally, these assumptions only focused on the items that Company A intended to develop for its new product.

This difference might be due to the range of changes that could be made by the Company A for the new product against its original or base model. Since Company A used its joint venture's model base platform, the platform parts or lower body such as chassis, engine and transmission parts were carried over from its joint venture company's base model. The case company only made changes on the upper body of the product by customizing it to suit Malaysian market's requirements in terms of styling, features and ride comfort. Any features and specifications changes on the lower body of the product to suit Malaysian market's requirement may affect and require major changes to the original or base model's platform parts. This eventually incurred high investment. Accordingly, Company A pre-determined the features and specifications of the new product before the new product market survey to identify the customers' preferences within the allowable or possible range of changes. This showed limited customer orientation in its new product development.

7.3.2 Step 2: Set the target profit

As highlighted in the literature (Lee & Monden, 1996; Cooper & Slagmulder, 1999; Kato et al., 1995; Okano, 2005), there are many ways of setting the target profit from simple to advance methods. Even though, the case company acknowledged the importance of linking the company mid-term and long-term profit planning with the target profit, the absence of overall competitive companywide mid-term or long-term profit planning and vehicle type target profit guidelines information hindered Company A to apply more advance methods. Generally, Company A used simple target profit setting which was based on the predecessor product or similar product with some adjustments, as highlighted by Cooper and Slagmulder (1999). Based on historical accounting financial statement, Company A selected a specific month of the predecessor product profitability result and its profit ratio. In order to make the target profit of the new product more realistic, some adjustments were made by considering the estimated profit increment and decrement. Furthermore, the average of predecessor product's profit trend for several years and budgeted based business plan profit level were used to justify the target profit level of the new product.

7.3.3 Step 3: Set the target cost

Previous literature (Monden & Hamada, 1991; Cooper & Slagmulder, 1988; Sakurai, 1989) highlights that the Japanese companies distinguish the definition of allowable cost and target cost. Since the allowable cost is very tight, the target cost is set in between the allowable cost and the estimated cost. The purpose is to make the target cost more realistic and attainable so that it can motivate the employees. However, Company A did not differentiate the allowable cost and the target cost. The target cost was derived by deducting the target profit from the target-selling price. In order to close the differences between the total estimated cost and total target cost, the case company imposed a cost reduction target ratio equally to the estimated cost of all exclusive controllable cost items only such as in-house cost, exclusive fixed cost, or exclusive purchased parts cost. This was because these costs could be controlled and possible to be reduced during the product development stage. Other costs such as tax and duty, overhead cost, sales and distribution cost, common purchased parts, no cost reduction target was imposed as they were considered as uncontrollable cost items under TCM activities. Accordingly, the target cost of these uncontrollable cost items remained as same as its current estimated cost level. This measure helped to make the target cost of each cost items more realistic and attainable. Nevertheless, this also showed that the TCM activities at Company A were limited to certain cost items.

Previous literature (Okano, 2005; Monden & Hamada, 1991; Copper & Slagmulder, 1999) highlights that the Japanese companies break down their purchased parts total target cost according to function, component, and part. However, Company A breaks down the total target cost of local purchased parts until function basis level only according to R&D Department's designer group - Shell body, Body Others, Interior, Electrical, Engine, Drive Train and Chassis. Considering the total purchased parts cost covers almost 60 per cent of the total vehicle cost, the equal ratio basis cost reduction method caused the total amount of cost reduction imposed to the purchased parts cost was higher than other cost items. However, each designer group unable to impose cost reduction ratio equally to all purchased parts because it was almost impossible to conduct cost reduction to the common purchased parts. A common purchased part was also used at other products. Thus, any design changes of common purchased parts would affect the design of other products. This could incur unexpected problems and cost up to the other products. On the other hand, the cost reduction could not be conducted to all exclusive purchased parts due to the design changes limitation. Furthermore, the quantity of exclusive purchased parts was smaller than common purchased parts. This required huge cost reduction per unit of exclusive purchased parts to cover the total purchased parts cost reduction target amount. Accordingly, if the target cost was breakdown to each individual part, it would be impossible for each individual part to achieve its target cost. Due to this limitation, each designer group unable to further break down the target cost to each component or part basis level. Thus, the target cost of purchased parts cost at Company A was detailed up until function basis level according to the designer group. Each designer group had to manage their cost within their design group target cost.

In terms of purchased parts cost estimation, unlike the Japanese companies that rely on their suppliers (Cooper & Slagmulder, 1999), Company A did not rely on its suppliers' estimation except for functional parts, such as wire harness and radiator, due to no expertise or knowhow. This finding was similar to Rattray et al. (2007) in New Zealand manufacturing companies who found low involvement of suppliers in the TCM activities. Accordingly, in order to increase the accuracy of the purchased parts cost estimation, the estimation was calculated together by TCM members from the Cost Planning Department, R&D Department, and Purchasing and Vendor Development Department. However, this estimation used current cost level information based on latest quotations of the existing products. This purchased part cost estimation was used as the reference point to challenge the suppliers' quotations.

7.3.4 Step 4: Conduct the profitability feasibility study

Even though previous literature (Monden & Hamada, 1991; Cooper & Slagmulder, 1999) mentioned about the profitability feasibility study, there was no in-depth explanation made concerning how it was conducted. This case study provides more evidence on how the profitability feasibility was conducted in terms of the process, frequency of preparing it, and how and when the result was used.

Previous study by Monden and Hamada (1991) highlight that at the Japanese companies the TCM activities were anchored by the Cost Management Department. At Company A, instead of Cost Management Department, Cost Planning Department anchored the TCM activities. Accordingly, the Cost Planning Department compiled all information used in the profitability feasibility study from various sources. The profitability feasibility study was calculated based on project assumptions, such as foreign currency exchange rates, project volume and product model life by using a customized profitability format sheet. These project assumptions were fixed along the development stage. The objectives are to synchronize the calculation method and to avoid the fluctuation in capturing the cost information at each development stage. Accordingly, all the material costs which were bought from the overseas were converted to the local currency value based on foreign currency exchange rates assumption. As for the fixed costs such as investment and development cost, the total investment per unit vehicle was calculated by dividing the cost with monthly project volume and product model life assumption.

Monden and Hamada (1991) highlight that the Japanese companies calculate the profitability feasibility study at the initial product planning stage. Similarly, this case study also found that Company A calculated the profitability feasibility study at the initial product planning stage. However, this case study also found that the profitability feasibility study was calculated at each development stage to capture and monitor the current cost and profit estimation status against the target cost and target profit. Accordingly, the cost information was continuously updated in the profitability feasibility study from the product planning stage until the mass production stage. This was due to the case company used the cost reduction activities as its achievement scenario planning to cover the differences between total estimated cost and total target cost. Thus, the cost achievement results of the cost reduction plan need to be monitored at each development stage.

Previous literature highlight that based on the profitability result, the project would be adopted if it appears profitable and dropped or modified if it appears unprofitable (Monden & Hamada, 1991). Generally, at Company A, the profitability feasibility study plays an important role in TCM to capture the total estimated cost and total estimated profit at each development stage. The result of profitability feasibility study was used to evaluate whether a particular project meet its targets or not. However, since usually the total estimated cost was unable to meet the total target cost at the initial stage, the Company A's top management did not make project profitability decision at the initial stage solely based on the profitability feasibility study result. Instead, they also considered the achievement scenario planning as a set of concrete cost reduction strategies or planning on how to meet the target cost before mass production stage started.

7.3.5 Step 5: Achieving the target cost

The engineering tools mainly value engineering (VE) are commonly used by the Japanese companies to close the differences between the target cost and the estimated cost (Kato et al., 1995). Through VE activities, the drawings are continuously adjusted until the target cost is met. Similarly, Company A used VE to meet its target cost. Nevertheless, Company A more focused on the negotiation activities to meet the target cost instead of continuously adjusting the drawings by conducting VE. This was due to limited benchmarking information to conduct effective VE. Furthermore, Company A hardly received alternative design prospects as VE ideas from its suppliers. Without enough information, VE would likely to fail and affect the performance of other surrounding parts. This would affect the whole specification performance and quality of the new product. Accordingly, any VE failure would likely to increase the cost further. This was due to the cost of redesign the part to counter the VE failure or to counter the engineering issues at other surrounding parts. In addition, as the product approached its mass production stage, any design changes to cater VE issues would incur more cost. Specifically after tooling planning confirmation stage, any modification would incur cost up because the designs of the moulds or dies were already fixed.

The Japanese companies conduct VE continuously until mass production stage and at the same time negotiate with their suppliers to close the difference between target cost and suppliers' quoted prices (Cooper & Slagmulder, 1999). On the other hand, Company A focused more on the negotiation with the suppliers instead of continuously conducting VE to achieve the purchased parts target cost. Accordingly, starting from the supplier selection stage, Company A gave priority to the suppliers that were able to meet the target cost. Then, for any engineering changes during the development stage, challenge meetings were conducted to challenge the suppliers' quoted prices. Furthermore, under the cost reduction activities, Company A analysed the suppliers' cost level by comparing it with the similar purchased part cost level of its joint ventures partner, Company M. Then, a series of negotiation meetings were conducted to reduce the cost. These negotiation meetings were also joined by the top management.

Cooper and Slagmulder (1999) highlight that the Japanese companies get the market feedback frequently during the development stage and fine-tune their product specifications to cater market changes. However, in general, Company A did not modify its product's specifications after specifications had been being decided at the planning stage, unless due to the unavoidable new regulation by the government. After the planning stage, Company A fixed the specifications because any changes in the specifications would increase cost further up due to many inter-related engineering changes need to be studied and conducted.

7.3.6 Step 6: Continuous monitoring and reporting

Previous literature (Monden & Hamada, 1991; Cooper & Slagmulder, 1999; Kato et al., 1995; Okano, 2005) highlights that continuous monitoring and reporting are conducted to monitor the cost achievement status. This case study also found there was a high frequency of reporting the TCM results to the management, such as in monthly meetings, periodic meetings and special meetings. However, instead of monitoring and reporting the achievement status of all the cost items at the same frequency, Company A reported and monitored the local purchased parts cost achievement status more frequently (i.e. on a monthly basis) than other cost items such as in-house costs. This might be due to the fact that local purchased parts amounting to almost 50 per cent of the total vehicle costs. Case study findings by Carr and Ng (1995) also highlighted that the TCM implementation at Nissan UK focuses more on local purchased parts compared to other costs. For the purchased parts monthly reporting, each R&D designer group was responsible to present their group cost achievement status against the target cost to the management. This indicated that the TCM activities of the purchased parts mainly focused on the design and development stage to meet the target cost. However, this finding was different from TCM practices at New Zealand companies (Rattray et al., 2007) that focus on manufacturing department instead of design and development department to meet the target cost.

Even though there were various TCM related meetings conducted at Company A, these meetings were joined by middle to top management level from certain departments only such as Cost Planning Department, R&D Department, and Purchasing and Vendor Development Department. This was due to the achievement status reports contained confidential issues which were related to cost and profit status of the new product. Consequently, the strategies and the results of the TCM activities were not widely known by working level and other non-related departments. This shows that the TCM activities at Company A still limited to certain departments and not yet fully implemented as companywide activities.

7.3.7 Step 7: Cost improvement stage

Previous studies (Sakurai, 1989; Kato et al., 1995) highlight that some Japanese companies link the standard costing and budgeting to the TCM. Furthermore, the Japanese companies also link the Kaizen Costing and Cost Maintenance activities with the TCM by conducting the continuous cost reduction at the mass production stage to meet the target cost (Lee & Monden, 1996; Monden & Hamada, 1991). However, as Company A used actual costing method, no comparison was made concerning the standard cost and target cost variance at the mass production stage. Furthermore, even though Company A conducted the kaizen activities at the mass production stage, these kaizen activities were manufacturing plants' individual activities and had no linkage with TCM targets. Therefore, in order to make continuous cost reduction at the production stage for Model X1, Company A introduced a new project code, Model X2. By using this new project code, Company A re-conduct some of TCM activities for Model X1 in order to make the cost of the product more competitive.

Previous literature highlight that the Japanese companies report the actual cost and profit after three months of mass production started (Kato et al., 1995; Monden & Hamada, 1991). This case study found that Company A also conducted similar practice. Nevertheless, Company A continued to monitor the result by quarterly basis until the end of the product model life from the TCM planning's viewpoint. The main objectives were to report to the top management the actual cost movement compared to the previous quarter, and total accumulated profit since its launching time against its accumulated target profit plan. In addition, since Company A used actual costing, due to allocated overhead method, the historical accounting information was unable to reflect actual resource consumption by any particular product (Kaplan, 1984). Accordingly, based on historical accounting statements some adjustments were made to some of the cost items such as overhead cost. For these cost items, instead of using one particular month historical accounting statement, an average of several months historical accounting statement was used as the cost information. Based on this adjustment, Cost Planning Department reported the accumulated actual profit achievement of the product against its total accumulated target profit until the end of the product model life to the management.

The Japanese companies link the product design and development activities and mass production activities through TCM and Kaizen Costing. The latest information from the Kaizen Costing activities is used as the base cost to estimate future new product (Monden & Hamada, 1991). Due to a lack of cost information cycle between the design stage and mass production stage, Company A unable to use the latest cost information from the manufacturing plants as the base cost of the future new product. Accordingly, a particular month of predecessor product profitability or historical accounting statement was used as the base cost of the future new product. Nevertheless, since Company A used actual costing method, the cost per unit of some cost items were fluctuated from month to month based on production volume. Thus, actual cost and profit per unit vehicle was unable to be captured accurately (Guan et al., 2009). Accordingly, the case company made some adjustment by averaging up certain cost items for several months to make the cost information more accurate for the base cost for future new model.

7.3.8 New proposed conceptual framework for TCM

Based on the major differences explained in sub-section 7.3.1 to 7.3.7, Figure 7-1 proposes the new revised conceptual model of TCM implementation process for Company A. The number indicated on the upper left side in the Figure 7-1 shows the major steps of the TCM implementation process. Nevertheless, in the actual process, some of the activities might occur concurrently. However, for easier understanding the TCM implementation process flow is divided into PDCA stages and seven steps. This new proposed conceptual model for TCM implementation process could also be applied to other companies in the same context i.e. loose supplier relationship, limited cost information, limited customer orientation and TCM activities not fully integrated with other manufacturing systems.

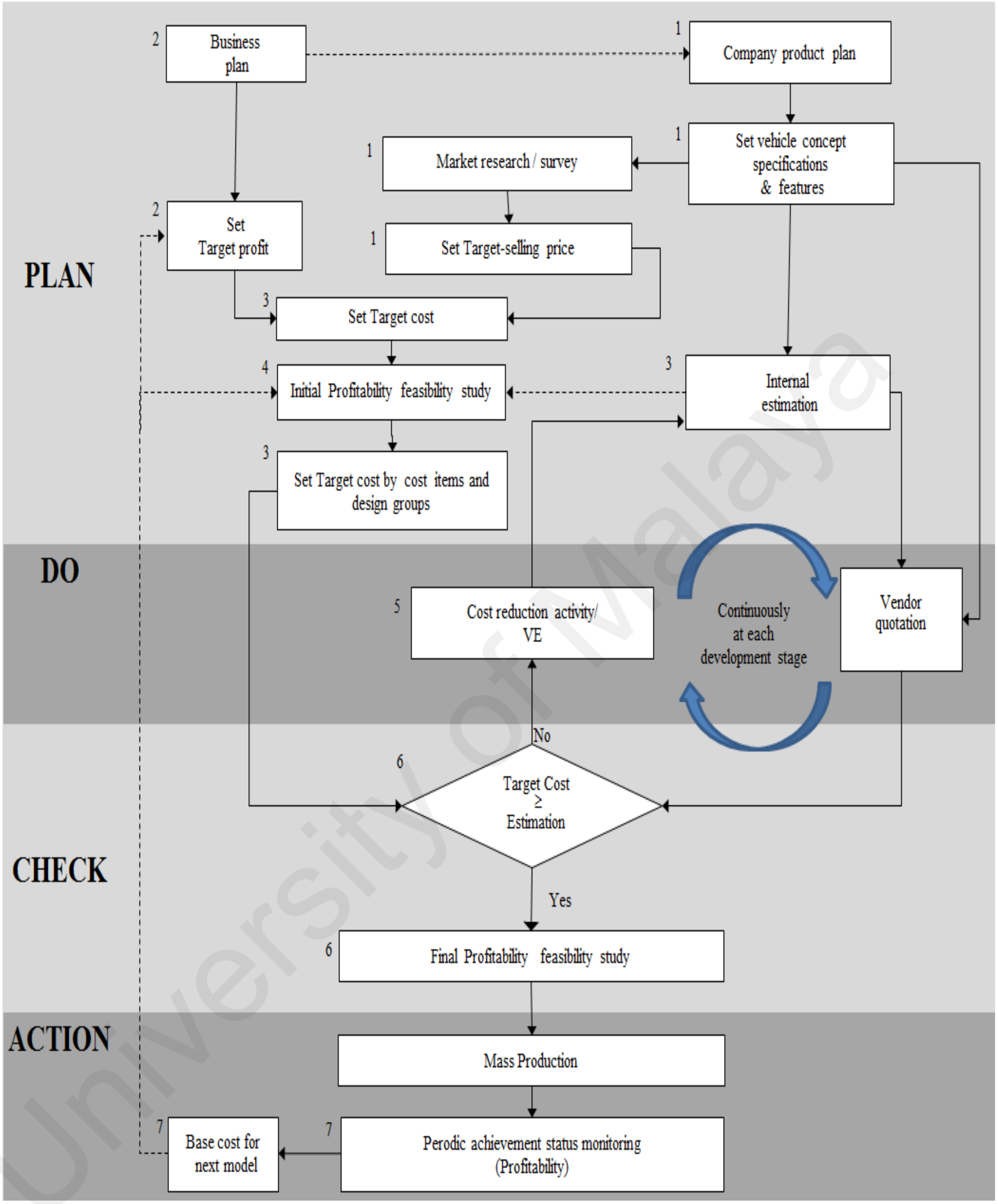

Figure 7-1: TCM – Revised Conceptual Model.

