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بَوْتِنَبَرُؤْمِيَتِيْ اِسْلَامًا اِنْتَبَارًا اِبْتِجَابًا مُلْتَمِسَاتًا

APPLICATION OF STATISTICAL PROCESS CONTROL  
AT  
TELEDATA MANUFACTURING DIVISION SDN. BHD.  
(A SUBSIDIARY OF SAPURA HOLDINGS SDN. BHD.)  
-A CASE STUDY.

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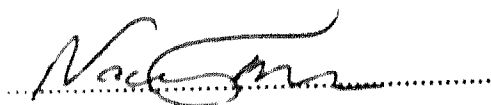
Approval Page

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The undersigned certify that the above candidate has fulfilled the conditions of the technical project paper prepared in partial fulfillment of the requirement for the degree of Master of Business Administration.

Supervisor,



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Date: 6/12/97

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## **ABSTRACT**

The purpose of the study is to identify and analyze the factors affecting the performance of Teledata Sdn. Bhd. (a subsidiary of the Sapura Holdings Group) Manufacturing Division. The focus of the analysis is on its Telephone Production Section inability to manufacture and deliver the telephone products on schedule to customers.

The study utilizes the application of statistical process control technique to analyze the issues and scopes of human behavior and scientific management, information flow and communication, and process control within the company.

The root causes of the problem are identified after the data have been analyzed and the hypotheses have been tested. Then, the conclusion of the root causes is presented and recommendation is made to rectify the situation.

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The objective of the study is to identify and analyze the factors affecting the performance of Teledata Sdn. Bhd. (a subsidiary of the Sapura Holdings Group) Manufacturing Division. The focus of the analysis is on its Telephone Production Section inability to manufacture and deliver the telephone products on schedule to customers.

Sapura Holdings Sdn. Bhd. was founded by the present Executive Chairman, Ir. Shamsuddin Abdul Kadir, and was incorporated in 1975 to meet the growing needs of telecommunications industry and its related businesses in Malaysia. It was one of the first Malaysian companies to venture into the field of telecommunications, and it played a major role in establishing the country telecommunication infrastructure. In less than a decade, it had gained a reputation for reliability and resourcefulness.

Sapura's success can be attributed to the company's ability to position itself in meeting the needs of the Malaysian ever expanding economy. However, its continued success is largely due to its competence in creating products and services that meet the customers' needs.

In 1996, Sapura reported total assets of over Ringgit Malaysia (RM) 1.2 billion with a gross annual sale figure exceeding RM 900 million. As a corporate entity, Sapura is committed in utilizing its assets and resources in the design and manufacture of advanced, innovative products with the objective of enhancing the life of the community.

## **1.1 The Company Being Studied**

Sapura owns two public listed companies involved in almost every aspect of telecommunications. They are Uniphone Telecommunications Berhad (UTB) and Sapura Telecommunications Berhad (STB).

The UTB Group is involved in the implementation of a number of major contracts within the telecommunications industry while the STB Group focuses its resources on three areas: the manufacturing and the marketing of telecommunications equipment, design and installation of cable networks, and paging services.

Under STB, Teledata Sdn. Bhd. (a subsidiary of STB) is entrusted to manufacture and market the telecommunications equipment bearing the Sapura brand.

Thus, the study will only encompass Teledata Sdn. Bhd.'s Manufacturing Division (TSB-MD) from the 2nd half of 1996 to that of the first quarter of 1997.

## **1.2 Teledata's Company Profile**

Teledata Sdn. Bhd. Manufacturing Division (TSB-MD) was established in February 1985 and started its operation in June 1985. The company was a pioneer in manufacturing of telecommunication equipment in Malaysia. From 1985 to the early 1990's it has a sizable command of the local market share. Its products are mainly single-line and feature telephones, mini PABX systems, pagers, and payphones. However, of late, TSB-MD Production Assembly Section concentrates more on manufacturing single-line telephone where this is evident in the 1996 products produced in Table 1.

