

CHAPTER 2

2.0 LITERATURE REVIEW

The literature review conducted in this chapter discuss about the theoretical framework of this research. Since information on usage of DMT in Malaysian context is limited, wider literature review and insights were gathered to provide better understanding about DMT. This chapter begins with the definition of DMT and followed by the roles of DMT. The empirical studies and researches relating to the determinants of accuracy in decision making would be discussed next, in detail. Lastly, the overall research framework for this study is presented at the end of the chapter.

2.1 What is DMT?

DMT also known as DSS or Decision Making Software (DMS) which is a computer-based information system that includes decision analysis tools where it is used to facilitate decision making process in today's organisations (McGowan & Lombordo, 1986). They also concluded DMS as one of the DSS which commonly used to consolidate data, structure information, simulate events, forecast uncertainty, identify and solve problems as well as to anticipate future performance in both organisations and government department. Similarity, Chen and Lee (2002) described that DSS have been envisioned as “executive mind-support systems” that serves as the human mind in supporting non-routine decision making which required judgements,

estimations, evaluations and insights. The use of DSS has effectively enabled the users such as managers and department heads to identify important variables and model the effects of various decision scenarios, subsequently; make better decisions based on the analysis and evaluation done (Williams et al, 2004). In addition, Turban et al, (2007) concurred that DMT could improve the quality and accuracy of decisions made and design to answer 'what if' types of inquiries.

An earlier research conducted by Markulis and Strang (1985) revealed that DMS, DMT, Operations Research and Management Science are frequently used in decision making process and they are now known as an important pedagogy in most business schools as the use of DMT will aid in teaching and lecturing. Furthermore, Wang and Azizah (2005) revealed that DMT could provide various decision supports during different phases of decision making process which has been shown in Table 2-1 below. Based on the table below, the phases of decision process could be divided into three levels which are Intelligent Phase, Design Phase and Selection Phase. In Intelligent Phase, DMT can be used to support, identify, define, generate and determine problems or alternatives whereas in Design Phase, DMT can be used to explain and support various suggestions, implications, options and alternatives. In addition, in Selection Phase, DMT could be used to choose or select the best decisions and evaluate the best alternatives.

Table 2-1
Decision Support Provided by DMT (Source: Wang & Azizah, 2005)

Phase of Decision Process	Supports
Intelligent Phase	Identify problems Define the problem Determine priorities
Design	Generate alternatives Limit or illustrate the alternatives Determine performance criteria Assign criteria, value, weightage and rank Provide suggestions to alternatives
Selection	Identify suitable selection Arrange and presents information Evaluate alternatives

For instance, the DMT or DMS which are readily available on-the-shelf and sporadic in used, among others, are SAS, SIMUL8, SPSS, Eviews, Arena, PowerSim, STELLA, VenSim and Project Management. Most of these tools fall under the category of Operational Research which is also known as Management Science. For example, SPSS can be used in measuring the theoretical win and average bet for their players in casino operation. By analysing the theoretical win of each player, the company can identify the average win and loss by their players in daily, weekly, monthly, quarterly and yearly basic. Besides that, a Japanese wine company named Kirin Brewery Company has been successfully adopted SAS in their company. This company used SAS to control the inventory level and forecast demand. As we know, failure in predicting and controlling the inventory level would bring a negative influence to the whole business as it would affect the daily operation

of the business. This indicates that DMT can bring positive influence and it can effectively assist and support decision making.

2.2 Roles and contribution of DMT

Prior studies had proven that, the major role of DMT is to improve the decision making process, accuracy of decision making and quality of decision making. Djamasdi (2006) explained that quality of decision making and decision making processes are the two measures that have been the focus of many studies in the DSS research. Many methods can be used and different steps can be taken in making decisions. One of the methods introduced by Baker et al, (2001) in decision making process is problem definition, requirements identification, goal establishment, select and apply a DMT and evaluation criteria development. However, Marakas (1999) argued that there is no fixed decision making process in the world. One of the common decision making process which frequently used by decision makers is shown in Figure 1 below.