Notes: Number on the top left shows the step number of the TCM process. [1] STEP 1: Setting the target-selling price; [2] STEP 2: Setting the target profit; [3] STEP 3: Setting the target cost; [4] STEP 4: Making the profitability feasibility study; [5] STEP 5: Achieving the target cost; [6] STEP 6: Monitoring and reporting the cost achievement status; [7] STEP 7: Cost improvement.

The Plan stage consists of four steps: (1) setting the target-selling price, (2) setting the target profit, (3) setting the target cost, and (4) making the profitability feasibility study. In the first step, based on the company product plan and business plan, the new product specifications and features are pre-determined. Then, the new product market research is conducted to confirm these assumptions. Based on the market survey and the company product plan, the tentative target-selling price is set. In the second step, the target profit is set based on the company business plan and predecessor product's profit trend. Next, in the third step, the target cost is determined by subtracting the target profit from the target-selling price. Then, the target cost is broken down to all cost items, such as purchased parts cost, investment cost and in-house production cost. For the purchased parts cost, the target cost is further broken down to the R&D designer group level only. At the same time, all the related costs are estimated based on assumptions. If there is a gap between the target cost and the estimated cost, an achievement scenario planning as a set of cost reduction strategies must be planned to close the gap. In the fourth step, after setting the target-selling price, target profit, target cost and estimating all the costs, the initial profitability feasibility study is calculated to assess the per unit vehicle profit and loss. Upon top management judgment, the process can proceed to the next stage.

In the Do stage, the cost reduction activities are conducted to achieve the target cost. Based on the internal estimation, the suppliers' quotations are compared and challenged. Further cost reduction activities or negotiation will be conducted if the suppliers' cost is higher than the target cost. The cost achievement status is monitored continuously until the mass production timing.

Next in the PDCA-Check stage, the achievement status is monitored continuously until the mass production stage through periodical meetings. Before the mass production stage starts, all the latest costs are captured to finalize the profitability feasibility study. The profitability feasibility study result, i.e. the estimated total cost and simulated profit per unit vehicle, is reported to the management before proceed to the mass production stage.

Finally, in the PDCA-Act stage, after the product has been through the mass production stage and introduced to the market, the actual profitability is analysed against its original targets to grasp the product's profit achievement status. The actual profitability is continuously monitored with some adjustments based on project assumptions to monitor the product's profit achievement by periodic basis until the end of the product model life. For the future new product's base cost, an appropriate timing of the monthly actual profitability or historical accounting statement will be selected as the base cost. The actual profit trend of the predecessor product will be used as the basis to set the new product profit level.

7.4 The possible causes of the differences in TCM practices at Company A

Previous section explained the differences between Company A and the TCM conceptual model. This section discusses in-depth the possible reasons of the differences in TCM practice in the Company A context from the contingency and dynamic capabilities theory viewpoints.

As posit by contingency theory, the application of any management accounting system to the foreign setting must be designed with an adaptive framework. This is because all elements in the organization must fit well with one another to perform optimally (Drury, 2004). Generally, the case study showed that Company A was unable to fully implement TCM as highlighted in the TCM conceptual model due to some contextual constraints. As highlighted by Anderson and Young (1999), the setting of SMA is unlikely to thrive regardless of how competent the implementation is managed because the contextual factors have a major influence on the performance outcome. Nevertheless, the improvement of the process factors might mitigate the indirect effect of the contextual factors to the SMA implementation result.

On the other hand, this case study also showed that Company A utilized its available resources or capabilities to cater the contextual constraints in TCM implementation process. As posited by dynamic capabilities theory, the dynamic capabilities in the organization influence the company's existing resources and transform it to new resources so that the company can enhance or sustain its competitive advantage (Teese et al., 1997). Since TCM can be considered as bundle of routines or capabilities, this case study also explains TCM from the dynamic capabilities perspective. Specifically, this case study showed that within the case company's external and internal positions, the case company managed to adapt, integrate and reconfigure it resources through TCM activities to achieve the companies' objectives.

Next sub-sections summarize four issues that might have caused the differences in TCM practices and explain how the case company manages it resources to overcome the constraints.

7.4.1 No integration with other systems

The ultimate goal of TCM implementation is to achieve the target profit (Kato, 1993). Nevertheless, in the early stage of TCM development in Japan, the TCM was seen as a cost reduction tool (Monden et al., 1991; Tani et al., 1994). As the TCM developed and integrated with other business elements, the perspective of TCM shifted from a cost reduction tool to a profit management tool (Ansari et al., 2007; Feil, Yook, & Kim, 2004). The

TCM definitions also evolved from a cost reduction technique (Sakurai, 1989) to an integrated systematic profit management technique (Kato et al., 1995). As the activities become developed and matured, the Japanese companies gradually integrated it with the profit management system and applied it as a companywide activity (Kato et al., 1995). A full integration stage of TCM integrates and links various business functional areas into a coherent system (Kato et al., 1995). For example, the Japanese companies used total product portfolio that derived from mid-term and long-term profit planning, or vehicle type target profit guidelines to set the target profit for each new product (Kato et al., 1995; Okano, 2005). This makes the TCM closely related to corporate profit planning (Monden et al., 1991). Accordingly, by linking the short-term competitive plan and long-term strategic plan with TCM, the multiple loops feed forward system helps the company to be able to take proactive action in achieving its targets (Nishimura, 2005). In addition, the Japanese companies also link the TCM and other manufacturing systems, such as Kaizen Costing to continue cost reduction in the mass production stage, lean manufacturing to bring the mass production cost in line with the target cost in the mass production stage, and *3-Gens* principle to increase the accuracy of the cost information (Okano & Suzuki, 2007; Lee & Monden, 1996; Monden & Hamada, 1991; Helms et al., 2005).

Company A main objective to implement TCM was to remain profitable by securing its new product's profit. However, in setting the target profit for its new product, there was no connection between the new product's target profit and the strategic profit planning of the company. Thus, there was lack of multiple loops feed forward system in TCM practice at Company A. This was because Company A only had budget based business planning and did not have a solid strategic profit planning in terms of long-term and mid-term profit planning that considered the target profit level of future competitive products. Accordingly, Company A unable to set its new product target profit based on mid-term and long-term profit planning, or vehicle type target profit guidelines. In order to counter these information constraints, Company A set its new product target profit based on a particular month of predecessor product's historical profit by considering the estimated profit increment and decrement. The budget based business plan and yearly average of predecessor product's historical profit trend were also used as the reference points to justify the target profit level.

The case study found that the TCM activities at Company A focused on design and development stage which involved limited departments, mainly R&D Department, Purchasing and Vendor Development Department, and Cost Planning Department. Even though the kaizen activities were conducted to the existing products at the mass production stage, there was no continuation to achieve the target cost of the new product after the mass production stage. Additionally, due to the absence of Kaizen Costing, the in-house target cost, which was set during the design stage, was hardly monitored and improved after the mass production stage. Accordingly, instead of extended the mass production of Model X1 due to cost competitiveness issue, the case company conducted a special project code, Model X2, for cost reduction activities of Model X1 after a few months of its product launching.

As highlighted by Ellram (2000), the ideal situation for TCM requires a full integration with the other activities and value chain, but not all organizations have the resources and support to create it. Based on Ansari et al.'s (2007) five stages of management practice life cycle, the TCM practice in Company A can be categorized in the third stage of life cycle, the organizational context of the practice stage. The TCM implementation process is still in the process of adaptation within the company context but not yet integrated with other organizational tools and processes, and lacks an information cycle.

In summary, a lack of integration with other systems might have caused the differences in the TCM practices at Company A. TCM activities at Company A only involved the upstream of the production stage with the participation of certain departments and divisions, standalone activities and isolated from other management tools.

7.4.2 Low degree of customer orientation

TCM helps the Japanese companies plan and design the product quality that best meets the customers' needs (Sakurai, 1989). Accordingly, before the development starts, an intensive market research is conducted to determine the customer needs (Lee & Monden, 1996; Cooper & Slagmulder, 1999). The Japanese companies also change their design during the development stage to cope with competitors' products (Kato et al., 1995). In order to meet the target cost, the Japanese companies mainly focus on the design effort by improving the product design in the design and development stage or even earlier without sacrificing the value added functions or features (Tani et al., 1994; Kato et al., 1995).

Company technology and interdependence among its subunits are among the contingent factors that influence the design of management accounting system (Fisher, 1998). Due to the huge technology investment required to develop own platform parts such as engine and transmission parts, Company A do not develop its own platform parts. Accordingly, Company A uses the same platform as its joint venture partner's base or original product, and only make changes to the upper body of the predecessor product to suit with Malaysian market's requirement. Thus, compared with the Japanese automotive companies, Company

A has limited range of design engineering changes that can be conducted to its new product. In order to focus on allowable or possible range of design changes area, Company A set its pre-determined assumptions of the new product specifications and features before conducting the new market survey. These assumptions only focused on the items that the case company intended to develop for its new product. The case company did not conduct a new market survey to identify the potential customers' specifications and features requirement, or to decide the new product specifications and features solely from the new product market survey results. In other words, the objective of the new product market survey only to verify or justify the prior assumptions concerning the upper body related new product features and specifications. Additionally, Company A was less likely to integrate the new market feedback on the additional functionality requirements during the development stage unless due to unavoidable government regulations. This was due to any changes during development stage particularly after the tooling and mould planning confirmation stage, would cause changes on other surrounding parts which would increase cost.

In summary, the degree of customer orientation particularly in terms of determining the features and specifications of the product might have caused the differences in the TCM practices at Company A. Since Company A has limited scope in determining the design or making major changes from the base design, the degree of customer orientation in terms of identifying and integrating all customer requirements in products' features and specifications might be different compared with Japanese companies. As a result, a thorough new market survey to decide the specifications and features solely from the customers' requirements might not be necessary for Company A.

7.4.3 Cost information constraint

TCM requires comprehensive internal and external information (Cooper & Slagmulder, 1999; Kato et al., 1995; Monden & Hamada, 1991). Japanese companies create a total cost management system by linking the TCM with the Kaizen Costing (Monden & Hamada, 1991). In addition, instead of relying on the accounting result, the Japanese companies believe in *3-Gens* by directly communicating with the shop floor people during the planning, designing and production stage. This allows proactive and fast action in respect of cost reduction activities (Okano & Suzuki, 2007). It also creates a cost information cycle between the design and the production stages (Monden & Hamada, 1991).

However, the case company did not implement either Kaizen Costing or *3-Gens*. Thus, it relied on the information from the financial accounting as the main source of TCM cost information. This finding supports Chenhall & Langfield-Smith (1998b) who posit that traditional and advance management accounting tend to complement each other. In fact, this finding is similar to the study findings of Nishimura (2005a) who found that management accounting in Malaysia still relies on financial accounting, budgetary or standard cost information. As Company A used the actual costing method in preparing its financial accounting report, the actual incurred indirect costs, such as energy, consumables and overheads, were allocated to each product by using the volume and standard time. Abnormal factors such as reject rate were not considered during the cost allocation. Therefore, the cost per unit not reflected the actual cost incurred for the particular product. In order to increase the cost estimation accuracy, some cost adjustments were made, such as using monthly average historical accounting statement, to calculate the new product profitability.

As highlighted by Johnson and Kaplan (1987), the financial accounting information was originally designed for external financial reporting principles and procedures. Therefore, the management accounting reports, which are prepared from this source, may not be suitable for operation related decisions and strategic decisions (Johnson & Kaplan, 1987). On the other hand, Hoque (2003) suggests that SMA is "the process of identifying, gathering, choosing and analysing accounting data for helping the management team to make strategic decisions and to assess organizational effectiveness". Accordingly, in order to counter the cost information constraint issue, Company A identified, gathered and chose the most suitable accounting data and adjusted the cost data as the base cost of the new product profitability feasibility study calculation. Furthermore, after the mass production, the case company also continued to monitor a particular product's profit and loss until the end of the product model life to track the project achievement from the viewpoint of TCM planning.

In terms of target cost setting, the top-down method is the best method to link the TCM with the company profit planning and business planning (Kato, 1993). This method also fulfils the top management's requirement (Sakurai, 1989). Company A also used the top down method in setting its overall target cost. However, Company A has limited benchmark cost information to set the right level of target cost particularly for the purchased parts. Accordingly, in order to cover the differences between the target cost and the estimated cost, an achievement scenario planning was planned at the planning stage. Since the purchased parts cover almost 60 per cent from the total cost, the achievement scenario planning mainly focused more on the cost reduction of the purchased parts. Among the purchased parts, Company A more concentrated on the cost reduction activities of exclusive local purchased parts due to limited range of changes that could be conducted to the common purchased parts.

In terms of the cost estimation of exclusive purchased parts, due to a lack of global benchmark cost information, the estimation used current cost level by referring to the available information, such as from previous suppliers' quotations of existing purchased parts. This estimation became the target cost of the exclusive purchased parts. However, due to the estimation being made based on the current cost level, the target cost level is less competitive. Accordingly, even though the part cost achieved its target cost, it still did not achieve the global standard. This enforced the Company A to proceed with the cost reduction of Model X1 after it had been launched in the market.

In summary, this research suggests the cost information constraint might have caused the differences in the TCM practices at Company A. The case company used the most useable and available cost information, such as historical accounting statement and existing suppliers' quotations, to adapt with the cost information constraint.

7.4.4 Loose supplier relationship

TCM implementation not only requires internal cooperation but also external cooperation (Monden & Hamada, 1991; Okano, 2005). An effective TCM requires joint effort through the companies or through the entire value chain to achieve the target cost. This is because the pressure of reaching the target must be communicated and well understood by all parties in the supply chain, especially the suppliers (Helms et al., 2005). According to Ellram (2000), TCM companies will reach a full integration stage when they have a close supplier relationship. The close relationship between the Japanese companies and their suppliers (Kato et al., 1995) helps the Japanese companies to transmit down the competitive pressure to their suppliers and generate cost reduction throughout the supply chain (Kaplan et al., 1998; Cooper & Slagmulder, 1999). The Japanese suppliers even assist the Japanese automotive manufacturers in the cost estimation of parts and proactively propose cost reductions ideas (Cooper & Slagmulder, 1999, Okano, 2005). This high cooperation and mutual consensus in the relationship with suppliers gives a competitive edge to the Japanese companies (Howard & Herbig, 1996).

However, this research found that the case company relationship with its suppliers was rather low. This finding was similar to Rattray et al. (2007) in New Zealand manufacturing companies who found low involvement of suppliers in TCM activities. Accordingly, the low supplier relationship meant the case company did not have any long-term commitment with its suppliers. Furthermore, unlike the Japanese suppliers, the suppliers of the case company hardly suggested any VE ideas for cost reduction ideas. In order to adapt with the loose supplier relationship, Company A adjusted its TCM process implementation. For example, the suppliers' selection was mainly based on meeting the target cost and the cost estimation calculation mainly was estimated by the TCM members instead of relying on suppliers' cost estimation. By using the cost estimation of TCM members as a reference point, the case company conducted a series of challenge meetings with suppliers to challenge the suppliers' estimation.

In summary, this research suggests that a loose supplier relationship might have caused the differences in the TCM practices at Company A. Specifically, the relationship between Company A and its suppliers was more to win-lose or lose-win relationship instead of win-win relationship. Accordingly, Company A modified its TCM implementation process in order to adapt to the loose suppliers-buyers environment.

