

## 1.0 Introduction

A well organised and managed inventory system is one of the key objectives that the management of many organisations are looking for [1, 5]. A lot of time, effort and money have been invested into this area to ensure that a good inventory planning and control system is achieved. The main objective of this research project is to highlight the effectiveness of information technology in resolving some of the management problems faced by the organizations. In this case, we study the inventory management problems faced by Bauer and how information technologies can be utilized as an integral solution to the problem and to enhance the operational efficiency of the organization [2, 4, 7, 8].

The company, Bauer is chosen in this study due to the following reasons:

- i) Bauer is a multi-national company, it has many branches and subsidiaries in the Far East region which makes the research study more challenging and interesting.
- ii) There is a feasible solution to the existing problem.
- iii) Secondary data is readily available for the research. In addition, primary data can be obtained from all the Bauer locations.
- iv) Due to the Asian financial crisis and the economic slow down, a large inventory holding will pose major problem to the company cash flow. Therefore, any improvement in visibility and operational efficiency in the area will help to reduce the inventory holding and hence improve the overall operational efficiency of the organization.
- v) Effective use of IT in the construction and foundation industry is still lagging behind other industries like electronics and consumer products for example.

## **1.1 General Information of the Company**

Bauer, a world leader in advanced foundation technology, is an international geotechnical contractor and manufacturer of specialist foundation equipment. Coppersmith Sebastian Bauer founded the family business in 1790 in Schrobenhausen, Germany and since then it have been operated by several generations of the same family.

The current Chairman, Dr. Karlheinz Bauer, took the company into new fields including ground water lowering, deep excavations, grout anchoring, piled foundations, ground improvement and last but not least, the manufacture of geotechnical equipment. His son, Dipl.-Kfm. Thomas Bauer, the current managing director of the company, expanded Bauer worldwide through subsidiaries, branches and dealerships in almost 40 different countries.

Over the last 40 years, it has expanded to become a world leader in geotechnical engineering, recognised not only as a contractor but also as a manufacturer of geotechnical equipment. The organisation has expanded to meet the challenge of its international role, to maintain close links with clients and to ensure that Bauer's geotechnical services are immediately available.

In order to gain and retain the confidence of their clients and business partners, Bauer's management and staff have continuously set a high standard for themselves by consistently producing highly reliable, high quality, good workmanship and innovative products.

Bauer has established a quality management system which complies with ISO 9001. In addition, it has been awarded the Assurance Institute certification. The company also invests a high percentage of its revenues

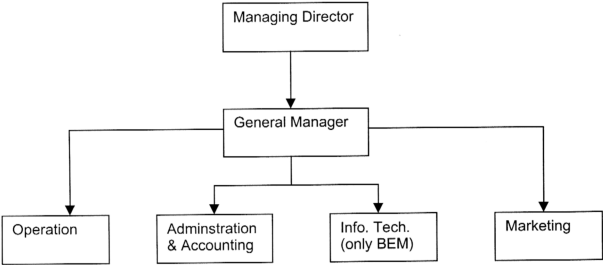
in research and development of geotechnical methods and equipment in order to maintain its leadership position among foundation contractors.

## **1.2 Bauer Far East Holding Pte Ltd**

Bauer Far East Holding Pte Ltd or BFEH in short, a 100% owned subsidiary of Bauer Germany, was established and operated in the early 90s. BFEH is primarily responsible for the marketing and sales of Bauer leading edge foundation equipment in the Asia Pacific region. Since then, it has established offices in almost all major cities in the region, for instance Beijing, Tianjin and Wuhan in China, Hong Kong, Taipei in Taiwan, Singapore, Manila in Philippines, Vietnam, Thailand, South Korea and Malaysia, which Bauer Equipment (Malaysia) Sdn Bhd (BEM) was established in December 1996.

Each office operated independently and has its own Marketing, Operation and Administration teams to conduct its business activities. A typical organisation chart of a Bauer Far East location is shown in Figure 1. Please note that only BEM has an Information Technology department in the whole Bauer Far East region.

**Figure 1: Typical Organisation Chart of Bauer Far east Location**



**1.3 Nature of Business**

Basically, the businesses in Bauer are divided into two main strategic business units (SBU). The first is the Construction Division which involves in the construction of all types of specialised foundation works and the second is the Equipment Division which involves in the manufacturing and distribution of specialised foundation equipment. The equipment is designed for it's Construction Division for specialised foundation works. It is also custom made for other geotechnical companies which are involving in specialised foundation works.

Bauer Far East Holding and its subsidiaries are responsible for the marketing, distribution and after sales service of the Equipment Division in the Asia Pacific region. It's main core business can be summarised under 3 main categories, they are,

- i) Sales and Rental of Foundation Equipment,
- ii) Providing after sales service to clients, and
- iii) Spare parts sales.