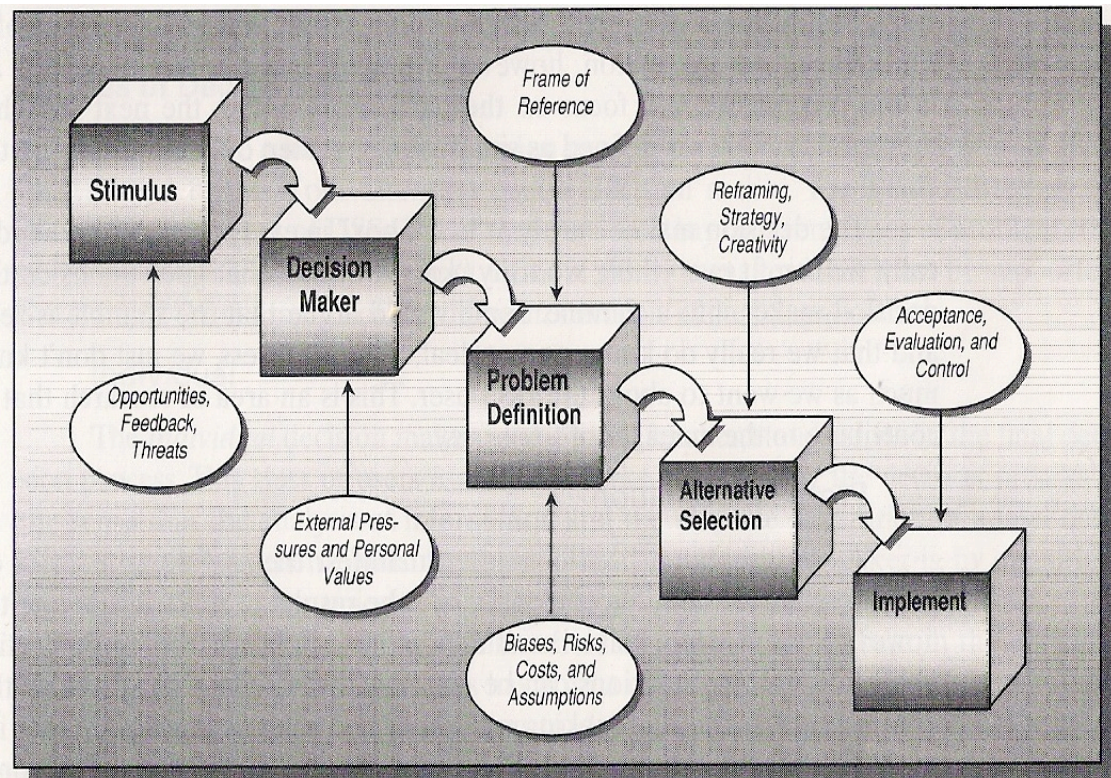


Figure 1: Example of a Decision Making Process (Source: Rowe & Boulgarides, 1994; cited by Marakas, 1999)

The major contradiction between that two decision making processes mentioned above is the decision making process introduced by Marakas (1999) will start the process by simulating the opportunities and feedbacks received while the decision making process introduced by Baker et al, (2001) will start the process by defining problem statement. Although the steps involving in the decision making process are different, however the objective and purpose for the decision making process is the same which aims to choose the best solution and decision.

In Malaysia, the state government had spent 5.2 percent of its GDP in year 2001 for Information and Communication Technology (ICT) due to the awareness of importance on this particular sector (Junoh, 2004). According to

Yusof (2003), the growth of ICT has triggered organisations to implement and adopting ICT in supporting their day to day business operations. ICT is able to effectively assist in decision making as stated by Rantapuska and Ihanainen (2008) who done a similar research in UK, Rohmeyer and Tal (2009) who also done a similar research in US and James et al, (2004) who also done a similar research in UK. Although the prior studies have done a similar research in different location and different time period, however their findings also found that ICT is effectively assist in decision making. Nevertheless, the usage of ICT in decision making has not been progressively developed within Malaysia (Yusof, 2003). According to the research, Yusof (2003) had disclosed that the Malaysia monthly ICT usage among managerial level was approximately 70 percent which can be considered relatively high.

Yaakup et al, (2007) revealed that the amendment on Town and Country Planning Act, 1976 (Act 172) in year 2001 offered a strong platform for DSS in Development Planning Malaysia to support either structured or semi-structured decision making. The use of DSS in development planning has successfully improve the decision making process thoroughly. Based on the research done by Kerstholt (1994) and Baker et al, (2001), two major roles of DMT are forecasting and evaluation, as discussed below.

2.2.1 Forecasting

According to Chen and Lee (2002), DMT can be used to forecast the future risk and uncertainty. Managers are encountered to make decisions based on

their value of judgement, work experience and present circumstance only after they have considered the numbers and figures surrounding their circumstances. Decision making is considered both art and science.