7.5 The relationship between the proposed TCM enablers and the successful implementation of TCM at Company A

This section summarizes the relationship between the TCM enablers and the successful implementation of TCM from the perspective of the contingency theory. As posited by contingency theory, the contingent factors influence the management accounting information systems design (Otley, 1980; Gordon & Miller, 1976; Fisher, 1998). From the review of documentation and interviews of key personnel of Company A, nine enablers were identified and expected to have a positive association with the successful implementation of TCM at Company A. These nine enablers are: Advanced manufacturing technology (AMT) implementation, confrontational strategy, a customer orientation, an information-sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training. The qualitative data indicated that these enablers exist to some degree and were likely to support the TCM implementation process in Company A. In order to answer the third research question on what factors are perceived by the TCM users as the critical factors that positively associated with the successful implementation of TCM, quantitative data i.e. survey was collected and statistical analysis was conducted. The statistical analysis results using PLS showed that out of nine propositions on TCM enablers, only three enablers – teamwork, top management support and commitment, and training – were perceived as the enablers that support the successful implementation of TCM by the TCM users at Company A. Among all, teamwork was perceived as the most valued enabler. This result was almost similar with Huh et al. (2008) findings who found that among local, architectural and process capabilities, the Japanese companies consider the architectural capabilities, such as top management support and cross–functional team, are the most important factor for the successful implementation of TCM practices in Japan. In other words, the software capabilities are more important than the hardware capabilities for the successful implementation of TCM.

In the subsequent sub-sections, the findings on the relationships between each enabler and the successful implementation of TCM are discussed. The discussion is based on the triangulation of both the qualitative and quantitative data in order to increase the validity of the findings.

7.5.1 AMT and the successful implementation of TCM

Based on the qualitative findings, it was observed that, to some extent, Company A implemented AMT from the planning stage until the product delivery stage. Nevertheless, the PLS results showed that AMT and the successful implementation of TCM have negative correlation but not at a significance level to conclude a definite conclusion. There are a few reasons that might cause AMT implementation has negative correlation and not to be perceived as an enabler that supports the TCM implementation by the TCM users in Company A.

First, Company A has highly hierarchical organization structure with highly departmentalized functions. Under this organization structure, employees only concentrated on their specialization areas and likely to unaware of other departments' operations and automation systems. For example, since the CAE and CAD system only used by the R&D engineers, non-R&D respondents did not aware the existence and the functions of these systems in supporting the TCM operations in Company A. This might cause the respondents to give low evaluation on AMT implementation at Company A.

Second, even though the AMT helps the companies to improve their production related competitiveness with production processes and product quality improvement (Hoque, 2003), it requires a huge amount of investment (Mcnair & Mosconi, 1987). In the case of Company A, one of the main criteria for the selection of the supplier of local purchased parts is meeting the target cost. The AMT implementation, such as using robots for the production, involves additional investment, which increases the total tooling cost of the purchased parts. As a result, the suppliers may quote higher price than the target cost. In order to improve the situation, Company A could assign future similar parts to the same supplier to increase the volume of production and decrease the tooling amortization amount. However, since there is no long-term relationship between Company A and its suppliers, there is no guarantee that the same supplier would be selected again to supply the similar purchased part for the future new products. Accordingly, the TCM users might unable to link the importance of AMT as one of the important enablers of successful implementation of TCM.

Third, despite a moderate level of AMT implementation in Company A, the AMT usage was still not comprehensive. The robotics systems were not widely used in the manufacturing plants. Unlike world automotive manufacturers in which their productions are fully automated, Company A still relied on labour workforce for its production with almost 80 per cent of its manpower are direct labour. This labour-oriented production focus is common in Malaysia. As highlighted by Nishimura (2005a), Malaysia is still immature in technology-oriented production compared with USA and European companies. In addition, according to Chin et al. (1996), even though Malaysian companies implement a variety of advanced technology within the company, the usage is not comprehensive. The advanced technology only affects a small part of the company. Even though most of the companies understood the importance of AMT for better product quality, productivity and production flexibility, they were still in dilemma on the necessity to invest in imported advances technologies. Furthermore, Felker and Jomo (2007) argue that poor industry policy design causes most companies to totally depend on foreign partners for technology input, tools and key machinery. Due to this, the main technologies of the project are neither understood nor accessible to the locals.

Based on the above arguments, it is concluded that there is no association between the AMT implementation and the successful implementation of TCM at Company A.

7.5.2 Confrontational strategy and the successful implementation of TCM

Based on the qualitative findings, it was observed that, to some extent, Company A gave similar priority to quality, cost and functionality. Nevertheless, the statistical analysis result showed that confrontational strategy had no positive association with the successful implementation of TCM. There are a few explanations that may explain why confrontational strategy was not perceived as an enabler that supports the successful implementation of TCM by the TCM users at Company A.

First, even though Company A has the capacity to produce 250,000 units per annum on a 2-shift cycle, the level of the capacity utilization was still below its capacity. As a rule of thumb, full capacity utilization could reduce the total amortization cost related to fixed cost investments such as tools and jigs. Although Company A was exporting its products to the overseas markets, the volume was still low. This inadequate level of capacity utilization somehow impact the cost competitiveness of Company A's products.

Second, even though Company A has made some changes to the external design of the vehicle to suit the local tastes in terms of styling, features and ride comfort, most of the platform parts were carried over from the base product's platform of Company M. Company A only make changes to the upper body portion with limited design changes due to the target cost constraint. This might cause uniqueness of the Company A's product hardly been seen compared with its base product.

Third, the hierarchical organization structure of the company might cause business strategies related to the pricing, cost and profit were only known to the higher management level. For example, due to the confidentiality issues, not all employees understand how Company A positioning its product pricing, strategies behind the pricing ranges and strategies behind the selection of production plant for the production of any particular product.

Fourth, the tasks at Company A were highly segregated by divisions and departments. The departmentalization might cause employees to focus on their specialization and unaware with other departments activities. For example, how capacity utilization at the production plants could increase the efficiency of TCM activities might unknown to some respondents. Furthermore, even though Company A shared information with employees openly in the new product development meetings, cost and profit information was very confidential and only disclosed to certain departments and for certain management levels. Therefore, TCM related activities and result in terms of cost and profit achievement status were not easily accessible to the employees. Hence, even though Company A emphasized on the cost, quality and functional simultaneously, above reasons could provide some justifications for the insignificant relationship between confrontational strategy and the successful implementation of TCM in Company A.

7.5.3 Customer orientation and the successful implementation of TCM

Based on the qualitative findings, it was observed that Company A put customer orientation as its main agenda. This was shown by customer centric as its corporate value and satisfying customers as its corporate mission. Nevertheless, the statistical analysis result showed that customer orientation has negative correlation with the successful implementation of TCM but not at a significance level that required a definite conclusion. There are a few reasons that might cause this result.

First, due to high competition and liberalization of the automotive industry, there are many choices of products in the market that provide similar specifications with better prices. Thus, it was very hard for Company A to get full commitment and full customer loyalty to continuously loyal to Company A's brand. Since meeting the target cost was the main objective of TCM at Company A, the specifications or features of the product are bound by the target cost. Specifically, in order to achieve the target cost, Company A trade off some specifications and gave priority to the product specifications that had high value added to the customers only. Thus, not all customer requirements adapted to the product's specifications and features. In fact, since Company A only responsible to change the upper body portion of product, platform related parts were as same as the base product with no changes made to meet Malaysian customers' requirement. Furthermore, during the development stage, Company A did not incorporate the new customers' requirements into its product unless required by the compulsory government regulations. Thus, due to above constraint, TCM users might feel lack of customer commitment in the TCM practice at Company A.

Another possible reason for the insignificant result is due to the fact that customer orientation activities were not so obvious to the non-sales operation members. In Company A, the sales and manufacturing operations were under separate entities. Accordingly, the customer orientation related activities were conducted mainly by the sales operation, whereas, the TCM related activities were mainly anchored by the manufacturing operation. The hierarchical organization structure helped the management teams at Company A had a full set of information to operate the business. However, the hierarchical organization structure with segmentation of tasks by departments and divisions might cause the lower level of management had restricted information. According, this might cause TCM members not being aware of the customer orientation activities conducted by the sales operation especially particularly activities related with after sales services.

In summary, above explanation might justify the reasons of no association between customer orientation and the successful implementation of TCM at Company A.

7.5.4 Organizational information-sharing network and the successful implementation of TCM

Based on the qualitative study, even though information sharing was observed at Company A, most of the respondents from the survey considered that cost related information sharing was still limited for TCM practice in which limited the effectiveness of TCM practice. This was supported by the statistical analysis result which showed that the organizational information-sharing network has no correlation with the successful implementation of TCM. However, contrary to the proposition, the statistical analysis also showed negative correlation but not at a significance level to conclude a definite conclusion. There are a few reasons that might lead to this result.

Information-sharing network does not seem to have association with the successful implementation of TCM at Company A might due to lack of exclusive information sharing between Company A and its business partners. Even though Company A openly shared general information with employees, exclusive information related with cost and profit information was very confidential and could only be accessed by certain departments at management level. In addition, Company A has vertical and hierarchical organizational structures where tasks are segregated by departments and divisions. This departmentalization and specialization lead to narrow view of business operation among employees. Thus, not all the employees of Company A understood the overall picture of TCM activities and its interrelated linkage, and able to access the result of TCM activities. Moreover, the knowhow concerning TCM information sharing seems insufficient in Company A. With the manpower turnover issue in the Cost Planning Department, the knowledge of TCM detail implementation process was hardly embedded in the organization. Accordingly, Ansari et al. (2006) argued that to make TCM successful, a right implementation process is not enough. They posit that TCM should be institutionalized into the company's daily work routine and culture by breaking down the communication barriers among employees. This is because the simultaneous engineering can only work effectively after the value and information are shared (Tani, 1995).

Another plausible explanation for the insignificant result may be due to the limited cost benchmark information. In TCM activities, cost information is essential in identifying and prioritizing the cost improvement opportunities (Kulmala et al., 2002). Even though Company A has Company M as its joint venture partner, due to legal and confidentiality issues, Company A was unable to access the detailed cost information from Company M's suppliers or subsidiaries. This cost benchmark information was also not available openly in the market. In addition, some Company A's suppliers with high supplier power were also reluctant to share the cost information. Thus, Company A was unable to accurately benchmark whether or not the cost charged by suppliers was competitive. On the other hand, the TCM members could not verify all the costs by using the cost tables. This is because the cost tables were limited to a few manufacturing processes only as the process for making cost tables was very time consuming and difficult. This is similar to what was highlighted by Tani et al. (1994) where the Japanese companies also have problems in updating the cost tables because the updating procedures are difficult and expensive.

Hence, the above explanations could provide some justifications for the insignificant relationship between the organization information-sharing network and the successful implementation of TCM at Company A.

7.5.5 Lean manufacturing implementation and the successful implementation of TCM

Based on the qualitative findings, it was observed that, to some extent, the case company implemented lean manufacturing. The concept of continuous improvement in lean manufacturing helps to improve the actual mass production cost after the mass production stage as per target cost set during the planning stage (Helms et al., 2005). However, the statistical analysis results showed that lean manufacturing implementation and the successful implementation of TCM have negative correlation but not at a significance level. There are a few reasons that might have caused the lean manufacturing implementation to be considered as insufficient to support the TCM practice by the TCM users at Company A.

First, the TCM activities at Company A focused on the design and development stage only, which mainly involved the R&D Department, Purchasing and Vendor Development Department, Product Marketing Department, Product Planning Department and Cost Planning Departments. Other than VE, most of the lean manufacturing techniques were used by the manufacturing plants and only involved the manufacturing personnel. Neither Accounting Department nor Cost Planning Department involved in the lean manufacturing activities. As the organizational structure of Company A was highly segmented, the TCM members might not be familiar with the production related cost reduction activities and programmes conducted by the manufacturing plants to reduce waste and non-value added activities.

Second, even though the production plants continuously conducting cost reduction, there was insufficient linkage between the actual mass production cost and cost reduction result under lean manufacturing activities at Company A. Since Company A company used the actual costing accounting method, the allocated production cost did not reflect the actual production cost incurred for a particular product. Accordingly, any cost reduction under the implementation of lean manufacturing for a particular product unable to be reflected as the actual cost improvement of that product. The lack of cost related performance and information from the lean manufacturing activities might have caused non-manufacturing personnel especially design and development related personnel to not be aware of the impact of lean manufacturing activities conducted at the manufacturing plants. Due to this reason, TCM users unable to see the significance of lean manufacturing implementation to the TCM activities. As highlighted by Silvi et al. (2008), lean manufacturing approach does not provide any financial and cost information which make it fails to provide an overall picture of process performance conducted under the lean manufacturing activities. Furthermore, lack of accounting personnel involvement in manufacturing improvement teams caused the lean manufacturing activities and measures do not link with the key business priorities (Silvi et al., 2008).

Third, TCM was still not integrated at Company A. Even though the lean manufacturing, such as the Kanban system, JIT, 5S, Total Productive Maintenance were implemented, there was a lack of integration of these activities with the TCM. In fact, these activities were seen as separate activities and not as part of the TCM activities. Furthermore, even though kaizen activities were conducted at the manufacturing plants to reduce non-value added activities, the targets were not derived from TCM. Therefore, there no continuation to achieve the target cost of the new product after mass production stage. Due to lack of integrated coordination, respondents might feel there was no enough complete cycle to eliminate waste and non-value added cost from design and development stage until production process.

Due to the above reasons, it is concluded that in the case study context, lean manufacturing implementation is not related to the successful implementation of TCM.

7.5.6 Supplier relationship and the successful implementation of TCM

Based on the qualitative findings, even though a positive supplier relationship was observed at the case company, most of the respondents considered that the level of supplier cooperation in TCM as being still limited. This was supported by the statistical analysis result, which showed that there is no significance relationship between the supplier relationship and the successful implementation of TCM.

There are a few arguments that might have caused supplier relationship to be considered as insufficient to support the TCM practice in the Company A context. First, suppliers with high supplier power were reluctant to share detailed cost information. Most of the functional parts were developed by suppliers because Company A did not have the expertise. Additionally, TCM members were unable to learn details of the processes because some suppliers were reluctant to submit their quotations with a detailed breakdown as per required by the Purchasing Department. Without a detailed quotation breakdown, TCM members were unable to analyse the cost, identify the detailed contents of the cost structure and use the information to counter the cost estimation of the suppliers in the future. Thus, the estimated cost changes for most of the functional parts continued to rely on the information from the suppliers. Hence, Company A might expose itself to the suppliers' opportunistic gaming behaviour, which resulted in a higher part cost. According to Kato (1993), Nissan Europe also faced similar issues with its European suppliers. In fact, Nissan's suppliers were reluctant to reveal their cost information, reluctant to allow their production lines to be inspected, reluctant to provide unreasonable cost estimations, increased costs unreasonably, and their quotations were not based on the drawings. As highlighted by Yigitbasioglu (2010), the extent of the information shared between the buyers and suppliers depends on the dependence of key suppliers on the buyer and the buyer's dependence on the key suppliers. In addition, unlike the supplier relationship in Japan, most of the suppliers outside Japan do not have a co-existent relationship with their buyers (Kato, 1993). Therefore, it is common that suppliers particularly with high supply power reluctant to reveal their detailed cost information to their customers.

Second, incapability of the local suppliers in terms of technical knowhow limited their involvement in the product design and development stage. This limits Company A in pooling their local suppliers' expertise to find a creative solution to reduce the cost. Hasan and Jomo (2007) emphasize that incompetent local suppliers are among the major issues faced by the automotive industry in Malaysia. Furthermore, Rosli and Kari (2008) in their comparative study of Proton's local and foreign suppliers on economics and the financial ratio found that the capabilities of the local suppliers was behind the foreign suppliers, which hindered them in being competitive. Their study highlights that the foreign suppliers are superior to the local suppliers because the foreign suppliers can access superior technology from abroad, which makes their performance better than the local suppliers.

Third, the win-win relationship between Company A and its suppliers was weak. For example, except for functional parts, Company A did not rely on its suppliers to estimate the part costs. The part cost estimation was estimated by the TCM members. Eventually, this part cost estimation was used as a target cost to challenge the supplier's estimation. Furthermore, Company A had to go through with lengthy negotiation process to request vendors to meet their target cost. A study by Rattray et al. (2007) of New Zealand manufacturing companies also found a weak supplier involvement in the TCM practices at these companies.

Due to the above arguments, it is concluded that in the case study context, there is no relation between supplier relationship and the successful implementation of TCM.

7.5.7 A teamwork orientation organization culture and the successful implementation of TCM

Organizational culture can be a source of competitive advantage if it rare, valuable and inimitable (Barney, 1986). Based on the qualitative findings, it was observed that the teamwork orientation culture was rather strong at Company A. This was supported by the statistical analysis result, which showed that the team orientation cultures had a positive association with the successful implementation of TCM. This result is supported by Feil et al. (2004) who suggest that teamwork is one of the critical factors for the successful implementation of TCM. This result is also similar to Lynn and Akgun (2003) who found a positive impact between the teamwork and NPD.