**Table 1: Products Produced (1996)**

<b>No.</b>	<b>Product</b>	<b>Model</b>	<b>Quantity</b>
1.	Telephone	S3000A	4,407
2.	Telephone	S3000STB	9,702
3.	Telephone	S3000CL	535
4.	Telephone	S3000STM	368,123
<b>TOTAL (sets)</b>			<b>382,767</b>

In 1996, the TSB-MD's sales turnover of telephony products (excluding Payphone) was about RM 10.3 million and its major customers were the Malaysian Telecoms where the concentration was more than 96% of the products produced. The increasingly competitive nature of this industry makes it more important for any telecommunication contract and tender to be evaluated based not only on product quality but also on the ability of the company to deliver quality products on time. The same conditions apply to the contracts committed by TSB-MD.

Late deliveries will reduce the division's profitability due to penalty costs, unplanned overtime, and under utilization of equipment, and also indirectly cause the division's credibility as a telephone manufacturer to be at stake. As such, this study is focusing on the factors that are contributing to the late deliveries of products by this company. The study utilizes the application of statistical process control technique to analyze the issues and scopes of human behavior and scientific management, information flow and communication, and process control within the company.

The importance of this study lies in the fact that TSB-MD's business opportunities in the future will be affected if the situation is not rectified. With the entry

of new players into the industry, the competitiveness of the company to sustain its very existence is uncertain. This in turn will affect the turnover of the whole group, in general, and the division, in particular. Thus, this situation creates a challenge to TSB-MD to curb and resolve the problem as to meet not only the CEO's mission statement but also to sustain the competitiveness of the company in this line of business.

### **1.3 The Organization Structure**

The TSB-MD organization is headed by a Group General Manager with three distinct Departments to provide support. The organization chart in Figure 1 shows the structure with several sections indicated under each department.

At the end of 1996, the strength of the workforce was 148 people, of which 107 are direct workers (72.3%), while the remainders are in the support functions.

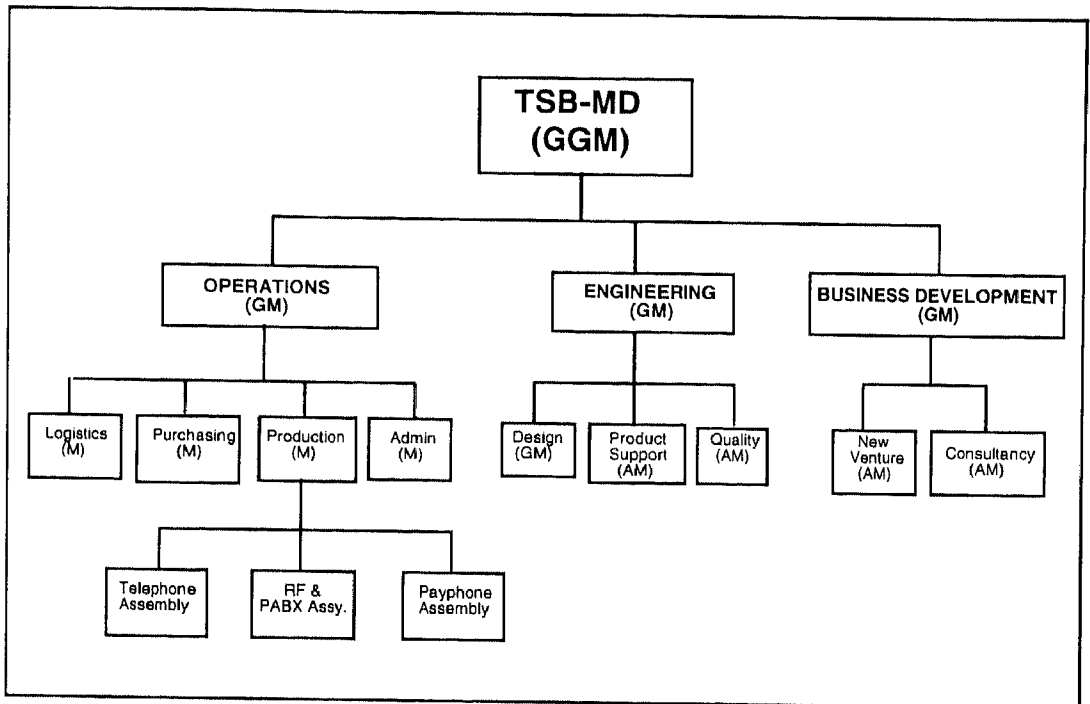
However, in the telephone assembly section, the direct workers are only 35 people, as the products only require to be assembled. Components assemblies onto the printed circuit boards are done by the subcontractors.