Although future is uncertain and undetermined, managers still need to forecast the possible outcomes and transformations to be used as business matrix to achieve desired financial performances. However, there is no single best way of forecasting as indicated by Turban et al, (2007) and Water (2008). McGowan and Lombordo (1986) described that DMT is one of the best approach in forecasting as it can reduce the data bias and understand the importance of time series. Besides, Water (2008) also agreed that DMT able to produce valuable data for forecasting. DMT is able to calculate the potential errors and tracking the possible risks involved. For example, SAS, Project Management and SILMU8 are few of the DMT that extensively used in demand forecasting, structure positions, constructing events and simulating systems.

2.2.2 Evaluation

Water (2008) revealed that DMT can be served as a quantitative method in evaluating the relationship between variables. Managers have to decide the best solution during decision making process considering every factors that would affect their business. It is important for managers to know which will be the main factors which may impact the business in positive and also negative ways. Thus, using DMT may facilitate managers or the organisation to identify the main determinant by looking at the correlation, association and

relationship between the factors and make a better or accurate decision (McGowan & Lombordo, 1986). Besides, DMT also could narrow down the possible factors by examining relationship between the factors. DMTs such as SPSS, Eviews and SAS are viewed as good tools in evaluating the correlation and relationship between dependent and independent variables and they are also widely used in analysing factors and issues of the categorical and continuous variable.

2.3 Determinants of Accuracy in Decision Making

The determinants of accuracy in decision making which were chosen to be discussed in this study are time pressure, information accessible, behaviour of decision makers and DMT. Empirical evidences and studies had proven that time pressure, behaviour of decision makers, information accessible and DMT have relationship with the accuracy of decision making (Cao et al, 2009, Dror, et al, 1999, Kerstholt, 1994, Lee et al, 2008, Marakas, 1999, Prelec & Loewenstein, 1991 & Workman, 2004).

2.3.1 Time Pressure

Time pressure plays a crucial role in making decisions. Dror et al, (1999) defined time pressure as one of the stresses facing by decision makers where they have to make a good decision under the time constraint. Also, time pressure can be classified into three levels which are low, medium and high time pressure. According to Kerstholt (1994), time pressure can be measured

by the degree of stressfulness faced by decision makers. Prior research conducted by Kerstholt (1994) has indicated that due to the continuous changes in dynamic environment, making a good decision is too time consuming. Based on his very research, Kerstholt (1994) found that when time pressure increased, the accuracy of decision making will decrease. A similar research carried out by Kowalski-Trakofler et al, (2003) in US have stated that most of the decision makers preferred to make decisions under low time pressure as they believed they are able to think suspiciously being under the sufficient time frame. In addition, Cao et al, (2009) also indicated that decision makers have to allocate their time wisely and develop heuristic decision strategies in order to make a good decision within the time limit. Although Kerstholt (1994), Kowalski-Trakofler et al, (2003), Cao et al, (2009) and Dror et al, (1999) concluded that decision makers are able to make better decisions when under a low level of time stress, however a prior research conducted by Turban et al, (2007) indicated that some of the simple decision can be determined within few hours or one day based on their working experiences. As a result, time pressure does not influence the accuracy of decision making when the decisions can be settled in self-involving situation. In contrast, Kertholt (1994) argued on his own research and stated that time pressure can be overcome by allocating the time spent in different decision phases and increasing the information processing speed. Payne et al, (1988) stated that decision making process can be improved by adjusting decision making strategies; whereas, the information processing speed can be increased by requesting and including less information or collecting information at the beginning of the process. Nevertheless, Prelec and

Loewenstein (1991) argued that including less information in decision process due to time pressure will reduce the accuracy in decision making.

H_{a1}: There is a relationship between time pressure and accuracy of decision making.

2.3.2 Information Accessible

According to Ozer (2003) due to the fast growing of ICT, now information is available instantaneously and in incredible amounts across the globe. Besides, the researcher also defined that information could be gathered in various sources such as internet, books and also from the insight or knowledge from the experience persons they know. Ozer (2003) defines information accessible as the degree of accessibility of the data, facts, statistics and figures that could be gathered prior to making decisions. However, Prelec and Loewenstein (1991) indicated that information accessible could also be measured by the amount and volume of the information and data gathered. Marakas (1999) stated that, since information could be easily access due the fast growing information technology, thus information accessible has relationship with the accuracy of the decision making.