As highlighted in the previous sections, Company A had a vertical and hierarchical organization, no CFM like the Japanese companies, lacked a multi-skilled expertise workforce, and the TCM activities only involved certain departments. Nevertheless, in spite of the constraints, all the TCM related departments played their role well in each TCM activity to achieve the company objectives. In fact, all TCM members showed high sense of responsibility and enthusiasm to tackle the TCM issues that were related with their departments. The trustworthy attitude and sense of camaraderie among TCM members created healthy working environment of information and knowledge sharing among members. These reasons might have caused the teamwork orientation organization culture to be considered as an enabler that supports the TCM practice in Company A context.

Accordingly, it is concluded that in the case study context, teamwork is positively associated with the successful implementation of TCM.

7.5.8 Top management support and commitment and the successful implementation of TCM

Based on the qualitative findings, it was observed that the top management support and commitment was rather strong at Company A. This was supported by the statistical analysis result, which showed that the top management support and commitment had a positive association with the successful implementation of TCM. This finding also supports the previous findings by Kuen and Suhaiza (2012), and Chang and Zailani (2012), who posit that top management support and commitment is important for project success.

As highlighted above, compared with the Japanese companies, the TCM practice at Company A was still new and faced many environment constraints particularly due to lack of information and loose supplier relationship. The top management at Company acknowledged the situation by proving adequate resources and visible supports to promote the TCM practice. For example, Company A's top management made frequent re-structuring within the business units and division levels. These changes were made to create solid and robust organization to adapt with the changing markets. Furthermore, the top management of Company A set a clear cost reduction target under "Triple T" vision. This vision helped to communicate the cost reduction mission and create cost awareness to the employees. Under Hofstede's (1984) index dimension, Malaysia is under the large power distance and low individualism quadrant category. Thus, in Malaysia context, the top management is indispensable to direct and pull the workforce towards the company direction. Company A's top management played it roles well by delivering its strong and active support to the TCM implementation in terms of providing necessary resources, determining the direction and evaluating the result.

Therefore, it is concluded that in the case study context, top management support and commitment is positively associated with the successful implementation of TCM.

7.5.9 Training and the successful implementation of TCM

Based on the qualitative findings, it was observed that the training was rather strong at Company A. This was supported by the statistical analysis result, which showed that training had a positive association with the successful implementation of TCM. This finding also supports the previous findings by Pinto and Slevin (1989), which emphasize that training people with the right administrative and technical skills has a positive impact on successful project implementation.

The TCM members acknowledged that knowhow and skills were important in conducting the TCM. Company A provided ample resources for human capital development through various external and internal trainings. Like the Japanese companies, Company A also focused on OJT for designing, implementing and using TCM. Besides that, Company A even sent its manpower to be trained at Company M's plants in Japan to expose its employees to the Japanese manufacturing methods and work culture. Although some of the external and internal trainings were general and not directly related to the TCM implementation, these trainings increased members knowhow concerning the parts making and business processes, which, ultimately, helped the members to identify ideas for cost reduction activities. Accordingly, this helped the employees to understand the business processes and continuously improve themselves and the companies (Okano & Suzuki, 2007; Feil et al., 2004; Sadoi, 1998). In addition, a teamwork orientation organization culture also helped to create a positive working environment for OJT training at Company A. It also helped to create healthy environment for informal training through spontaneous, informal feedback and interaction among employees (Mathis & Jackson, 2004).

Accordingly, it is concluded that in the case study context, training is positively associated with the successful implementation of TCM.

7.6 Contributions and implications

Generally, this research contributes to the body of knowledge by investigating in-depth the TCM practice in a non-Japanese environment, i.e. Malaysia, and the differences of TCM practices by comparing it to popular Japanese TCM theoretical model. The findings of this research have several significant implications for researchers and practitioners. This chapter segregates the research contributions and implications into theoretical contributions and practical implications.

7.6.1 Theoretical contributions

The theoretical contributions of this research can be categorized into two categories: (1) understanding of TCM practice in Malaysia context, and (2) the application of contingency theory and dynamic capabilities theory in TCM practices. The subsections below explain each category in detail.

7.6.1.1 Understanding of TCM practice in Malaysia context

From the accounting perspective, TCM is one of the competitive tools that may assist the companies to gain competitiveness. Nevertheless, due to a lack of in-depth empirical case studies, the TCM practices in Malaysia remains comparatively unknown. This research provides preliminary evidence on detailed insights of TCM implementation process in Malaysian context. It also provides a detailed comparison between the TCM practices in a Malaysian automotive company and those in Japanese automotive companies based on previous case studies research. As highlighted before, the automotive industry is one of the main manufacturing sections that contribute to the development of Malaysia. Under the current liberalization of the market and high competition, the Malaysian automotive companies must have competitive tools to remain competitive. Accordingly, this research provides better understanding of TCM practices specifically in terms of its process implementation in non-Japanese environment context.

A survey by Nishimura (2005a) in Asian countries including Malaysia found that even the TCM practices in the Japanese affiliated companies were not the same as Japan. However, there is a lack of case study research to understand the actual level of TCM implementation in Malaysia. This research provides a better understanding of the actual TCM practice and the issues concerning its implementation in the Malaysian automotive industry context and what causes the differences compared to the Japanese TCM theoretical model. Accordingly, the necessary further action can be taken to close the gap between the theory and practice to enhance its implementation.

The results showed that even though the basic fundamentals of TCM were the same as those of the Japanese companies, some differences were found concerning the details of the TCM implementation process. Generally, the findings showed that unlike the Japanese companies, the TCM implementation level in Malaysia was between the standalone and full integration stage. This was mainly because: (1) TCM activities mainly focused on the upstream process to achieve the target cost, and were not perceived as a companywide activity to achieve the target cost from the upstream to the downstream process, (2) the TCM activities were not integrated with other manufacturing methods, and (3) the contextual constraints mainly in the supplier relationship and information-sharing network.

7.6.1.2 The application of contingency and dynamic capabilities theories in TCM practices.

This research showed the application and adaptation of TCM practices in non-Japanese context by underpinning it with the contingency and dynamic capabilities theories. According to the contingency theory, there is no one universal best design of management accounting systems that is applicable to all companies in all situations (Otley, 1980; Gordon & Miller, 1976; Fisher, 1998). Scholars (Tani et al, 1994; Feil, Yook, & Kim, 2004) also suggest that the TCM practices are influenced by its environment, strategy and the organization structure specific to the industry. In fact, Ellram (2000) suggests that the availability of resources plays important role in TCM practices. Therefore, the TCM implementation level can vary starting from a standalone activity at the lowest point up to full integration at the highest point. In the standalone stage, the TCM activities only involve a single department or team, whereas with full integration, the TCM activities involve an integrated effort consisting of value engineering and supply chain activities (Ellram, 2000).

In general, this study partially supports the study of Nishimura (2005) who advocates that the TCM practices in Malaysian companies are not the same as that highlighted in the Japanese TCM theoretical models. However, contrary with Nishimura (2005), this study found that the fundamental concept of the TCM in the case company was similar with the Japanese theoretical model but there were some differences in the detail processes. Accordingly, this study supports the contingency theory which claims that the situational factors influence the design of the management accounting system. For example, the Japanese companies conduct thorough market surveys to determine the product features and specifications. On the hand, Company A conducted the new product survey after the product features and specifications were already conceptualized. Company A only proceeded with the product features and specifications if the new product market surveys result were favourable. This was because Company A still did not have the technology capabilities to develop the whole vehicle by its own. As Company A had limitation to change the under body parts, it only focused on the allowable or possible range of design changes by pre-determining the new product's features and specifications. This showed that technology constraint influenced the design of TCM at Company A. According to contingency theory suggests that all elements must fit with one another for it to perform well (Otley, 1980). An appropriate fit between the identified contingent factors and a management accounting system resulted superior performance (Simon, 2007). By understanding its business process and environments, Company A designed the TCM practice to adapt with its non- Japanese environment context. This helped to create a fit inter-linkage of all elements in its non-Japanese environment for TCM implementation. Consequently, this adaptation enabled smooth implementation of TCM and helped the Company A to achieve its organization goals.

Nevertheless, the contingency theory does not explain how the companies manage to cope up with situational factors and gain competitive advantages. By using dynamic capabilities, this study explained how the case company adapted, integrated and reconfigured its resources through TCM practice and developed TCM as a source of competitive advantage in the non-Japanese environment. Generally, dynamic capabilities approach helps to explain why and how certain companies build competitive advantages in competitive environment (Teece et al., 1997). There are several implications can be derived from this study that contribute to the development of the dynamic capabilities. First, this study links

TCM as one of company level's capabilities. Specifically this study explained how dynamic capabilities approach helped the case company to modify and reconfigure its external and internal resources to gain competitive advantages in the competitive environment. For example, in terms of limited information, this research showed that Company A selected, reconfigured and utilized its available information, such as information from financial accounting and existing suppliers' quotations, for TCM implementation.

In addition, this study supports the dynamic capabilities theory in terms of providing empirical study on how the capabilities are shaped by external and internal positions (Teese at al., 1997). Specifically, this study outlined the dimensions of external and internal positions in terms of TCM implementation - advanced manufacturing technologies implementation, confrontational strategy, customer orientation, an information sharing network, lean manufacturing implementation, supplier relationships, a teamwork oriented organizational culture, top management support and commitment, and training. However, out of these factors, only three factors were positively associated with the successful implementation of TCM implementation at Company A. Due to a lack of supporting factors in the TCM practices, the resources were modified to adapt with these constraints. For example, due to weak supplier relationship, Company A did not rely on their suppliers' estimation for cost estimation of the purchased parts. Instead, through team work activities, Company A gathered all its expertise personnel to work together to estimate the purchased parts cost. This estimation was also used to challenge the suppliers' quoted prices. In fact, in order to meet the target cost, the top management of Company A also involved in the final negotiation process with the suppliers. This example showed that Company A adapted its loose supplier's relationship constraint by utilizing its other capabilities in terms of teamwork and top management support to make the implementation of TCM successful.

In summary, this research provided an empirical study of TCM practice in a Malaysian automotive company. As posited by Otley (1980), the particular features of a suitable accounting system depend on the specific situation in which a company finds itself. The research findings showed that the details of the TCM implementation process in Malaysia were different from its original Japanese TCM theoretical model due to some modifications being made to adapt to the contextual constraints. The findings also give useful insights into the TCM implementation process in terms of the major contextual constraints faced, and how the case company modified the TCM implementation process was made to adapt to these contextual constraints.

7.6.2 Practical implications

This research contributes to the management's understanding concerning the nine enablers' relationship with the successful implementation of TCM in a typical Malaysian automotive company context. By understanding the relationship of these enablers, managers can utilize the key enablers to support the TCM implementation and take necessary actions to mitigate the constraints. In addition, the understanding of TCM constraints in the case study context may help future potential TCM companies to modify the TCM implementation process to best suits their contexts. Eventually, this may help Malaysian automotive companies to utilize TCM as one of the tools to increase their competitiveness and Malaysian automotive industry as a whole.

This research found, among all the enablers, the top management support and commitment, training and teamwork had a positive association with the successful implementation of TCM in the typical Malaysian automotive company. Managers can expect that by increasing the environment of teamwork, providing more visible top management support and commitment, and facilitating more TCM specific training programmes, the level of successful implementation of TCM would increase. Furthermore, non-TCM user companies in the same context could equip themselves by giving priority to these key enablers before starting to apply TCM.

In addition, this case study also found low supplier relationship and lack of information sharing to be the main contextual constraints in TCM implementation. The new potential TCM companies in the same context can mitigate and leverage the risk of failure in implementing TCM by modifying the TCM implementation process to suit with contextual environment constraints. Nevertheless, if the Malaysian automotive companies focus on building up a long-term supplier relationship particularly with Malaysian automotive suppliers, it would help them create trust, cooperation and an open information exchange with the suppliers. Eventually, this environment of cooperation would help in achieving the target cost, reducing the car price and increasing the competitiveness of Malaysian automotive companies.

7.7 Limitations and recommendations for future research

This study's aims were to investigate how the TCM implementation process compared to the Japanese TCM theoretical model, to investigate how the modifications were made to adapt to the constraints and to understand the enablers that support the successful implementation of TCM. A single embedded case study was conducted to answer the research questions. As emphasized by Scapen (2006), a single case study helps the researcher to understand the variation in the management accounting practices and its complex mishmash of interrelated influences. The single case study objective is to understand the practice in-depth and not determine what is generally true for many (Meriam, 1998). Accordingly, comparison across different organizational contexts using multiple case studies was not adopted as the methodology for this research. Instead, the comparison was made within the same organization by applying a single embedded case study. These findings can only be replicated to the organizations that have a similar situation in terms of the nature of the problem and problem definition (Cavana et al., 2001). Nevertheless, as stressed by Yin (2003), in the context of case studies, generalization is feasible to the theoretical propositions with the objective of expanding and generalizing the theories.

As posited by Feil et al. (2004), TCM is environment specific. In order to focus on the scope of the study and to eliminate contextual variance, this research focused on the TCM implementation in the context of the automotive industry only. This is because, compared with other industries, the automotive industry involves a huge number of parts and components, many distinct processes and requires complex and high technologies to manufacture the output. The automotive industry was considered to be the best industry to reflect the research context. Accordingly, this case study focused on a single industry and a single company with its employees as the subunit of analysis. In order to understand the TCM enablers that have a positive association with the successful implementation of TCM in the case company, only those who were involved directly or indirectly with TCM were selected as the respondents. Even though various precautionary steps were taken to eliminate research bias, such as using multi-sources of data collecting and data triangulation, the researcher admits that potential bias still exists in terms of interpreting the collected data. Future research should conduct multiple case studies in various industries to understand the TCM practices in the Malaysian context.

As stressed by Monden and Hamada (1991), Japanese automotive companies have managed to create a total cost management system because they link the TCM with the Kaizen Costing. This case study only focused on the TCM practice without looking at the Kaizen Costing as part of TCM. The findings showed that even though TCM was implemented with a positive outcome at Company A, TCM implementation was not regarded as a tool that integrates other management tools to achieve company strategic profit. The absence of Kaizen Costing might cause no total cost management system that links the cost reduction between the mass production stage and the design stage. A future study to explore how the linkage with Kaizen Costing or other manufacturing methods, such as lean system manufacturing and the implementation of AMT, could impact the TCM performance at companies outside Japan would be very interesting. On the other hand, in the absence of integrated TCM, further exploration concerning how the traditional cost management could support and enhance the TCM activities would be an interesting topic to study.

The TCM implementation process is very long, complicated and involves many parties. Even though this research was conducted as a longitudinal study with multi-sources of data collection, it only focused on the technical aspects of the TCM, i.e. its implementation process and its key enablers. It did not focus on the motivational factors that influence the agents' behaviour towards the successful implementation of TCM. Future research should also study the implications of the motivational factors on the agents' behaviour towards achieving the target cost. For example, how rewards to the employees and suppliers could enhance and trigger the collective TCM responsibility among the organizational members and its suppliers.

7.8 Summary

Under the current global competitive market, the biggest challenge for companies is to remain profitable. Despite many studies showing the benefits of TCM, many companies still underestimate the power of TCM as a critical competitive tool (Ansari et al., 2007). This research listed details of all the processes, key enablers and constraints of the TCM implementation process in a Malaysian automotive company context using the case study method. It offers practical application knowhow in the specific environment of TCM. This helps potential TCM implementers to understand the constraints of TCM in the Malaysian context and the critical factors that are likely to assist the TCM implementation. This research also proposed the conceptual model for the TCM implementation process under the same context.

In a nutshell, TCM is environment specific. Accordingly, any company cannot simply "plug in" the TCM to their company system (Kato et al., 1995). Based on the contingent factors, companies should develop the TCM that suits its environmental constraints by utilizing the dynamic capabilities of the organization through adapting, reconfiguring and modifying their resources.

REFERENCES

Abdullah, S. H., Thong, L. L., Chin, T., Noh, I. M., Book, L. Y., Joon, O. T., et al. (1999). *Management in Malaysia: A basic text on general management with local reference to managing a Malaysian business*. Kuala Lumpur: Malaysian Institute of Management

Abu_Bakar, R., Salleh, D. A. L., & Ling, L. C. (2008). "How We Do Things Around Here": Implication of Corporate Culture On Job Performance. *The Business Review, Cambridge, 9*(2), 339-344

Adler, R., Everett, A. M., & Waldron, M. (2000). Advanced management accounting techniques in manufacturing: utilization, benefits, and barriers to implementation. *Accounting Forum, 24*(2).

Albright, T., & Lam, M. (2006). Managerial accounting and continuous improvement initiatives: A retrospective and framework. *Journal of Managerial Issues, 18*(2), 157-174.

Ambrosini, Véronique, & Bowman, Cliff. (2009). What are dynamic capabilities and are they a useful construct in strategic management? *International Journal of Management Reviews, 11*(1), 29-49.

Anderson, S. W., & Young, S. M. (1999). The impact of contextual and process factors on the evaluation of activity -based costing systems. *Accounting, Organization and Society, 24*, 525-559.