The next chapter is highlighting the effect and causes of late deliveries based on literature review. This chapter also explains how this problem can be rectified based on the information derived from the literature review.

The subsequent chapter is focusing on the problems faced by this company and the relevance and importance of this study with regards to the issues highlighted. This section will also explain the research methodology and treatment of data.

The last two chapters are focusing on the results of the study, conclusions and recommendations suggested by the author.

**Figure 1: TSB-MD Organization Chart**



Where : GGM - Group General Manager  
GM - General Manager  
M - Manager  
AM - Assistant Manager

This chapter focuses on the literature review on the effect and causes of late deliveries. This chapter also explains how this problem can be rectified based on the information derived from literature review. The information obtained will be utilized for enlightenment and further review of the subjects analyzed.

## 2.1 An Overview on the Effect and Causes of Late Deliveries

Factors such as late deliveries, poor quality, lack of labor flexibility and resistance to changes will obviously in the longer term incur great costs of the company's performance and competitive position.

The problem of late deliveries of products from production are common and discussed by Bedworth [1]:

. . . If deliveries get too far out, overtime is increased or more equipment is acquired . . . Thus, when demand is not satisfactorily met and the alternatives are to improve production control or to increase capacity, the latter is the easy way out.

However, even if the capacity is increased in the short term (eg. increase overtime), but the manufacturing process still cannot respond to the demand to manufacture on time, it is still a failure to comply to the customer's request as stressed by the next quote.

The importance of delivering product on time is vital for a company to sustain and be competitive, as mentioned by Hill [2]:



In some markets orders may be won through a company's ability to deliver more quickly than its competitors, or when it is able to meet the delivery date required when only some or even none of the competition can do so.

At times quality issues are used as excuses by the manufacturing for not getting the output or improve in the matter. However, by actually looking from the scope of human behavior, there are reasons why such failure to improve productivity exists within a manufacturing company.

## **2.2 The Manufacturing Process Defects and Workers' Motivation**

The best criterion to judge process control of product is through the principles of statistical inference by looking into the on-line process defects data. In the Industrial Management and Data Systems (IMDS) paper, Goh [3] discussed that the statistical principles have become the backbone of many practical and efficient approaches in quality and productivity improvement studies. In this paper, he stressed that, now there are no manufacturing activities that can claim to have the quality of the output under control without the support of statistical data or proof.

In the same paper but of earlier issue, statistical technique was also discussed to forecast the point at which units in production will become defective, based on trend projection [4]. Gettel-Riehl [4] pointed out that this gave the company an opportunity to take immediate preventive action before defective units are produced.

The list of statistical tools that can be used to gather and interpret data is certainly large. Pareto Chart displays the relative importance of the data. The way it is arrange helps prioritize on which category of problem contributors to be focused first. It is also useful in order to construct a cause and effect relationship of that category. Most

of the time, further analysis of the cause and effect diagram leads to one final conclusion that a success of a company or division is entirely dependent on its people. A company advancing with latest technology but with no commitment of a motivated work force will never succeed.

In a different context Bailey [5] mentioned that if employees view their work as a means to an end, and take a contractual view of their employment, it is actually an end to their means. The employees are demotivated and when the effect is widespread it will hurt the company's output in the long term.

Social factor plays an important role too, in influencing people's motivation and behavior at work. The results of the Hawthorne study [5] suggest that:

. . . factors such as the cohesion of the group, the openness of communication and the freedom they experienced over their own environment and work pace were more significant in influencing their motivation and performance . . .

However, the above quotation brought about negative development of informal groups within the organization where the cliques formed would develop their own codes of conduct, which often went against those of management. As Bailey [5] put it, this informal group set a norm on group output and ostracized individual members who exceeded the agreed level of output.