### **1.3.1 Sales and Rental of Foundation Equipment**

Bauer provides a wide range of leading edge foundation equipment and accessories (refers to Bauer Equipment Programme in Appendix) for specialised foundation works. For example, the Bauer Rotary Drilling rigs were used in the construction of KL LRT foundation piles and the building of KLCC foundation works; the Bauer Hydraulic Vibrators were used for soil improvement in land reclamation in Jurong Island, Singapore; the Bauer Grabs and Trench Cutters were used in the construction of retaining walls for high rise buildings and tunnels; and many other foundation equipment and accessories are used in specialised foundation and construction works globally.

The equipment and accessories can be rented or sold to any company which are involved in foundation works. The price of the Bauer's equipment or accessory ranges from a few hundred thousand Ringgit (RM) to a few million Ringgit. With such a price tag, it is quite difficult for a customer to commit to purchase the equipment unless it has enough projects on hand. The decision for a customer to buy or rent the equipment mainly depends on the following reasons:

- i) The number of jobs the customer is currently having,
- ii) The time taken to complete the current project,
- iii) The availability and timing of the next project, and
- iv) The economic situation.

If the time taken to complete the current project is short and there is no other project currently available or in the foreseeable future, the customer will most likely rent the equipment for a specific period until the foundation work for the project is completed. The rental amount usually depends on the model and size of the equipment in terms of the capacity. The model and the size of the equipment will depend largely on the ground condition for that particular job, the depth and the diameter of the piles. The more difficult the ground condition, the bigger the diameter of the pile size and the greater the depth, the higher will be the capacity of the required equipment. If needed, the equipment can be customised to meet the special requirements of the project.

### **1.3.2 After Sales Service of Equipment**

Bauer maintains a well trained and equipped after sales service team to take care of its customers. It is important that the equipment is well maintained to ensure operation efficiency, minimised cost in terms of repairs and downtime as well as increased safety. An idling equipment due to downtime can easily cost the customer a few thousands Ringgit a day.

As Bauer Regional Product Manager, Mr. TM Wong puts it, "The salesman can only sell the first equipment, the second or thereafter units will depend on the after sales team" which sums up the importance of customer service to Bauer. To further strengthen the after sales service team in each of the locations, at least one German specialist is seconded to the location. His responsibility is not only to handle the peculiar problems which could arise anytime during the operations of the equipment but also to train the local technical personnel in order to shorten their learning curve in the use of new technologies.

### **1.3.3 Spare Part Sales**

A good after sales service must be supported by an adequate stock of inventory for each different type of equipment. Each different equipment can consist up to a few hundred thousands of parts. And each part can cost from a few Ringgit to approximately one hundred thousand Ringgit. Some of the parts can be purchased or fabricated locally, but most of the parts especially the critical parts have to be ordered from the original manufacturers to ensure their quality.

## **1.4 Current Situation**

In the early 90s to the middle of 1997, Asian countries experienced high economic growth with low unemployment rate. Foreign investment was high and business activities were robust. The years of rapid development has resulted in bottleneck of various infrastructure facilities like port, airport, road, telecommunication, water and power supply, etc. As a result, a lot of investment was channeled into this sector. Heavy equipment used for the construction was in great demand. Majority of these equipment were imported from advanced countries like Germany, USA, Japan and Italy. During this period, Bauer Far East enjoyed a good market share of the foundation equipment sales as well. Its total turnover for the period was about 30% to 40% of Bauer total turnover of the equipment business.

However, the good times did not last forever, since July 1997, with the Asian financial turmoil, the foundation and construction industry was badly affected which resulted in a lot of mega projects being delayed or temporary put on-hold. Countries like Malaysia, Thailand, Indonesia and South Korea with heavy foreign borrowings were most affected by the economic crisis.

The slow down in construction industry has caused many construction companies to default their outstanding loans payment. With the depreciation of local currencies, the problem has become more serious as many of the loans are in foreign currencies. As a result of the current crisis, many construction equipment were idling. Sales of new equipment was slow except in a few countries with strong foreign reserves. In addition, equipment rental and spare parts sales business were also badly affected. Bauer, being a leading supplier of foundation equipment in the region, was not spare either.

In order to continue to remain in the region and to make a stronger presence when the economy recovers, Bauer has to stay competitive. A number of cost reduction measures and re-structuring exercises have been improvised and proposed. A proper inventory management system will be one of the strategic plan that Bauer Far East will be focusing on in view of the big amount of inventory and the problem of inventory handling and management.

### **1.5 Research Objectives**

As mentioned in the earlier section, Bauer, in order to be a leading international player in the foundation equipment sector, and to have closer links with its customers [10, 11], it had setup offices in about 40 countries around the world. Each office maintains its own fleet of equipment and an adequate stock of inventory to support the business operation in the region. To maintain all the required parts at every location is practically not possible and also financially not feasible, as it may end up that each location carries a big amount of inventory. Therefore, to reduce the equipment downtime due to non-availability of spare parts to an acceptable level by both Bauer and client standards, and the same time,