Ansari, S., Bell, J., Okano, H. (2007). Target Costing: Uncharted Research Territory. In: Chapman, C.S, Hopewood, A. G, Shields, M.D. (Ed.), *Handbook of Management Accounting Research*, edited by C. S. Chapman, A. G. Hopwood, and M. D. Shields, 507-530. Oxford, U.K.: Elsevier.

Ansari, S., Bell, J., & Swenson, D. (2006). A template for implementation target costing. *Cost Management, 20*(5), 20-27.

Arkinson, A. A., Banker, R. D., Kaplan, R. S., & Young, S. M. (1995). *Management Accounting*. Eaglewood Cliffs: Prentice Hall.

Ax, C., Greve, J., & Nilsson, U. (2008). The impact of competition and uncertainty on the adoption of target costing. *Int. J. Production Economics, 115*, 92- 103.

Baharudin, N., & Jusoh, R. (2015). Target Cost Management (TCM): A case study of an automotive company. *Procedia - Social and Behavioral Sciences, 172*, 525 - 532.

Barney, J. B. (1986). Organization Culture: Can It Be A Source of Sustainable Competitive Advantage? *Academy of Management Review, 11*(3), 656-665.

Boeije, H. (2010). *Analysis in Qualitative Research*. Sage: London.

Bright, J., Davies, R. E., Downes, C. A., & Sweeting, R. C. (1992). The deployment of costing techniques and practices: a UK study. *Management Accounting Research, 3,* 201-211.

Burgess, T. F., & Gules, H.K. (1998). Buyer-supplier relationships in firms adopting advance manufacturing technology: an empirical analysis of the implementation of hard and soft technologies. *Journal of Engineering and Technology Management 15,* 127-152.

Carr, A. S., & Pearson, J. N. (1999). Strategically managed buyer-supplier relationships and performance outcomes. *Journal of Operations Management, 17,* 497-519.

Cavana, R. Y., Delahaya, B. L., & Sekara, U. (2001). *Applied Business Research: Qualitative and Quantitative Methods.* Australia: John Wiley & Sons Australia, Ltd.

Chatterjee, S. R., & Nankervis, A. R. (2007). *Asian Management in Transition: Emerging Themes.* New York: Palgrave Macmillan.

Chen, J. V., Yen, D. C., Rajkumar, T. M., & Tomochko, N. A. (2010). The antecedent factors on trust and commitment in supply chain relationships. *Computer Standards & Interfaces, 33,* 262-270

Chenhall, R. H. (1997). Reliance on manufacturing performance measures, total quality management and organizational performance. *Management Accounting Research, 8*, 187-206.

Chenhall, R. H., & Langfield-Smith, K. (1998a). Adoption and benefits of management accounting practices: an Australian study. *Management Accounting Research, 9,* 1-18.

Chenhall, R.H., & Langfield-Smith, K. (1998b). The relationship between strategic priorities, management techniques and management accounting: an empirical investigation using a systems approach. *Accounting, Organizations and Society, 23*(3), 243-64.

Chin, W.W., & Newsted, P. R. (1999) *Structural equation modelling analysis with small samples using partial least squares*. In: R. H. Hoyle (Ed.), Statistical strategies for small sample research. Thousand Oaks: Sage, 307-341

Chin, W. W. (1998), *The Partial Least Squares Approach to Structural Equation Modelling*, in Modern Methods for Business Research, G. A. Marcoulides (Ed.). Mahwah, NJ: Lawrence Erlbaum Associates, 295–358

Choe, J. M. (2002). The organizational learning effects of management accounting information under advanced manufacturing technology. *European Journal of Information Systems, 11*, 142-158.

Chua, S. (2013). Malay press: Mustapa blames carmakers for pricey vehicles, The Edge. Retrieved from http://www.theedgemalaysia.com/political-news/243153-malay-press-mustapa-blames-carmakers-for-pricey-vehicles.html

Chun, L. S., Kasim, N. A. H. A., & Minai, B. (1996). Are management accounting systems in Malaysia outmoded? *Singapore Management Review, 18* (1), 55-68.

Cooper, R. (1996) Enterprise and the confrontation strategy. *The Academy of Management Executive, 10*(3), 28-29.

Cooper, R., Slagmulder R (1999). Develop profitable new product with target costing. *Sloan Management Review, 40*(4), 23-33.

Cooper, R. (1995). *When Lean Enterprises Collide*. Boston MA: Harvard Business School Press.

Cooper, R., & Kaplan, R. S. (1988). Measure Costs Right: *Make the Right Decisions. Harvard Business Review, September- October,* 96-103.

Copper, R., & Slagmulder, R. (2004). Achieving Full- Cycle Cost Management. [Cost Management]. *MIT Sloan Management Review, 46*(1), 45-52.

Creese, R. C. (2000). Cost Management in Lean Manufacturing Enterprises. *AACE International Transactions*, C5.1-C5.6.

David, F. R. (2005). *Strategic Management Concepts and Cases* (10th ed.). New Jersey: Prentice Hall.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance Of Computer Technology: A Comparison Of Two. *Management Science, 35*(8), 982-1003.

Day, George S. (1994). The capabilities of market-driven organizations. Journal of Marketing, 58(4), 37-52

Dekker, H., & Smidt, P. (2003). A survey of adoption and use of target costing in Dutch firms. *Int. J. Production Economics, 84*, 293-305.

Deshpande, R., & Webster, F.E. (1989). Organizational culture and marketing: defining the research agenda. *Journal of Marketing, 53,* 3-15.

Drazin, R., & Van de Ven, A.H. (1985). Alternative Forms of Fit in Contingency Theory. *Administrative Science Quarterly, 30*(4), 514-539.

Drury, C. (2004). *Management and Cost Accounting*. London: Thomson.

Drury C., & Tayles, M. (1994) Product costing in UK manufacturing organization. *European Accounting Association, 3*(3), 443-469.

Drury, C., & Tayles, M. (1995). Issues arising from surveys of management accounting practices. *Management Accounting Research, 6,* 267-280.

Drury, C., & Tayles, M. (1994). Product costing in UK manufacturing organization. *European Accounting Association, 3*(3), 443-469.

Drury, Colin. (2004). *Management and Cost Accounting*. London: Thomson.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal, 21*(10/11), 1105-1121.

Ellram, L. M. (2000). Purchasing and supply management's participation in the target costing process. *Journal of Supply Chain Management, 36*(12): 39-51.

Ellram, L. M. (2002). Supply management's involvement in the target costing process. *European Journal of Purchasing & Supply Management, 8*, 235-244.

Ellram, L. M. (2006). The implementation of target costing in the United States: Theory versus practices. *Journal of Supply Chain Management, 42*(1), 13-26.

Everaert, P., Loosveld, S., Van Acker, T., Schollier, M., & Sarens, G. (2006). Characteristic of target costing: Theoretical and field study perspectives. *Qualitative Research in Accounting & Management, 3(*3), 237-263.

Feil, P., Yook, K. H., & Kim, I. W. (2004) Japanese Target Costing: A Historical Perspective. *International Journal of Strategies Cost Management, Spring*, 10-19.

Felker, G., Jomo, K. S. (2007). *Technology Policy in Malaysia.* In: Jomo K. S. (Ed.), Malaysian Industry Policy Singapore: NUS Press, 129-156.

Ferrara, W. L. (1995). Cost Management Accounting - The 21st Century Paradigm. *Management Accounting, 77*(6), 30-36.

Filomena, T. P., Neto, J. F. K., & Duffey, M. R. (2009). Target costing operationalization during product development: Model and application. *International Journal Production Economics*, 118, 398–409

Fisher, J. G. (1998). Contingency Theory, Management Control Systems and Firm Outcomes: Past Results and Future Directions. *Behavioral Research in Accounting, 10*, 47-64.

Gagne, M., & Discenza, R. (1995). Target Costing. *Journal of Business & Industrial Marketing, 10*(1), 16-22.

Gandhinathan, R., Raviswaran, N., & Suthakar, M. (2004). QFD- and VE-enabled target costing: a fuzzy approach. *International Journal of Quality & Reliability Management*, *21* (9), 1003-1011.

George, J. M., & Jones, G. R. (2005). *Understanding and Managing Organizational Behaviour* (4th ed.). New Jersey: Pearson Prentice Hall.

Giroud, A. (2000). Japanese transnational corporations' knowledge transfer to Southeast Asia: the case of the electrical and electronics sector in Malaysia. *International Business Review, 9,* 571-587.

Gopalakrisnan, M., Samuels, J., & Swenson, D. (2007). Target costing at consumer product company. *Strategic Finance, 89*(6), 37-41.

Gordon, L. & Miller, D. (1976). A contingency framework for the design of accounting information systems. *Accounting, Organizations, and Society*, 1, 59-69.

Guan, L., Hansen, D. R., & Mowen, M. M. (2009). *Cost Management*. USA: South Western Cengage Learning.

Gupta, P. (2006). Beyond PDCA-A New Process Management Model. *Quality Progress, 39*(7), 45-52.

Hair, J. F., Black, W. C., Anderson, B. J., & Tatham, R. L. (2006). *Multivariate Data Analysis.* Upper Saddle River, New Jersey: Prentice Hall.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 131-151.

Harrison, G., & McKinnon, J. (2007). *National culture and management control*. In T. Hopper, D. Northcott & R. Scapens (Eds.), Issues in management accounting. England: Prentice Hall.

Hasan, H., & Jomo, K. S. (2007). *Rent- Seeking and Industrial Policy in Malaysia*. In: Jomo KS (Ed.), Malaysia Industrial Policy Singapore: NUS Press, 157-178.

Helms, M. M., Ettkin, L., Baxter, J. T., & Gordon, M. W. (2005). Managerial implications of target costing. *Competitive Review*, *15*(1), 49-56.

Henseler, J., Ringle C. M., & Sinkovics, R. R. (2009). *The use of partial least squares path modeling in internal marketing. New challenges to International Marketing*, in Advances in International Marketing, vol. 20. Rudolf R. Sinkovics and Pervez N. Ghauri, eds., Greenwich, CT: JAI Press, 277-320.

Hergert, H. (2002). Target Costing in the textile company. *Journal of textile and apparel, technology and management, 2*(IV), 1-10.

Hibbets, A. R., Albright, T., & Funk, W. (2003). The Competitive Environment And Strategy of Target Costing Implementers: Evidence From the Field. *Journal of Management Issues, XV*(1), 65-81.

Hilton, R. W. (2005). *Managerial Accounting: Creating Value in Dynamic Business Environment.* New York: Mc Graw.

Hiromoto, T. (1991). Restoring the Relevance of Management Accounting. *Journal of Management Accounting Research, 3*, 1-15.

Hitt, M. A., Ireland, R. D., & Hoskisson, R. E. (2007). *Strategic Management Competitiveness and Globalization.* Mason, OH: Thompson South-Western.

Hofstede, G. (1984). The Cultural Relativity of Quality of Life Concept. Academy of Management. *The Academy of Management Review, 9*(3), 389.

Hofstede, G. (1993). Cultural Constraints in Management Theories. *Academy of Maangement Executive, 7*(1), 81.

Hofstede, G., Deusen, C. A. V., Mueller, C. B., & Charles, T. A. (2002). What Goals Do Business Leaders Pursue? A Study in Fifteen Countries. *Journal of International Business Studies, 33*(4), 785-803.

Horngren, C. T., Bhimani, A., Datar, S. M., & Foster, G. (2008). *Management and Cost Accounting* (4th ed.). England: Prentice Hall.

Horngren, C.T., & Foster, G. (1987). *Cost Accounting: A Management Emphasis* (6th ed). Englewood Cliffs, NJ: Prentice Hall.

Hoque, Zahirul. (2003). *Strategic Management Accounting Concepts, Processes and Issues* (2nd ed.), London: Spipo Press.

Howard, C. & Herbig, P. (1996). Japanese Pricing Policy. *Journal of Consumer Marketing, 13*(4), 5-17.

Huh, S., Yook, K., & Kim, I. (2008). Relationship between organizational capabilities and performance of target costing: An empirical study of Japanese companies. *Allied Academies International Conference, 7*(2), 15-27.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic Management Journal, 20*(2), 195-204.

Hunt, S. D., Chonko, L. B., & Wood, V. R. (1985). Organizational Commitment and Marketing. *Journal of Marketing, 49*(1), 112-126.

Iman, G. (2006). *Structural Equation Modellling Metode Alternatif Dengan Partial Least Square*. Semarang: Badan Penerbit Universitas Diponegoro.

Ibusuki, U., & Kaminski, P. C. (2007). Product development process with focus on value engineering and target costing: A case study in an automative company. *International Journal of Production Economics*, 105, 459-474.

Ingram, R. W., Albright, T. L., Baldwin, B. A., & Hill, J. W. (2005). *Accounting Information for Decisions* (3rd ed.). Canada: Thomson South- Western.

Isa, C. R., & Foong, S. Y. (2005). Adoption of advanced manufacturing technology (AMT) and management accounting practices: the case of manufacturing firms in Malaysia. *World Review of Science, Technology and Sustainable Development, 2*(1), 35-48.

Isa, C. R. (2006). *Accounting in a Changing Environment: Issues & Implication for Management Accounting and Taxation*. Kuala Lumpur: Monteriro & Heng.

Islam, R., Md Zahidul, D., Jason, A., Mahtab, H., & Ahmad, Z. A. (2009). Team learning, top management support and new product development success. *International Journal of Managing Projects in Business 2*(2):289-260.

Islam, R., & Mustapha, M. R. (2008). Organizational Approach to Total Quality Management: A Case Study. *Asian Journal of Business and Accounting*, *1*(2),19-38.

Jarvis, C. B., Mackenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of consumer research*, *30*, 199-218.

Jayasankaran, S. (1993). Made In Malaysia: The Proton Project. In J. K.S (Ed.), *Industrializing Malaysia: Policy, performance, prospects*. London: Routledge , 272-285.

Johnson, H. T., & Kaplan, R. S. (1991). *Relevant Lost: The rise and fall of management accounting*. Boston, Massachusetts: Harvard Business School Press.

Johnson, P., & Duberly, J. (2000). *Understand Management Research*. London, England: Sage Publication.

Jomo, K. S. (1993). Introduction. In K. S. Jomo (Ed.), *Industrializing Malaysia: Policy, performance, prospects*. London: Routledge, 1-76.

Jones, M. J., Munday, M., & Brinn, T. (1998). Speculation on barriers to transfer of Japanese management accounting. [Literature review compilation]. *Accounting, Auditing & Accountability Journal*, *11*(2), 204-215.

Joshi, P. L. (2001). The international diffusion of new management accounting practices. The case of India. *Journal of International Accounting 10*(1), 85-109.

Kaplan, R. K., & Atkinson, A. A. (1998). *Advanced Management Accounting* (3rd Edition). New Jersey: Prentice Hall.

Kaplan, R. S. (1983). Measuring manufacturing performance: A new challenge for managerial accounting research. *The accounting review, 8*(4), 686-705.

Kaplan, R. S., & Cooper, R. (1998). *Cost and Effect: Using integrated cost system to drive profitability and performance*. Boston, MA: Harvard Business School Press.

Kaplan, R. S. (1984). The Evolution of Management Accounting. *The Accounting Review, 59*(3), 390-418.

Kato Y, Boer G, Chow C. W. (1995) Target Costing: An Integrative Management Process. *Journal of Cost Management*, *Spring*, 39-51.

Kato, Y. (1993). Target Costing Support Systems: Lessons from leading Japanese companies. *Management Accounting Research, 4,* 33-77.

Kerzner, H. (1987). In search of excellence in project management. *Journal of Systems Management*, *38*(2), 30 - 40.

Koch, C. (2010). An ethical justification of profit maximization. *Society and Business Review, 5* (3), 270-280.

Kohli, A. K., & Jaworski, B. J. (1990). Market Orientation: *The Construct, Research Propositions, and Managerial Implications*. Journal of Marketing, 54 (2), 1-18.

Krajewski, L. J., & Ritzman, L. P. (2005). *Operations Management: Processes and value chains.* New Jersey, USA: Pearson Prentice Hall.

Krumweide, K. R. (1998). The implementation stages of Activity-Based Costing and the Impact of Contextual and Organizational Factors. *Journal of Management Accounting Research , 10:* 239-277.

Kuen, C. W., & Zailani, S. (2012). Critical Factors in Successful New Product Development: An Empirical Study of Malaysian Manufacturing Companies. *International Journal of Management Reviews, 29*(1), 429.

Kulmala, H. I. (2004). Developing cost management in customer-supplier relationships: three case studies. *Journal of Purchasing and Supply Management, 10*(2), 65-77.

Kwon, I. G, & Suh, T. (2004). Factors Affecting the Level of Trust and Commitment in Supply Chain Relationship. *Journal of Supply Chain Management, 40*(2), 4-14.

Kwun, O., & Alshare, K. A. (2007). The Impact Of Fairness On User's Satisfaction With The IS Department. *Academy of Information and Management Sciences Journal, 10*(1), 47-63.