The above references simply explain why many contemporary work situations do not motivate employees to perform on the job. Steers summarized that there are five reasons for restriction of output [6]:

- i. Unappealing potential rewards. It is often assumed that all employees want the same thing from their jobs.
- ii. Weak performance-reward linkage. In many cases, employees fail to see a strong link between increased job performance and the rewards they desire from the organization.
- iii. Distrust of management. Sometimes employees do not trust management simply due to previously unkept promises by management or from negative outcomes associated with high output.
- iv. Desire of employees to have greater control over their jobs. To provide sufficient slack in their work schedule so that they can vary their work methods somewhat, and to maintain some control over their work behavior, workers often will intentionally restrict their output.
- v. Lack of job involvement. When employees fail to identify with or are not involved with their jobs, they are not likely to devote the same energy that they would to jobs in which they were highly interested.

In most manufacturing jobs, the best worker produces two to three times as much as the worst worker [7]. For high performance, motivation is necessary. Motivation is defined as a force, which energizes, directs, and sustains human behavior. A motive is some inner drive, impulse, or intention that causes a person to do something or act in a certain way. Motives may be conscious or subconscious. They affect not only the "ability to do" but also the "will to do" [8]. The process of motivation begins with the assumption that behavior or performance is directed toward the attainment of goals or toward the satisfaction of needs. These needs arouse and maintain human energy and activity in certain directions.

In motivating workers, there are three general approaches toward greater productivity as proposed by Mali [8]:

- i. The economic incentives approach.  
This approach to motivating employees is based on the view that workers are eager to maximize their monetary status, power, and prestige.
- ii. The behavioral approach.  
This approach is based on the view that people work to meet their needs. They come to the organization to see how many of these needs can be met.
- iii. The management approach.  
This approach is based on the view that there is no one best way to motivate. Different organizations with different tasks, different competitive environments, and different worker needs require different approaches. However, there are three techniques suggested by Mali.
  - a. Contingency approach. Motivate by analyzing the situation, selecting elements from a vast array of possibilities, and forming a model that will work for a given situation.
  - b. Systems approach. Motivate by developing a systems model for an organization in which the current motivational process is identified and finding the change agents for its improvements.
  - c. Expectancy alignment approach. Motivate by planning and obtaining the closest alignment possible between employee expectancies and organizational objectives.

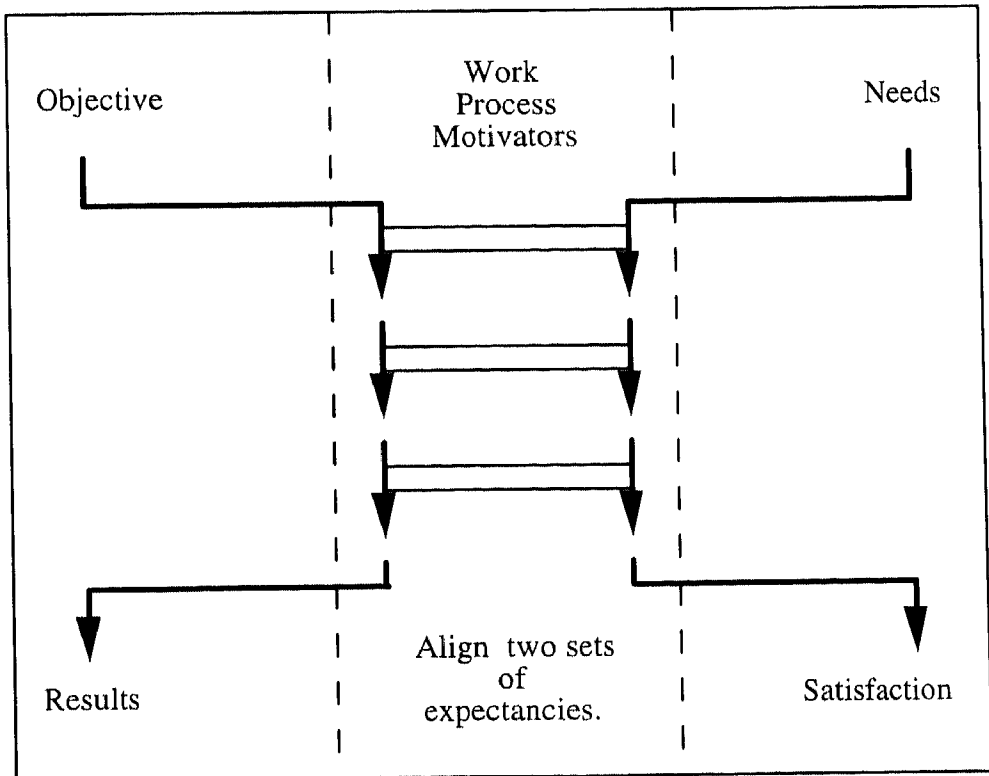
Based from the three general approaches to motivate the workers to achieve higher output, the most practical approach that an organization can adopt is the management approach using the expectancy alignment technique. The reason for this is

