

DO MANAGERS MAKE DECISIONS USING STATISTICS?

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The way in which businesses compete is rapidly changing. Businesses must constantly strive to offer “better” products and services than their competitors. South African Companies on the whole need to improve the quality of their products in order to be a player in the global market. Managers must decide how to overcome the many problems that prevent quality products and services. One of the aims of this study was to establish whether managers in the manufacturing industry of KwaZulu Natal are aware of the uses of statistics in decision making. In this study, it was found that most of the quality managers either do not use statistical process control techniques or use them seldom or very seldom. It was established that the majority of the respondents do not use statistical process control charts. The above facts indicate the need for the awareness of the uses of statistical process control techniques and charts to improve the quality of products. Results of the “Survey on Statistical Quality Control Techniques” used by Managers in the Manufacturing Industry of KwaZulu Natal, are also given (Hargreaves, 1999).

INTRODUCTION

It is important for managers to know the statistical techniques that can be applied in industry and the ways in which these techniques can help them in their decision making. In order for managers to make sound decisions, they must be able to extract the necessary information from the data, they must understand their business, and want to be competitive. The literature survey indicates that a survey of statistical methods used in business and industry in South Africa by Juritz, Money, Affleck-Graves, and Du Toit (1989) was undertaken. Of the 65 respondents, 47 (72%) reported that their company used statistical methods. The overall impression gained from the survey is that simple statistical methods are much used and are deemed to be effective by the users. However, many of the new sophisticated, and highly effective techniques are not used in practice, because users are either unaware of their existence or are untrained in their application.

According to “The involvement of statisticians in the application of statistical methods in companies - a study of the Durban-Pinetown Region “, by Moolman (1996), only 25 of the 55 (45%) companies investigated had personnel who knew a little about the uses of statistics and applied their knowledge. It was also found that 8 non-statisticians were doing jobs that should be done by statisticians. This phenomenon was confirmed by the results of a survey (in the Pretoria area) by the Careers Committee of the South African Statistical Association. In this survey 71% of the respondents indicated that the statistical work is carried out by non-statisticians. This indicates that management does not visualise the need for someone with a sound knowledge of statistical methods. In a study by Hargreaves (1999), only 43% of quality managers use statistical process control techniques, of which 59.3% indicated that results were good when using the statistical process control techniques.

RESEARCH METHODOLOGY

The aims of the study “Do Managers Make Decisions using Statistics?” are to determine:

- Are managers in the manufacturing industry of KwaZulu Natal aware of the uses of statistics in decision making?
- What are the common statistical process control techniques and charts used by managers in the manufacturing industry of KwaZulu Natal?
- Is there a need for statistical consultants in the manufacturing industry of KwaZulu Natal?

A questionnaire was designed by the researcher to meet the aims of the study. The target population was quality managers in the Manufacturing Industry of KwaZulu Natal. A list was obtained from the Chamber of Commerce of all the companies registered under the categories Industrial Equipment Manufacturing or Supply and Manufacturing General. There were 287 company names on these lists. One hundred and ninety questionnaires were sent out, of which, 86

(45% response rate) were returned. The questionnaire was constructed using Likert Scales and the data was captured on Excel 5.0 and processed using SPSS.

SOME RESULTS OF THE STUDY

Because the method of Likert Scale was used in the design of the questionnaires in this study, the Cronbach’s Coefficient Alpha was considered the most suitable since it “has the most utility of multi-item scales at the internal level of measurement” (Cooper & Emory 1995: 155). This study produced a Cronbach’s Coefficient Alpha of 0.8632. In this study, “ Survey on Statistical Quality Control Techniques used by Managers in the Manufacturing Industry in KwaZuluNatal”, indicated that:

- Only 43% of the quality managers made decisions using statistical techniques.
- Only 22% of the respondents use statistical process control charts (refer to Table 1). This indicates that very few quality control managers use statistical process control techniques to control the variability of their products. As statistical process control techniques are used to improve the quality of products, it is essential that many more quality managers are aware of the uses of statistical process control techniques. Quality managers need to be made aware of the fact, that by using information based on statistical process control, companies are able to reduce or eliminate nonconforming products, and this leads to reduced manufacturing costs, increased customer satisfaction, tighter specification limits and hence, improved product claims.