Langfield-Smith, K. (2008). Strategic management accounting: how far have we come in 25 years? *Accounting, Auditing & Accountability Journal, 21* (2), 204-228.

Lee, J. Y, & Monden, Y. (1996). An International Comparison of Manufacturing - Friendly Cost Manufacturing System. *The International Journal of Accounting 31*(2):197-212.

Leong, L., & Jarmoszko, A. T. (2010). Analyzing Capabilities and enterprise strategy: A value proposition framework. *International Journal of Management and Information System, 14*(1), 53-59.

Li, S., & Lin, B. (2006). Accessing information sharing and information quality in supply chain management. *Decision Support Systems, 42*, 1641-1656.

Lynn, G. S., & Akgun, A. E. (2003). Launch your new products/services better, faster. *Research Technology Management, 46*(3), 21-26.

MAA. (2013). *Summary of Sales & Production Data*. Retrieved from http://www.maa.org.my/info_summary.htm

Mahalingam, E. (2011) Institute expects one million total vehicle sales by 2020. Retrieved from http://biz.thestar.com.my/news/story.asp?file=/2011/5/16/business/8679103&sec=business.

Mahidin, M. U., & Kanageswary, R. (2004). *The development of the automobile industry and the road ahead.* Department of Statistics Malaysia.

MAI. (2010). *Malaysia Automotive Economy Trends And Outlook.* Kuala Lumpur: Malaysia Automotive Institute.

Malhotra, N. K. (2007). *Marketing Research An Applied Orientation* (5th ed.). Upper Saddle River, NJ: Pearson.

Manjunath, U, Metri, B. A, & Ramachandran, S. (2007) Quality management in a healthcare organisation: a case of South Indian hospital. *The TQM Magazine, 19* (2),129-139.

Mathis, R. L., & Jackson, J. H. (2004). *Human Resources Management* (10th ed.). Australia: Thomson South-Western.

Mahfar, R., & Omar, N. H. (2004). The current state of management accounting practice in selected Malaysian companies: An empirical evidence. *International Business Management Conference, Universiti Tenaga Nasional International, Malaysia* (pp. 50-61)

McGowan, A. S. (1998). Perceived benefits of ABCM implementation. *Accounting Horizons, 12*(1), 31-50.

Mcnair, C. L., & Mosconi, W. (1987). Measuring Performance in An Advance Manufacturing Environment. *Management Accounting 69*(1): 28-31.

Mcnair, C.L, & Mosconi, William. (1987). Measuring Performance in An Advance Manufacturing Environment. *Management Accounting, 69*(1), 28-31.

Meriam, S. B. (1998). *Quantitative research and case study application in education*. San Franscisco: Jossey –Bass.

MIDA. (2010). *Business Opportunities Malaysia's Automotive Industry*. Kuala Lumpur: Transport Industry Division Malaysian Industrial Development Authority.

MIDA. (July 2009). *Malaysia's Automotive Industry*. Kuala Lumpur: Malaysian Industrial Development Authority.

MITI. (2010). *Review of National Automotive Policy*. Retrieved from http://www.miti.gov.my/cms/content.jsp?id=com.tms.cms.article.Article_9971dce0-c0a81573-3edb3edb-686eb8ad

MITI. (2011). *AFTA*. Retrieved from http://www.miti.gov.my /cms/index.jsp

MITI. (2011). *Malaysia International Trade and Industry Report 2010*. Kuala Lumpur: Ministry of International Trade and Industry Malaysia.

Moen, R. D., & Norman, C. L. (Nov 2010). Circling Back. *Quality Progress, 43*(11), 23-28.

Mokhtar, S. S. M, & Yusof, R. Z. (2010). The influence of top management commitment, process quality management and quality design on new product performance: A case of Malaysian manufacturers. *Total Quality Management*, *21*(3):291-300.

Monden, Y., & Lee, J. (1993). How Japanese auto maker reduces cost. *Management Accounting*, *75*, 22-26.

Monden, Y., & Hamada, K. (1991). Target Costing and Kaizen Costing in Japanese automobile companies. *Journal of Management Accounting Research, 3*(Fall), 16-34.

Narver, J. C., & Slater, S. F. (1990). The effect of market orientation on business profitability. *Journal of Marketing, 54*(4), 20-34.

New Sunday Times (2012). *Nostalgic feeling*. Retrieved from http://www.highbeam.com/doc/1P1-170236406.html.

New Sunday Times (2012). *Perodua's new big car*. Retrieved from http://www.highbeam.com/doc/1P1-170236406.html.

Newman, R. G., & Mckeller, J. M. (1995). Target Pricing- A Challenge for Purchasing. *International Journal of Purchasing and Materials Management, 31*(3), 13-20.

Nishimura, A. (1995). Transplanting Japanese Management Accounting and Cultural Relevance. *The International Journal of Accounting, 30,* 318-330.

Nishimura, A. (2005a). Management Accounting Practices of Japanese Affiliates in Singapore, Malaysia and Thailand. In A. Nishimura & R. Willett (Eds.), *Management Accounting in Asia*. Malaysia: Thomson.

Nishimura, A. (2005b). Strategic Management and Contemporary Management Accounting. In A. Nishimura & R. Willett (Eds.), *Management Accounting in Asia* (pp. 1-8). Singapore: Thomson.

Nor, N. G. M., & Sumormo, S. (Jul 2005). Transaction Cost and Organizational Choice in the Malaysian Automobile Industry. *International Journal of Business and Society*, *6*(2), 97-112.

Okano, H., & Suzuki, T, (2007). A history of Japanese Management Accounting. In: C. S. Chapman, A. G. Hopwood & M. D. Shields (Eds.), *Handbook of Management Accounting Research* (pp. 1119-1137). UK: Elsevier Ltd,

Okano, H. (2005). Japanese Management Accounting and Recent Changes of Target Costing at Toyota. *Proceeding of International Conference on Management Accounting, Xiamen University, China.*

Omar, O. E. (1997). Target Pricing: A marketing management tool for pricing new cars. *Pricing Strategy & Practice, 5*(2), 61-69.

Otley, D. T. (1980). The contingency theory of management accounting: Achievement and prognosis. *Accounting, Organizations and Society, 5*(4), 413-428.

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods* (2nd ed.). California: Sage Publications.

Peng, D. X., Schroeder, R. G., & Shah, R. (2008). Linking routines to operations capabilities: A new perspective. *Journal of Operation Management, 26*, 730-748.

Perera, S., Harison, G., & Poole, M. (1997). Customer focused manufacturing strategy and the use of operation based non-financial performance measures: A research notes. *Accounting, Organizations and Society, 22*(6), 555-572.

Pierce, Be. (2002). Target Cost Management: Comprehensive Benchmarking for a Competitive Market. *Accountancy Ireland, 34*(2), 30-32.

Pinto, J. K., & Selvin., P. S. (1989). Critical success factors in R & D projects. *Research Technology Management, 32*(1), 31-36.

Rattray, C. J., Lord, B. R., & Shanahan, Y. P. (2007). Target Costing in New Zealand manufacturing firms. *Pacific Accounting Review, 19*(1), 68-83.

Roslender, Robin, & Hart, Susan J. (2003). In search of strategic management accounting: theoretical and field study perspectives. *Management Accounting Research, 14*, 255-279.

Rosli, M., & Kari, F. (2008). Malaysia's National Automotive Policy and the Performance of Proton's Foreign and Local Vendors. *Asia Pacific Business Review, 14*(1), 103-118.

S. Saberi, R. Mohd. Yusuff, N. Zulkifli and M.M.H. Megat Ahmad, 2010. Effective Factors on Advanced Manufacturing Technology Implementation Performance: A Review. Journal of Applied Sciences, 10, 1229-1242.

Sadoi, Y. (1998). Skill Formation in Malaysia: The case of Auto Parts Industry. *Southeast Asian Studies, 36*(3), 317-354.

Sakurai M (1989) Target Costing and How to Use It. *Journal of Cost Management, Summer,* 39-50.

Sakurai, M. (1990). *The influence of Factory Automation on Management Accounting Practices: A study of Japanese Companies.* Boston, Massachusetts: HBS Press.

Saraph, J. V., Benson, P. G., & Schroeder, R. G. (1989). An Instrument For Measuring The Critical Factors Of Quality. *Decision Sciences*, *20*(4), 810-829.

Scapens, R. W. (2006). Understanding management accounting practices: A personal journey. *The British Accounting Review, 38*(1), 1-30.

Schiller, B. R. (1980). *The Economy Today* (4th Ed.). New York: Random House.

Shank, J. K., & Fisher, J. (1999). *Case study: Target costing as a strategic tool. Sloan Management Review, Fall* (41), 73-81.

Shields, M. D. (1995). An Empirical Analysis of Firms' Implementation Experiences with Activity-Based Costing. *Journal of Management Accounting Research, 7*(1), 148-165.

Simons, H. (1990). *Case Study Research in Practice*. London: Sage Publication

Sirmon, D. G., Hitt, M. A., & Ireland, R. D. (2007). Managing Firm Resources In Dynamic Environments To Create Value: Looking Inside The Black Box. *Academy of Management Review, 32*(1), 273-292.

Slevin, D. P., & Pinto, J. K. (1986-1998). Balancing Strategy and Tactics in Project Implementation. *Sloan Management Review, 29*(1), 33-41.

Smith, M., Abdullah, Z., & Razak, R. A. (2008). The diffusion of technological and management accounting innovation: Malaysian evidence. *Asian Review of Accounting*, 16(3), 197-218.

Stainer, A. (1995). Productivity management: the Japanese experience. *Management Decision*, 33 (8), 4-12.

Steiner, G. A., & Steiner, J. F. (2006). *Business, Government, and Society*. New York: McGraw- Hill Irwin.

Sulaiman, M., Ahmad, N. N. N., & Alwi, N. M. (2004) Management accounting practices in selected Asian countries- A review of literature. *Managerial Auditing Journal*, 19(4), 493-508.

Sulaiman, M., Ahmad, N. N. N., & Alwi, N. M. (2005). Is standard costing obsolete? Empirical evidence from Malaysia. *Managerial Auditing Journal*, *20*(2), 109-124.

Swenson, D., Ansari, S. B. J., & Kim, I.W. (2003). Best Practices in Target Costing. *Management Accounting Quarterly,* 4(2), 12-17.

Swenson, D.W., Buttross, T.E. & Kim, Il-W. (2005), Using the CAM-I Diagnostic to Evaluate Readiness for Target Costing. *Cost Management, 19,* 3, ABI/INFORM Global, 41

Tani, T., Okano, H., Shimizu, N., Iwabuchi, Y., Fukuda, J., & Cooray, S. (1994). Target Cost Management in Japanese companies: Current state of art. *Management Accounting Research*, 5, 67-81.

Tani, Takeyuki. (1995). Interactive control in target cost management. *Management Accounting research*, 6, 399-414.

Tham, S. Y. (2004). AFTA and Competitiveness of Malaysian Manufacturing. *4th International Malaysian Studies Conference.* Universiti Kebangsaan Malaysia, Bangi, Malaysia.

Tho, L. M., Isa, C. R. M., & Ng, K. T. (1998). Manufacturing environment, cost structure and management accounting practices: Some Malaysia evidence. *Akauntan Nasional*, August.

Thompson, A. A., Strickland, A. J., & Gamble, J. E. (2010). *Crafting and Executing Strategy* (17th ed.). London: McGraw Hill International Edition.

Wad, P., & Govindaraju, V. G. R. C. (2011). Automotive industry in Malaysia: an assessment of its development. *Int. J. Automotive Technology and Management*, *11*(2), 152-171.

Wickramasinghe, Danture, & Alawattage, Chandana. (2007). *Management Accounting Change*. New York: Routlegde.

Wijewardena, Hema, & Zoysa, Anura De. (1999). A comparative analysis of management accounting practices in Australia and Japan: An empirical investigation. *The International Journal of Accounting*, *34*(1), 49-70.

Yamashina, H. (2000). Challenge to world class manufacturing. *International Journal of Quality & Reliability Management*, *17*(2), 132-143.

Yazdifar, Hassan, & Askarany, Davood. (2012). A comparative study of the adoption and implementation of target costing in the UK, Australia and New Zealand. *International Journal of Production Economic, 135*, 382-392.

Yee, J. Y., & Monden, Y. (1996). An International Comparison of Manufacturing -Friendly Cost Management System. *The International Journal of Accounting, 31*, 197-202.

Yigibasioglu, Ogan M. (2010). Information sharing with key suppliers: a transaction cost theory perspective. *International Journal of Physical Distribution & Logistics Management, 40*(7), 550-578.

Yin, R. K. (2003). *Case Study Research - Design and Methods* (3rd ed.). California: Sage Publications.

Yin, R. K. (2009). *Case Study Research - Design and Method*s (4th ed.). California: Sage Publications.

Zahay, D., & Griffin, A. (2010). Marketing Strategy Selection, Marketing Metrics, and Firm Performance. *Journal of Business & Industrial Marketing*, *25*(2), 84-93.

Zollo, Maurizio, & Winter, Sidney G. (2002). Deliberate Learning and the Evolution of Dynamic Capabilities. *Organization Science, 13*(3), 339-351.

Zwikael, Ofer. (2008). Top management involvement in project management: A cross country study of the software industry. *International Journal of Managing Projects in Business, 1*(4), 498-511.

LIST OF PUBLICATION AND PAPER PRESENTED

Baharudin, N. (2012). *Comparative study of Target Cost Management (TCM) process implementation and its key enablers: Malaysia automotive company case study*. Paper presented at ASEAN FBEPS-AGBEP PhD Colloqium. Brunei Darussalam: University of Brunei Darussalam.

Baharudin, N., & Jusoh, R. (2014). *Target Cost Management (TCM): A case study from Malaysian automotive company*. Proceedings of the Global Conference on "Business and Social Science Development" (GCBSS – 2014) Kuala Lumpur, Malaysia. Paper presented at Global Conference on Business and Social Science, Kuala Lumpur (p. 206). Kuala Lumpur: GATR Enterprise.

Baharudin, N., & Jusoh, R. (2015). Target Cost Management (TCM): A case study of an automotive company. *Procedia - Social and Behavioral Sciences*, 172, 525 - 532.

APPENDICES

APPENDIX A: The Case Study Protocol

A. Introduction to the case study and purpose of protocol

- Al. Overview of the study
  - Appendix B
- A2. Conceptual and Theoretical framework for the case study
  - Chapter 3.3 for TCM implementation processes
  - Chapter 3.4 for TCM enablers
- A3. Role of protocol in guiding the case study investigator

B. Data collection procedures

- Bl. Names of sites to be visited, including contact persons
- B2. Data collection plan
  - Overall schedule: Table 4-1
  - Supporting devices: digital record device, laptop computer
- B3. Expected preparation prior to site visits
  - Review the public documents, previous received documents and observations, previous interviews.
  - Review the screening survey data

C. Case study questions

- C1. Interview questions
  - Appendix C
- C2. Survey question
  - Appendix H

D. Outline of case study report

- DI. TCM implementation process
- D2. TCM enablers' existence
- D3. TCM enablers statistical survey result
- D4. Theories to support the result
- D5. Attachments: figures, tables, list of persons interviewed, statistical results, item coding.

Developed based on the guideline provided by Yin (2003, p. 68)

APPENDIX B: Case study research letter of consent

Norhafiza Baharudin
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24th AUGUST 2011

Madam Zarina Mansor,
General Manager,
Human Resource Department,
Perodua Manufacturing Sdn. Bhd
Sungai Choh, Locked Bag 226,
48009 Rawang,
Selangor Darul Ehsan,
Malaysia.

RE: REQUEST FOR RESEARCH PERMISSION

Dear Madam,
I am Norhafiza Baharudin, a PhD candidate in the Department of Management Accounting and Taxation, Faculty of Business and Accountancy at University Malaya. Currently, I am doing a research on how automotive industry at Malaysia implements Target Costing Management (TCM) and the enablers that influence its implementation for my PhD thesis. Conjunction to this, I would like to request permission to do data collection at your company.

1.1 Objective if the study

The purpose of this study is to understand the Target Costing Management (TCM) implementation in PERODUA and enablers that influence the TCM implementation process.
The results will give benefits in term of (1) understand the current level of Malaysia company's TCM practices compared with study made by the scholars on Japanese companies' TCM practices , (2) highlight the enablers that assist the TCM implementation at Malaysia . This result hopefully can help to promote the TCM implementation and eventually enhance the development of automotive industry at Malaysia.

1.2 Background Research

Basically there are many terms used to describe Target Costing Management (TCM) such as 'basis net price', 'manufacturing cost reduction', 'pre-calculation', 'direct cost feasibility study', 'design to cost' and 'Cost Planning'.

In this research, Target Costing Management is defined as:
'A comprehensive profit management activity in which targets are set as to quality, prices, reliability and delivery date at the time of product planning and development, to conform to the needs of customers, and respective targets are designed to attain simultaneously in all the processes from the start (upstream) to the end (downstream).'