that this technique is based on the theory that the greater the alignment of employee expectancies with organizational objectives, the greater the motivation to accomplish both. There are five steps outlined by Mali [8] that represent the process for motivating employees with expectancy alignment.

- i. Establish the productivity objectives to be achieved.
- ii. Identify organizational needs from productivity objectives.
- iii. Acquire insights into employee needs.
- iv. Decide on the job conditions (motivators) to be used that satisfy the needs of both employees and the organization.
- v. Establish an alignment between organizational needs and employee expectancies with motivators.

Figure 2 further illustrates the technique.

**Figure 2: Alignment of Expectancies**



Organization needs to understand this approach clearly and believe in its implementation, in order to have a committed and motivated work force. Apart from the training and organizational objectives that need to be established, productivity objectives is required as a mechanism to increase performance. In establishing the objectives, the clarity, congruence and commitment are essential to effectiveness, efficiency, and quality. Evidence from studies [7] suggests that specific, explicit, clear and difficult objectives improve the probability that motivation will be higher and performance will be greater for the employees. Therefore, it is crucial that before the five steps are being implemented, a systematic and accurate analysis should be conducted by the Management.

Training is one other factor that cannot be overlooked. Where output performance is critical, selection of well-trained employees is paramount of which the employees' know-how on product quality is greatly emphasized [9]. Thus, based on the context of this paper, it is agreeable that a company should have a well-designed and comprehensive training scheme with proper implementation, follow-up and assessment plans.

The impacts of unplanned training program implementation or no training program at all are [10]:

- i. decreased productivity or low output
- ii. higher departmental operating costs
- iii. higher employee turnover
- iv. high absenteeism
- v. negative attitude and behavior of employee
- vi. lack of personal growth and interest of the employee in the company.

The next factor in late product delivery can be attributed to materials delay in delivery to the production where the information to comply to the requester's needs was not properly diffused.

### **2.3 Impact of Miscommunication**

Communication is fundamentally defined as transferring of information and meaning from a sender to a receiver. In a group where communication is poor, the immediate and apparent results would be inefficiencies, wasted effort, low morale and overall general confusion [11].

In an organization, the purposes of communication are highlighted as follows by Steers et. al [6]:

- i. Communications can be intended to control the behavior of others, to clarify duties, and to establish or reinforce authority relationships within the organization.
- ii. Communications can provide information on which to base important decisions.
- iii. Communications can be used to motivate employees and elicit their cooperation and commitment.
- iv. Communications are used to express emotions or feelings about decisions or the actions of others inside and outside the company.

Communication is essential in diffusing information in a group. For instance, Collins [11] pointed out that it is important that orders and instruction are communicated clearly from the department head to the subordinate so that tasks can be performed and targets can be achieved.

In this paper, Collins stressed that communication is vital in diffusing information where if a task is to be completed satisfactorily, the requirements should

have clearly defined time limits, quantities and quality levels, and also the information must be consistent from group to group or individuals.

On the other hand, the specific purpose of a communication is usually unclear and misunderstanding can decrease its effectiveness. In addition, barriers to effective communication can exist in an organization. Steers [6] identified 5 important barriers to effective communication in organizations;

- i. Distortion.
- ii. Omission.
- iii. Overload.
- iv. Timeliness.
- v. Acceptance.

Steers [6] offers a more comprehensive set of suggestions for improving communications effectiveness. However, few of the important suggestions are listed below:

- i. Opening up multiple communication channels.
- ii. Repeating important messages.
- iii. Carefully choosing communication channels, bypassing formal communication channels if necessary.
- iv. Develop interpersonal skills between group members and departments for greater openness and trust to exist.
- v. Change the organizational climate so that the employees feel comfortable to transmit negative as well as positive messages to the Management without fear of retribution.