Table 1
The most Commonly Used Statistical Process Control Techniques

Statistical Process Control Technique	Percentage (%)
Check Sheets	40.7
Sampling Techniques	38.4
Statistical Process Control Charts	22.1
Capability Analysis	20.9

- Surprisingly, only (9.3%) use Shewhart Control Charts (refer to Table 2), yet, this chart is known to be the easiest and most widely used chart. This could mean that very few quality managers are aware of these charts, yet, the charts control the variability of a product, and thus help to improve the quality of the product

Table 2
The Popularity of Statistical Process Control Charts

Statistical Process Control Chart	Percentage (%)
Cumulative Sum Control Chart	23.3
Shewhart Control Chart	9.3
Exponentially Weighted Moving Average	7.0
Nonparametric Control Chart	1.2

- The correlation coefficient (0.629) for the level of statistical knowledge and frequency of using statistical process control techniques indicates that the higher the level of statistical knowledge, the more frequently statistical process control techniques were used. Hence, if it is desired that quality managers use statistical process control techniques more often, then there is a need to increase their level of statistical knowledge.
- The correlation coefficient of 0.59 indicates that the higher the respondents statistical knowledge, the higher the rating on “statistical quality is important for producing a quality product”. Hence, there is again an indication that, the belief that “statistical quality is important for producing a quality product” depends on the level of the statistical knowledge of the quality manager. There seems to be a need to increase the level of statistical knowledge of quality managers so that their belief that “statistical quality is important for producing a quality product” is increased.

- A significant correlation exists between the use of statistics for decision-making and the frequency of using statistical process control techniques. In fact, a correlation coefficient of 0.789, indicates that there is a strong relationship between the use of statistics for decision making and the frequency of using statistical process control techniques. Again, if it is desired to increase the frequency of using statistical process control techniques, quality managers would have to be made aware of the uses of statistics in decision making.
- A significant correlation exists between the use of statistics in decision-making and the level of statistical knowledge. A correlation coefficient of 0.755 indicates a strong relationship between the use of statistics in decision-making and the level of statistical knowledge. It does make sense too that as the use of statistics in decision making increases, so does the level of statistical knowledge increase.

CONCLUSION

Very few of the quality managers use statistical process control techniques or charts to monitor and improve the quality of their products and services. It could be possible that the quality control managers are not aware of the uses of statistical process control techniques or charts, as only 43% of the respondents indicated that they use statistical process control techniques and only 22.1% indicated that they use statistical process control charts. The need for the awareness of the uses of statistical process control techniques and charts seems evident. To compete effectively with other companies, managers need to make decisions based on data. Just over 50% of managers use statistics in decision-making, this indicates the need for the awareness of the uses of statistics. It is thus important for statisticians to make managers in the manufacturing industry and other industries aware of the uses of statistics in decision-making.

It was also found that the higher the respondents' statistical knowledge, the more frequently statistical process control techniques are used. It may be concluded that if managers' statistical knowledge is improved, they would use statistical process control techniques more frequently and this would increase the number of managers making sound decisions in the assessment of the quality of their products. The quality of these managers' products would improve and their companies would be able to compete effectively in the global market.

A significant correlation existed between statistical knowledge and the use of statistics in decision-making. It does make sense that as the level of statistical knowledge increases so too does the use of statistics in decision-making. It is thus absolutely necessary for statisticians to help managers improve their level of statistical knowledge so that they use statistics more often when making decisions. This would result in managers making better decisions and this would improve the economy of South Africa.

RECOMMENDATIONS

The focus of this study was firstly, to determine whether managers have statistical knowledge and whether they use statistical process control techniques in order to improve the quality of their products and services. This is seen as important by the researcher, as statistical process control techniques and charts, help in determining whether the quality of the manufacturing is satisfactory. It also ensures uniformity of the quality of products manufactured, thus, making it possible to produce according to specific standards.

Secondly, the researcher was also interested in establishing whether the quality control manager in the Manufacturing Industry of KwaZulu Natal use statistical process control charts. The researcher believes that the charts are useful for monitoring a process and they provide a means for communicating information about the performance of a process. Thirdly, the researcher wanted to establish whether there was a need for statistical consultancy in the manufacturing Industry of KwaZulu Natal. This would be based on the number of respondents who do not use statistical process control techniques and charts. In other words, if too few respondents use these, this would support the motivation for the need of statistical consultants in the Manufacturing Industry of KwaZulu Natal.

According to Hannagan (1995), the way in which a business competes is rapidly changing. Organisations must constantly strive to offer "better" products and services than their

competitors. With increasing choice, customers are able to favour organisations, which deliver “quality” products and services. It is thus of great concern that manufacturers improve the quality of their products and services if they want to remain in business. It is therefore recommended that quality managers in the Manufacturing Industry of KwaZulu Natal be made aware of the uses of statistics in decision making and be made aware of the uses of statistical process control techniques and charts. It is hoped that if more quality control managers are aware of the uses of statistics in decision-making and the uses of statistical process control techniques and charts, more quality control managers will use statistics in decision making and more will use statistical process control techniques and charts, and hence, the quality of products and services will be improved. It is thus recommended that statistical consultants be used to perform in-house training of quality control managers in KwaZulu Natal, in the uses of statistics for decision-making and in the uses of statistical process control techniques and charts.

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