TCM starts by estimating a market-based product selling price and then subtracting a desired target profit to arrive at a target cost. Then, all the possibilities for cost reduction in the various product-development phases to achieve the cost are assessed. This should be achieved without compromising the specified product demands connected with functionality, quality, reliability et cetera.

The following formula applies to Target Costing Management:-

Target-selling Price - Target Profit = Target Cost

Once the target cost has been determined, further efforts are focused to ensure that the product is designed to meet that target cost. Several tools can be used to accomplish this, such as, Value Engineering (VE), reverse engineering, Value Analysis (VA) and process improvement.

1.3 Methodology of Data Collection

The data will be collected thru interview and survey questions. Please refer to appendices for interview questions and the survey questionnaires. The interview will be conducted around 30 to 60 minutes per respondent. While, the survey questions will take around 20 minutes to complete.

1.4 Target Respondents

The target respondents are the employees from departments which are involved directly with TCM implementation such as PVD, R&D, Cost Planning and et cetera.
The target respondents are 10 pax for the interview and 100 pax for the survey.

1.5 Anonymity and Confidentiality

In this research I only explore the TCM implementation process and the factors that enable the implementation process at PERODUA. NO information related to cost, profit or loss figures will be collected or revealed.
The anonymity of the respondents and company is guaranteed. The strict ethic guidelines of University Malaya will ensure that anonymity is maintained at all time. Hence, no names are required. Individual participants will not be identified in the analysis as only aggregated results will be analysed and presented. The result of the findings will be presented for academic related purpose only. However, upon request, I would be very honoured to share the findings with PERODUA's management.

Herewith I attached the supporting document from University Malaya for your reference.

Thank you very much for your consideration. It is only with your generosity and help that this study can be successful.

Sincerely,

Norhafiza Baharudin
CHA080010
PhD Candidate,
Department Of Management Accounting & Taxation,
Faculty of Business and Accountancy
University Of Malaya

Cc:

Associate Prof. Dr. Ruzita Binti Jusoh
Department Of Management Accounting and Taxation
Faculty of Business and Accountancy
Email: geee@um.edu.my

Dr. Tengku Mohamed Faziharudean Bin Dato Tengku Feissal
Director,
Graduate School of Business
Faculty of Business and Accountancy
University Malaya
Email: deanfeissal@um.edu.my

APPENDIX C: Target Cost Management Interview Protocol

1) Please describe why your company started to implement Target Costing management.

1. When your company did start using Target Costing Management (TCM) approach?
2. How did your company manage the cost and price of your product before you started to implement TCM?
3. What are the reasons that your company change to TCM?
4. Who has influenced the TCM implementation at your company (e.g.: consultant, employee)?
5. Whose idea was it and how TCM progress gets started?
6. How the Japanese expatriates influence the TCM implementation in your company?
7. Was there any top management involvement in the early levels of TC development?
8. What levels/functions were involved?
9. What departments starting the TCM? Who led the effort? Was it the committee, department and individual?
10. How different the TCM implementation of early practice look like and how different is from current practice?
11. Is TCM viewed as tools or a philosophy? Could you give examples to support this?

2) Please explain how your company manages to implement Target Costing Management.

PLAN STAGE

1. What departments involve TCM planning stage and how these departments tied with TCM?
2. Are there any management involvements at the TCM planning process? What level functions were involved?
3. What kind of information and supports are necessary to implement target cost management at your company?
4. How does your company set the target cost?
5. How does your company set the selling price was set?
6. How does your company set the target profit was set?

DO STAGE

7. What departments involves this DO stage TCM and how?
8. Are there any management involvements at the TCM implementation process? What level functions were involved?

9. Who is responsible for gathering/maintaining data related to TC - individual, team, ad hoc?
10. Are there tools that you aware that support TCM implementation at your company?
11. How do you link the Japanese manufacturing method such as one flow system, Kaizen, JIT in assisting TCM?
12. To your best knowledge, do you suppliers use TCM approach? Do you encourage your suppliers to use TCM approach?
13. To what extent you share the TCM information with current or potential suppliers? Under what circumstances?

CHECK STAGE

14. What departments involve this stage planning TCM and how?
15. Do you track cost saving from the TCM approach? What kind of cost saving are tracked and how?
16. Who received the reports?
17. How much saving annually does your company save by using the TCM? Could I see the report you issued on the TCM activity saving?
18. How do you check your TCM activity result?
19. How do you communicate your target cost achievement?
20. What will happen if the actual cost exceeds the target cost?
21. Are there any management involvements at the TCM planning process? What level functions were involved?
22. Do you track non-monetary benefits using a TC approach? If so, what are they and how are they tracked? May I see/have a copy of the summary report(s) you have issued on non-monetary benefits?
23. How you/team/others are held accountable for TC results?

ACTION STAGE

24. What departments involve this stage TCM and how?
25. Are there any management involvements at the TCM stage process? What level functions were involved?
26. Do you benchmark your company TCM practices with other companies? Please explain.
27. What changes or enhancements will you still make to your TCM approach?

TCM ENABLERS

28. How do you develop your members or company to understand TCM?
29. Are any employees trained on the use of TCM approach? If so, how does the training occur? Do you train your supplier? Could you explain in details?
30. How your corporate cultures affect the TCM implementation process?
31. How supplier involved in TCM practices?

32. Do you believe that the linkage of TCM to other initiatives (such as supplier relationship, Japanese manufacturing method and etc.) have helped the acceptance of TCM, or vice versa? How and why?
33. How do you information network with your mother company, shareholders, business partners, suppliers help you to strengthen the TCM achievement?
34. How do you your top management assist your company to in TCM implementation?
35. Are there any specific TCM execution rules at your company? Who set the rules? And it is known to companywide?

3) Please describe the issues of Target Costing Management that you faced during its implementation.

1. Are there any misapplication of TCM that you have seen or notice?
2. What do you see as the drawbacks / difficulties/ disadvantages of using the TCM approach?
3. Are the any problems which you see are so serious that they may distort/ undermine the result of TCM?
4. Do you see your firm doing more or less in the future? Which areas will be affected and why?
5. Is there anything else significant about your use of TCM approach or your implementation of TCM approach that you think I should know about?

4) Please explain the results of Target Costing Management to your company.

1. Are your company or department gain benefits with the TCM implementation?
2. Does TCM help you with the decision-making?
3. What do you see as the main benefits of using TCM?
4. Do you measure these benefits?
5. How do you measure this?

SECTION 2: INTERVIEWEE BACKGROUND

1. Position & responsibilities background
2. Involvement in TCM

APPENDIX D: Document Summary Sheet Format

DOCUMENT SUMMARY SHEET			
Received date:		Document number:	
Document date:		Category:	Main/ Support
Document name:		Document source:	
1. Brief of documents			
2. Significant of document to this research			
3. Summary of the contents			
4. Next evidence to check/verify/ask			

APPENDIX E: List of interviewees

No	Code	Position	Department	Length of Services	Genders	Date	Recorded/ Not recorded
1	Informant 1	Middle management	Purchasing and Vendor Devel-opment	13	Male	March 2011	Recorded
2	Informant 2	Middle management	Product Plan-ning Depart-ment	14	Male	March 2011	Recorded
3	Informant 3	Lower management	Product Mar-keting Depart-ment	10	Male	March 2011	Recorded
4	Informant 4	Middle man-agement	R& D	14	Female	March 2011	Recorded
5	Informant 5	Technical staff	Purchasing and Vendor Devel-opment	6	Male	Feb 2011	Recorded
6	Informant 6	Middle management	Cost Planning	15	Male	Feb 2011	Recorded
7	Informant 7	Middle management	Account De-partment	15	Female	March 2011	Not Recorded
8	Informant 8	Middle management	Cost Planning	14	Male	Feb 2012	Recorded
9	Informant 9	Middle management	Cost Planning	15	Male	April 2012	Recorded
10	Informant 10	Top management	Cost Planning	19	Male	March 2012	Recorded
11	Informant 11	Middle management	Cost Control	10	Male	April 2012	Recorded
12	Informant 12	Middle management	R&D	15	Male	April 2012	Recorded
13	Informant 13	Lower management	Cost Planning	7	Female	April 2012	Recorded
14	Informant 14	Technical Staff	Cost Planning	3	Male	April 2012	Recorded
15	Informant 15	Technical Staff	Cost Planning	4	Female	April 2012	Recorded
16	Informant 16	Technical Staff	Cost Planning	4	Female	April 2012	Recorded
17	Informant 17	Lower management	R& D	8	Male	April 2012	Not recorded
18	Informant 18	Middle management	Cost Planning	12	Male	April 2012	Not recorded
19	Informant 19	Top management	Vendor P	16	Male	April 2012	Not recorded
20	Informant 20	Middle management	Vendor A	10	Male	April 2012	Not recorded
21	Informant 21	Middle management	Vendor T	11	Female	April 2012	Not recorded
22	Informant 22	Technical staff	Purchasing and Vendor Devel-opment	5	Male	April 2012	Not recorded
23	Informant 23	Middle management	Vendor S	11	Female	April 2012	Not recorded
24	Informant 24	Middle management	Cost Control	12	Male	April 2012	Not recorded

APPENDIX F: Survey cover letter

UNIVERSITY OF MALAYA
FACULTY OF BUSINESS AND ACCOUNTANCY
DEPARTMENT OF MANAGEMENT ACCOUNTING & TAXATION

"Questionnaire"
Enablers of the Target Costing Management (TCM) implementation process in PERODUA.
By
Norhafiza Baharudin
CHA080010

Dear Sir/ Madam,
I am Norhafiza Baharudin, a PhD candidate in the Department of Management Accounting and Taxation, Faculty of Business and Accountancy at University Malaya. Currently, I am conducting a survey to gather data for my PhD thesis. The purpose of this study is to understand the Target Costing Management (TCM) implementation in PERODUA and determine enablers that influence TCM implementation process.

Your response is very important to the accuracy of my study. I understand that your time is valuable, however, if you could take a few minutes to complete this short questionnaire it would be very much appreciated.

Your completion of the questionnaire is critical to my study. Please complete and return the questionnaire as soon as possible. **Your anonymity is guaranteed. The strict ethic guidelines of University Malaya will ensure that anonymity is maintained at all time**. Hence, no names are required. Individual participants will not be identified in the analysis as only aggregated results will be analysed and presented. Please email to nurphd21@gmail.com, if you require further explanation or should you need the results of this study.

In making your ratings, please remember the following points:-

1. Please answer each of the statements related to the questions by circling the number that best describes your answer.
2. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully.
3. Please answer ALL questions.
4. Please circle only one number for each item.

Thank you very much for your time and consideration. It is only with your generosity and help that this study can be successful.

Sincerely,

Norhafiza Baharudin

PhD Candidate

Tel: 012-6638281

Email: nurphd21@gmail.com

APPENDIX G: Explanation of the study and guideline to answer the questionnaire

HOW TO COMPLETE THE QUESTIONNAIRE

Please read carefully before answering the questions. It will take approximately 20 minutes to complete the questionnaire. Please answer each question by circling the most appropriate number that represents the answer, as shown below. Kindly ensure all questions are answered.

Not at all	To a minimum extent	To a slight extent	To some extent	To a moderate extent	To a large extent	To a great extent
1	2	3	4	5	6	7

DEFINITION

Basically there are many terms used to describe **Target Costing Management (TCM) such as 'basis net price', 'manufacturing cost reduction', 'pre-calculation', 'direct cost feasibility study', 'design to cost' and 'Cost Planning'.**

In this research, Target Costing Management is defined as:
'A comprehensive profit management activity in which targets are set as to quality, prices, reliability and delivery date at the time of product planning and development, to conform to the needs of customers, and respective targets are designed to attain simultaneously in all the processes from the start (upstream) to the end (downstream).' (Huh et al., 2008)

TCM starts by estimating a market-based product selling price and then subtracting a desired target profit to arrive at a target cost. Then, all the possibilities for cost reduction in the various product-development phases to achieve the cost are assessed. This should be achieved without compromising the specified product demands connected with functionality, quality, reliability et cetera.
The following formula applies to Target Costing Management:-

Target-selling price - Target profit = Target cost

Once the target cost has been determined, further efforts are focused to ensure that the product is designed to meet that target cost. Several tools can be used to accomplish this, such as, Value Engineering (VE), reverse engineering, Value Analysis (VA) and process improvement.

APPENDIX H: Survey form

SECTION 1: TARGET COSTING MANAGEMENT ENABLERS

This section requires the respondents to indicate their perception on Target Costing Management (TCM) enablers at PERODUA.
Please rank your level of agreement with the following statements.

Strongly disagree	Disagree	Slightly dis-agree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
1	2	3	4	5	6	7

TRAINING								
1	Specific work-skill training (technical and vocational) is given throughout COMPANY A.	1	2	3	4	5	6	7
2	Team building and group dynamics training is given to employees in COMPANY A.	1	2	3	4	5	6	7
3	Top management at COMPANY A gives commitment to employee training.	1	2	3	4	5	6	7
4	Resources are available for employee training at COMPANY A.	1	2	3	4	5	6	7
5	Adequate training is provided for designing TCM at COMPANY A.	1	2	3	4	5	6	7
6	Adequate training is provided for implementing TCM at COMPA-NY A.	1	2	3	4	5	6	7
7	Adequate training is provided for using TCM at COMPANY A.	1	2	3	4	5	6	7
Please write your additional comments if any:								

SUPPLIER RELATIONSHIP								
1	COMPANY A enters into special agreements with suppliers who have improved performance.	1	2	3	4	5	6	7
2	COMPANY A is loyal to its key suppliers.	1	2	3	4	5	6	7
3	COMPANY A has very frequent face-to-face planning or commu-nication with its key suppliers.	1	2	3	4	5	6	7
4	There is high corporate level communication on important issues with key suppliers.	1	2	3	4	5	6	7
5	There are direct computer to computer links with key suppliers.	1	2	3	4	5	6	7
6	Purchasing and Vendor Development department can influence first tier supplier's responsiveness to the purchasing requirements.	1	2	3	4	5	6	7
7	COMPANY A supports its suppliers in production related matters.	1	2	3	4	5	6	7
8	COMPANY A works with its suppliers starting from the product development stage.	1	2	3	4	5	6	7
Please write your additional comments if any:								

Please rank your level of agreement with the following statements.

Strongly disagree	**Disagree**	**Slightly disagree**	**Neither agree nor disagree**	**Slightly agree**	**Agree**	**Strongly agree**
1	**2**	**3**	**4**	**5**	**6**	**7**

TEAMWORK CULTURE								
1	TCM related members acknowledge conflict and work together to resolve issues on the team.	1	2	3	4	5	6	7
2	TCM related members help one another by sharing knowledge and information.	1	2	3	4	5	6	7
3	TCM related members encourage diverse perspectives and different points of view from others in the team.	1	2	3	4	5	6	7
4	TCM related members demonstrate interest and enthusiasm during team activities.	1	2	3	4	5	6	7
5	TCM related members acknowledge the contributions made by others in the team.	1	2	3	4	5	6	7
6	TCM related members are working together towards a unified goal.	1	2	3	4	5	6	7
7	TCM related members freely share information (technical, market, etc.) with others in the team.	1	2	3	4	5	6	7
8	Overall, TCM related members are very trustworthy.	1	2	3	4	5	6	7
9	TCM related members are usually considerate of each other's feelings.	1	2	3	4	5	6	7
10	TCM related members are friendly.	1	2	3	4	5	6	7
11	I can rely on my TCM related members.	1	2	3	4	5	6	7
Please write your additional comments if any:								

TOP MANAGEMENT SUPPORT AND COMMITMENT								
1	In COMPANY A, TCM receives strong and active support from the top management.	1	2	3	4	5	6	7
2	Upper management in COMPANY A provides adequate resources to the TCM implementation effort.	1	2	3	4	5	6	7
3	TCM is closely tied to COMPANY A competitive strategies.	1	2	3	4	5	6	7
4	COMPANY A's management has provided visible support for the TCM initiatives.	1	2	3	4	5	6	7
5	Support for implementing TCM in COMPANY A comes from both the manufacturing operations and support groups.	1	2	3	4	5	6	7
6	Support for implementing TCM in COMPANY A is widespread.	1	2	3	4	5	6	7
Please write your additional comments if any:								

Please rank your level of agreement with the following statements.

Strongly disagree	Disagree	Slightly dis-agree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
1	2	3	4	5	6	7

INFORMATION-SHARING NETWORK with business partners (e.g. joint venture partners, suppliers, trading companies).									
1	COMPANY shares exclusive information with its business partners.	1	2	3	4	5	6	7
2	COMPANY shares business knowledge of core business processes with its business partners.	1	2	3	4	5	6	7
3	COMPANY A and its business partners exchange information that helps in the establishment of business planning.	1	2	3	4	5	6	7
4	COMPANY A and its business partners keep each other informed about events or changes that may affect the other partners.	1	2	3	4	5	6	7
5	COMPANY A share common information technology (software) to facilitate communication with its business partners.	1	2	3	4	5	6	7
6	Information sharing on important issues is a critical element to maintain the business partnerships.	1	2	3	4	5	6	7
7	COMPANY A and its business partners share cost information that helps TCM performance.	1	2	3	4	5	6	7
Please write your additional comments if any:								

Please rate the extent to which the following items are being practiced at COMPANY A.