Schwenk (1995) has done a research in US and he also agreed that the decision makers should collect more relevant information in decision making process. The truthfulness of the information collected would positively

increase the accuracy of decision made. Besides that, the researchers also argued that some restricted information relevance for certain decisions, which mainly used by government, may not be available for public use and thus it may affect the accuracy of such respective decisions made. In contrast, a prior research conducted by Dimauro (2009), indicated that due to the advancement in ICT, some information has been disrupted by the social media. Therefore the information gathered may not be accurate. If the decision makers accidentally included the disrupted information in the decision making process, then this will reduce the accuracy of decision making. Moreover, Prelec and Loewenstein (1991) indicated that the decision maker should include all the relevant information they found when making a decision as this will increase the accuracy of decision making.

H_{a2}: There is a relationship between Information accessible and accuracy of decision making.

2.3.3 Behaviour of Decision Makers

Marakas (1999) stated that decision makers can be divided into individual decision maker, team decision maker and group decision maker which have been shown in the Figure 2 below. Behaviour is one of the factors which would influence the accuracy of decision making (Marakas, 1999; Water, 2008). Water (2008) defined behaviour of the decision makers as the characteristic and attitude of the decision makers. According to Agency Theory (Ross et al, 2005), conflict of interest always exist between agents and

principals. Sometimes agents would make the decision based on their self-interest when they behave in opportunistic behaviour. When decision makers make decision based on their self-interests, it will then directly affect the accuracy of the decision made compared to what was desired by the principals. In another research conducted by Ozer (2003) indicated that the characteristic of the decision makers have positive influence on the quality of the decisions made. Decision makers should be able to produce more accurate output if they are seriously committed in decision making process.

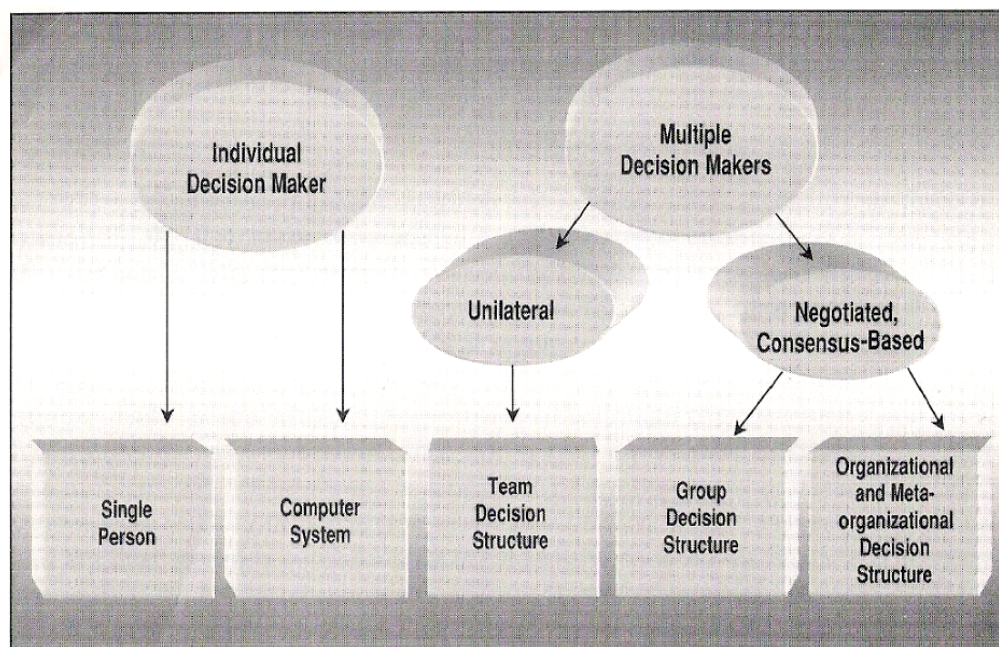


Figure 2: Classification of Decision Makers (Source: Marakas, 1999)

Besides, another research conducted by Djamasbi (2006) and Ozer (2003) have stated that some decision makers did not put enough effort and being careless when making decisions. They will only decide decisions based on their own judgement rather than doing a research due the convergence of interest between agent and principal. As we know the decision making

process is an ongoing process, some decisions can be made within few hours, while some decisions take a few years to be determined. The behaviour of managers in putting in the desired effort when making decisions will affect the accuracy of the decision (Marakas, 1999).

H_{a3}: There is a relationship between behaviour of decision makers and accuracy of decision making.