Not at all	To a minimum extent	To a slight extent	To some extent	To a moderate extent	To a large extent	To a great extent
1	2	3	4	5	6	7

CONFRONTATIONAL STRATEGY									
1	Level of capacity utilization.	1	2	3	4	5	6	7
2	Level of operating efficiency.	1	2	3	4	5	6	7
3	Low overhead cost.	1	2	3	4	5	6	7
4	Emphasis on finding ways to reduce production cost.	1	2	3	4	5	6	7
5	Uniqueness of its products.	1	2	3	4	5	6	7
6	Targeting clearly identified segment or segments.	1	2	3	4	5	6	7
7	Offering products that are suitable for its price segment.	1	2	3	4	5	6	7
8	Offering quality products.	1	2	3	4	5	6	7
Please write your additional comments if any:									

CUSTOMER ORIENTATION									
1	Customer commitment.	1	2	3	4	5	6	7
2	Create customer value.	1	2	3	4	5	6	7
3	Understand customer needs.	1	2	3	4	5	6	7
4	Customer satisfaction objectives.	1	2	3	4	5	6	7
5	Measure customer satisfaction.	1	2	3	4	5	6	7
6	After sales services.	1	2	3	4	5	6	7
Please write your additional comments if any:									

Please rate the extent to which COMPANY A practices on the following items.

Not at all	To a minimum extent	To a slight extent	To some extent	To a moderate extent	To a large extent	To a great extent
1	**2**	**3**	**4**	**5**	**6**	**7**

LEAN MANUFACTURING IMPLEMENTATION								
1	Programmes to improve the suppliers' quality and reliable delivery of materials and components.	1	2	3	4	5	6	7
2	Programmes to reduce waste or non-value added activities throughout the production process.	1	2	3	4	5	6	7
3	Programmes to reduce time delays in manufacturing and designing products (e.g. improve cycle time).	1	2	3	4	5	6	7
4	Involvement of employees in quality improvement programmes (e.g. training, involvement in improvement teams).	1	2	3	4	5	6	7
5	Involvement of COMPANY A departments' personnel (e.g. Manufacturing, R & D, and Marketing) in COMPANY A's strategic planning.	1	2	3	4	5	6	7
6	Developing close contact between manufacturing and customer (internal or external).	1	2	3	4	5	6	7
7	Programmes to coordinate quality improvements between departments.	1	2	3	4	5	6	7
Please write your additional comments if any:								

ADVANCED MANUFACTURING TECHNOLOGIES (AMT) IMPLEMENTATION								
1	Computer Aided Engineering (CAE).	1	2	3	4	5	6	7
2	Computer Aided Design (CAD).	1	2	3	4	5	6	7
3	Computer Aided Manufacturing (CAM).	1	2	3	4	5	6	7
4	Numerically-Controlled machines or tools (NC) (e.g. Parameter controller).	1	2	3	4	5	6	7
5	Flexible manufacturing system.	1	2	3	4	5	6	7
6	Robots.	1	2	3	4	5	6	7
7	Computer Integrated Manufacturing (CIM).	1	2	3	4	5	6	7
Please write your additional comments if any:								

SECTION 2: SUCCESSFUL IMPLEMENTATION OF TCM

This section requires the respondents to indicate their perception concerning the organization level of Target Costing Management (TCM) implementation performance.
Please rank your level of agreement with the following statements.

Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
1	2	3	4	5	6	7

EFFICIENCY IMPROVEMENT								
1	TCM implementation has resulted in efficiency in the 'design to cost'.	1	2	3	4	5	6	7
2	TCM implementation has resulted in efficiency in strengthening the design or development process.	1	2	3	4	5	6	7
3	TCM implementation has resulted in efficiency in cost reduction efforts by the engineers.	1	2	3	4	5	6	7
4	TCM implementation has resulted in efficiency in improving design or development technology.	1	2	3	4	5	6	7
5	Overall, the benefits of TCM outweigh the cost of installing a new method or system.	1	2	3	4	5	6	7
Please write your additional comments if any:								
PRODUCT MARKETABILITY IMPROVEMENT								
1	TCM implementation has resulted in an improvement in quality.	1	2	3	4	5	6	7
2	TCM implementation has resulted in product features that suit the needs of the customer.	1	2	3	4	5	6	7
3	TCM implementation has reduced the development lead time.	1	2	3	4	5	6	7
4	TCM implementation has resulted in the timely introduction of new products.	1	2	3	4	5	6	7
Please write your additional comments if any:								
COST REDUCTION IMPROVEMENT								
1	TCM implementation has resulted in product cost reduction.	1	2	3	4	5	6	7
2	TCM implementation has resulted in upstream cost reductions.	1	2	3	4	5	6	7
3	TCM implementation has resulted in a reduction in purchased materials and raw materials.	1	2	3	4	5	6	7
4	TCM implementation has resulted in waste reduction at the factory floor.	1	2	3	4	5	6	7
Please write your additional comments if any:								

SECTION 3: BACKGROUND INFORMATION

Please tick or write your answer in the column provided.

1. Your department: ____

2. Your present job position:

	Top level manager (e.g. General Manager, ED, Managing Director)
	Middle level manager (e.g. Senior manager, Department manager)
	Lower level manager (e.g. Specialist engineer, Assistant manager)
	Technical staff (e.g. Engineer, Executive)
	Others, please specify________________________________

3. Your gender:

Male	Female

4. Your age:

Less than 30 years	Between 31 and 39 years	Between 40 and 49 years	More than 50 years

5. Your qualification:

High School and below	Certificate	Diploma	Bachelor's Degree	Master's Degree	PhD

6. Your work experience/service in COMPANY A.

Less than 1 year	1-2 years	3-5 years	6-10 years	11 -20 years	More than 20 years

Please provide your comments, if any.

THANK YOU VERY MUCH FOR YOUR TIME AND ASSISTANCE IN COMPLETING THIS QUESTIONNAIRE.

APPENDIX I: Items coding

Construct	Item code	Item wording
ADVANCED MANUFAC-TURING TECHNOLOGIES (AMT) IMPLEMENTATION	AMT1	Computer Aided Engineering (CAE).
	AMT2	Computer Aided Design (CAD).
	AMT3	Computer Aided Manufacturing (CAM).
	AMT4	Numerically-Controlled machines or tools
	AMT5	Flexible manufacturing system.
	AMT6	Robots.
	AMT7	Computer Integrated Manufacturing (CIM).
CONFRONTATIONAL STRATEGY	CS1	Level of capacity utilization.
	CS2	Level of operating efficiency.
	CS3	Low overhead cost.
	CS4	Emphasis on production cost reduction.
	CS5	Uniqueness of products.
	CS6	Targeting clearly identified segment or segments.
	CS7	Offering products that are suitable for its price segment.
	CS8	Offering quality products.
CUSTOMER ORIENTA-TION	CO1	Customer commitment.
	CO2	Create customer value.
	CO3	Understand customer needs.
	CO4	Customer satisfaction objectives.
	CO5	Measure customer satisfaction.
	CO6	After sales services.
INFORMATION-SHARING NETWORK with business partners	IS1	Exclusive information sharing
	IS2	Business knowledge sharing.
	IS3	Exchange business planning information.
	IS4	Sharing info that might affect partners.
	IS5	Share common software
	IS6	Information sharing as critical element to maintain partner-ships.
	IS7	Share cost information.
LEAN MANUFACTURING IMPLEMENTATION	LM1	Programmes to improve the suppliers' quality and reliable de-livery
	LM2	Programmes to reduce waste or non-value added
	LM3	Programmes to reduce time delays
	LM4	Involvement of employees in quality improvement programmes
	LM5	Involvement departments' personnel in strategic planning.
	LM6	Developing close contact between manufacturing and customer (internal or external).
	LM7	Quality improvements programmes between departments.

Construct	Item code	Item wording
SUPPLIER RELATION-SHIP	SR1	Special agreements with improved suppliers
	SR2	Loyal to key suppliers.
	SR3	Face-to-face planning or communication with its key suppliers.
	SR4	High level communication on important issues with key suppliers.
	SR5	Direct computer to computer links with key suppliers.
	SR6	Purchasing and Vendor Development department influence first tier suppliers
	SR7	Supports suppliers in production related matters.
	SR8	Works with its suppliers starts from the product development stage.
TEAMWORK CULTURE	TW1	Acknowledge conflict and work together to resolve issues.
	TW2	Sharing knowledge and information.
	TW3	Encourage diverse perspectives
	TW4	Demonstrate interest and enthusiasm
	TW5	Acknowledge the contributions
	TW6	Work together towards a unified goal.
	TW7	Share information freely
	TW8	Trustworthy team members
	TW9	Consider each other's feelings.
	TW10	Friendly team members
	TW11	Reliable team members
TOP MANAGEMENT SUPPORT AND COMMIT-MENT	TSC1	Top management strong and active support.
	TSC2	Provide adequate resources
	TSC3	TCM is closely tied to COMPANY A competitive strategies.
	TSC4	Visible top management support.
	TSC5	Support from manufacturing operations and support groups.
	TSC6	Company widespread support
TRAINING	T1	Specific work-skill training
	T2	Team building and group dynamics
	T3	Top management commitment to training.
	T4	Resources are available
	T5	Adequate training for designing TCM.
	T6	Adequate training for implementing TCM.
	T7	Adequate training for using TCM
TCM SUCCESSFUL IM-PLEMENTATION	TSIE1	Efficiency in 'design to cost'.
	TSIE2	Strengthening the design or development process.
	TSIE3	Efficiency in cost reduction efforts
	TSIE4	Efficiency in improving design or development technology.

Construct	Item code	Item wording
TCM SUCCESSFUL IMPLEMENTATION	TSIE5	Benefits outweigh the cost of installing a new method or system.
	TSIM1	Quality improvement.
	TSIM2	Product features based on customer needs
	TSIM3	TCM implementation has reduced the development lead time.
	TSIM4	Timely introduction of new products.
	TSICR1	Product cost reduction.
	TSICR2	Upstream cost reduction.
	TSICR3	Purchased materials and raw materials cost reduction
	TSICR4	Waste reduction at the factory floor.

APPENDIX J: Descriptive Analysis of the variables (n=87)

Construct items	Mean	SD.	Min	Max	Skewness	Kurtosis
Advanced Manufacturing Technologies1	5.06	1.315	1	7	-0.736	0.538
Advanced Manufacturing Technologies2	5.68	1.28	1	7	-1.208	1.584
Advanced Manufacturing Technologies3	4.76	1.338	1	7	-0.499	0.286
Advanced Manufacturing Technologies4	4.67	1.411	1	7	-0.577	0.259
Advanced Manufacturing Technologies5	4.53	1.293	1	7	-0.478	0.25
Advanced Manufacturing Technologies6	4.78	1.233	1	7	-0.827	0.617
Advanced Manufacturing Technologies7	4.48	1.302	1	7	-0.544	-0.102
Confrontational Strategy1	5.09	1.052	3	7	-0.249	-0.505
Confrontational Strategy2	5.06	1.093	3	7	-0.225	-0.497
Confrontational Strategy3	4.48	1.265	1	7	-0.7	0.621
Confrontational Strategy4	5.29	1.109	3	7	-0.438	-0.26
Confrontational Strategy5	4.78	1.166	2	7	-0.462	0.037
Confrontational Strategy6	5.08	1.059	2	7	-0.705	0.064
Confrontational Strategy7	5.18	1.04	3	7	-0.126	-0.916
Confrontational Strategy8	5.56	1.198	2	7	-0.921	0.69
Customer Orientation1	5.44	1.097	1	7	-0.837	1.796
Customer Orientation2	5.51	1.109	1	7	-1.062	2.056
Customer Orientation3	5.53	1.077	1	7	-1.306	2.904
Customer Orientation4	5.57	1.096	2	7	-0.819	0.577
Customer Orientation5	5.52	1.01	2	7	-1.192	2.182
Customer Orientation6	5.38	1.193	2	7	-0.82	0.293
Information Sharing Network1	4.76	1.248	1	7	-0.519	0.214
Information Sharing Network2	4.93	1.087	1	7	-0.862	1.409
Information Sharing Network3	5.00	1.161	1	7	-1.185	1.306
Information Sharing Network4	4.99	1.215	2	7	-0.654	-0.006
Information Sharing Network5	4.83	1.112	2	7	-0.376	-0.47
Information Sharing Network6	5.47	1.199	1	7	-0.78	0.985
Information Sharing Network7	4.54	1.237	1	7	-0.604	0.633
Lean Manufacturing1	5.21	1.025	2	7	-0.429	-0.044
Lean Manufacturing2	5.13	1.179	1	7	-0.468	0.516
Lean Manufacturing3	5.32	1.146	3	7	-0.379	-0.56
Lean Manufacturing4	5.36	1.034	3	7	-0.379	-0.384
Lean Manufacturing5	5.07	1.274	1	7	-1.099	1.079
Lean Manufacturing6	4.75	1.25	1	7	-0.82	1.3
Lean Manufacturing7	5	1.276	1	7	-0.825	0.487
Supplier Relationship1	5.08	0.991	3	7	-0.091	-0.623
Supplier Relationship2	5.08	1.003	1	7	-0.731	2.022
Supplier Relationship3	5.41	0.922	3	7	-0.378	-0.147
Supplier Relationship4	5.24	1.045	2	7	-0.44	-0.112
Supplier Relationship5	4.68	1.61	1	7	-0.364	-0.726
Supplier Relationship6	5.29	0.901	3	7	-0.216	-0.666
Supplier Relationship7	5.92	0.879	3	7	-0.682	0.484

Construct items	Mean	SD.	Min	Max	Skewness	Kurtosis
Teamwork1	5.13	1.043	2	7	-0.762	0.205
Teamwork2	5.32	1.029	2	7	-0.686	0.672
Teamwork3	5.15	1.018	2	7	-0.646	0.302
Teamwork4	5.05	1.022	2	7	-0.361	-0.103
Teamwork5	5.08	1.025	2	7	-0.363	0.028
Teamwork6	5.41	0.983	2	7	-0.844	1.239
Teamwork7	5	1.21	2	7	-0.483	-0.006
Teamwork8	5.1	1.035	2	7	-0.34	-0.19
Teamwork9	4.84	0.901	2	7	-0.162	-0.024
Teamwork10	5.21	1.069	2	7	-0.543	0.356
Teamwork11	5.06	1.135	1	7	-0.946	1.072
Top Management Support and Commitment1	5.24	1.045	2	7	-0.816	0.753
Top Management Support and Commitment2	4.59	1.052	2	7	-0.202	-0.161
Top Management Support and Commitment3	5.3	1.202	1	7	-1.012	1.633
Top Management Support and Commitment4	4.8	1.021	2	6	-0.601	-0.146
Top Management Support and Commitment5	4.76	1.294	1	7	-0.558	0.046
Top Management Support and Commitment6	4.62	1.287	1	7	-0.525	0.088
Training1	4.78	1.324	2	7	-0.662	-0.341
Training2	5.64	1.229	2	7	-1.513	2.091
Training3	5.31	1.144	2	7	-0.734	0.047
Training4	5.29	1.112	2	7	-0.95	0.587
Training5	4.1	1.303	1	7	-0.002	-0.541
Training6	4.07	1.292	1	7	0.167	-0.533
Training7	3.99	1.342	1	7	0.11	-0.62
TCM Organization Benefit- Efficiency1	5.37	1.08	2	7	-0.614	0.129
TCM Organization Benefit- Efficiency2	5.16	0.963	3	7	-0.251	-0.357
TCM Organization Benefit- Efficiency3	5.38	0.955	2	7	-0.915	1.072
TCM Organization Benefit- Efficiency4	5.01	0.994	2	7	-0.387	-0.013
TCM Organization Benefit- Efficiency5	5.1	1.023	2	7	-0.478	-0.3
TCM Organization Benefit- Marketability1	4.52	1.337	1	7	-0.605	0.293
TCM Organization Benefit- Marketability2	4.68	1.196	1	7	-0.267	0.29
TCM Organization Benefit- Marketability3	4.57	1.282	1	7	-0.34	0.139
TCM Organization Benefit- Marketability4	4.57	1.197	1	7	-0.493	0.616
TCM Organization Benefit-Cost Reduction1	5.56	0.985	2	7	-0.965	1.48
TCM Organization Benefit-Cost Reduction2	5.26	1.062	1	7	-0.552	1.61
TCM Organization Benefit-Cost Reduction3	5.07	1.108	2	7	-0.611	0.584
TCM Organization Benefit-Cost Reduction4	5.13	1.087	2	7	-0.368	0.263

Scale'1= Strongly Disagree/ Not at all' to '7=Strongly Agree/To a great extent'