2.3.4 Decision Making Tools (DMT)

Nowadays, the usage of DMT are found to be significant as it could effectively help in forecasting, evaluating, modelling and simulating events that take place various conditions especially in uncertain risk associated complex situations (Djamasbi, 2006 & Lee et al, 2008). DMT could be measured by the type of various DMT available on the market as indicated by (Lee et al, 2008). Nowadays, there are many DMT available on the shelf, such as SAS, Project Management, SPSS, Eview and SIMUL8. Besides, a research conducted by Lee et al, (2008) indicated that DMT is an effective tool which widely used by managers and management people in decision making. Many researchers have the same reviews and concurred that using DMT in decision making could reduce the time spent and the accuracy of the decisions made are found to be high (Giupponi et al, 2006, Djamasbi, 2006 & Turban et al, 2007). In addition, the usage of DMT is found to be important as it could measure what is intended to be measured in dynamic dilemma (Danneels, 2002). Marakas (1999) argued that using relevant DMT in decision making process can ensure quality and accuracy in decision.

H_{a4}: There is a relationship between DMT and accuracy of decision making.

2.4 Summary of Hypotheses

- i. H_{a1}: There is a relationship between time pressure and accuracy of decision making.
- ii. H_{a2}: There is a relationship between Information accessible and accuracy of decision making.
- iii. H_{a3}: There is a relationship between behaviour of decision makers and accuracy of decision making.
- iv. H_{a4}: There is a relationship between DMT and accuracy of decision making.

2.5 Theoretical Framework

Based on the prior discussions, a theoretical framework has been formed to summarise the theoretical perspective, interrelation concepts and information of literature review. Refer to Figure 3.

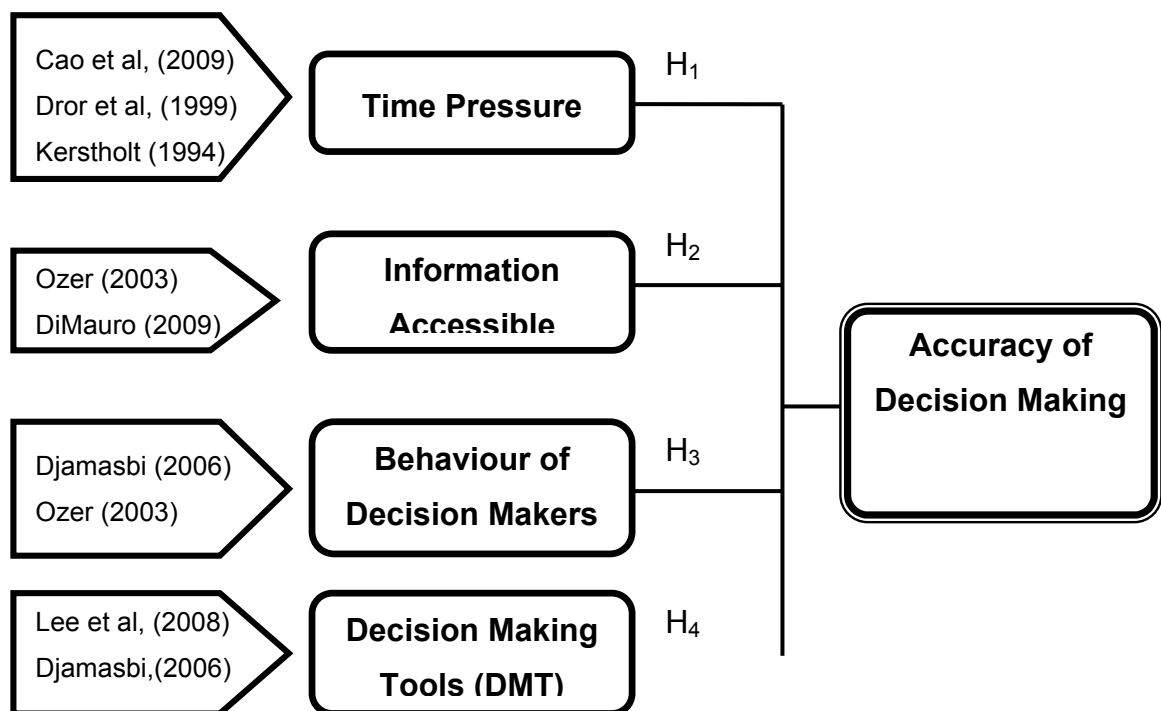


Figure 3: Theoretical Framework