8.1 CONCLUSIONS

8.1.1 Objective 1

Investigate the nature of customer complaints to identify problem areas

Customer complaints were investigated using data from each of the mills. The chi-square test was used to check for differences in the customer complaints. This test showed that there were significant differences in the categories of customer complaints at the mill. Mill X shows the worst performance with the most number of customer complaints.

Three categories of customer complaints were identified, viz. technical, logistics and financial. The largest category of customer complaints was the technical customer complaints, and the logistics complaints were the least. The technical category was therefore chosen as the area in need of focus and the technical characteristics of fluting-paper was therefore chosen as the area for this study.

There were ten reasons for customer complaints that were categorized as technical. Of these ten reasons, “out of specification” accounted for the largest percentage of customer complaints. This reason encompasses paper that is received by the customer and found to not meet the technical specifications that were agreed upon. It is clearly an indication that quality assurance checks and policies are not being adhered to and there poor manufacturing practices controlling the quality of the product leaving the mills.
Moisture also accounted for large numbers of customer complaints, and therefore warrants better controls on the papermachine to ensure that the paper reaches the customer at the agreed upon moisture content. Glueability and cracking which are also dependent on the moisture and porosity of the paper accounted for large numbers of customer complaints, emphasizing the significance of good moisture and porosity control. There were also several customer complaints that were related to poor practices in the finishing department. These complaints illustrate poor manufacturing and quality control practices or problems areas in need of improvement initiatives.

8.1.2 Objective 2

*Identify and relate the customer needs to the technical specifications, defined by the company, of fluting-paper*

The survey method was successfully used to identify the customer needs. Although the number of customers surveyed was small, the results obtained were capable of identifying the customer needs and showing the relationship between the customer needs and the technical characteristics of fluting-paper. Three new customer needs were identified viz. consistent moisture, consistent weight and low grit content.

The customer needs were related to the technical specifications using quality function deployment. Using these principles, it was found that there are several technical characteristics and technical specifications to describe each customer need, except the new customer need of grit content.

It was also found that the customers’ most important needs were consistent moisture, consistent weight and strength. The most important technical characteristics were consistent moisture, consistent weight and porosity. The technical difficulty ratings show that consistent weight and consistent moisture are
easy to manipulate while porosity is slightly more complex. Important customer needs like cracking and glueability, for which there were also several customer complaints are dependent on moisture and porosity. These findings further substantiate the customer complaint data highlighting that moisture and porosity, together with weight, of the fluting-paper needs to be controlled to improve customer satisfaction.

8.1.3 Objective 3

*Relate the technical specifications to measures of the process of producing fluting-paper*

The QFD matrix was the tool chosen to relate the technical specifications of fluting-paper to the process measurement, cull. It was found that there were several differences in the reasons for which paper is culled at the mills. There are several reasons for cull for which there are no technical specifications. The technical specifications of tensile strength, tear and porosity have not resulted in paper being culled.

Although porosity emerged as an important technical characteristic there were no customer complaints received for this and neither is paper culled for this reason, although there is a technical specification for this characteristic. Important customer needs like cracking and glueability for which there were customer complaints, are dependant on porosity which therefore warrants better focus and control on the machine operations.
8.1.4 Objective 4

*Determine the reasons (if any) for the customers differing perceptions and claims of inconsistent quality*

There were several reasons, for the customers’ different perceptions and claims of inconsistent quality that were determined from the investigation of the first three objectives. These reasons are explained in chapter 7. Problems seem to emanate from the inconsistency in the control of specifications for fluting-paper. This is shown by the comparison of the reasons for cull with the technical specifications for fluting-paper, where it is seen that paper is not culled for tensile strength, tear and porosity. Moisture, grammage, porosity and aesthetics are salient technical specifications for which cull is not standardised across the mills. There are also additional reasons (cracking and aesthetics) for which paper is culled that are not standardised across the mills. Winding operations have also been identified to be different at the mills, with mill X having numerous customers complaints relating to the condition of their cores, loose edges and creasing.

The end-use of the product further contributes to customer’s perceptions as customers have different needs depending on the type of fruit packaged in these boxes. There could also be other customer needs based on factors such as Garvin’s (1987, p43) dimension of serviceability that fell out of the scope of the technical evaluations done here.

8.2 Hypothesis

The four objectives established to investigate the hypothesis were achieved. The first objective investigated the nature of customer complaints and identified the salient category of technical customer complaints as the problem area in need of attention. Thus the technical characteristics and specifications of fluting-paper were further investigated. The customer needs were related to the technical specifications of fluting-paper as part of the second objective. The most important customer needs were determined and it was found that of the customer needs, grit
content did not have a technical specification. The third objective related the technical specifications to cull, where several technical specifications that did not relate to reasons for cull were identified. There were also several disparities between the mills in reasons for which paper is culled. It is seen that different mills cull paper for different reasons, and mills do not always cull paper according to the technical specifications.

In essence it is seen that there are some gaps, between the customer needs and the technical specifications of the fluting paper that the company produces. The hypothesis, the company produces fluting-paper consistently according to technical specifications that meet the customer needs, is therefore rejected. The following recommendations are made to rectify the gaps between the customer needs and the technical specifications.

### 8.3 Recommendations

From the comparison of the company to the competitor using QFD, it was clear that certain customers are happy (customers D and E) with the company while others (customers A, B and C) are unhappy. It could be that the customers have little choice with the market being a duopoly and available volumes of paper being limited. There is therefore opportunity here to increase customer satisfaction and sales volumes with improved product performance and customer service. Evaluation of sales point ratings indicate that the customer needs of consistent weight, consistent moisture and low grit content will give some increase in sales. Some customers also expressed an interest in moisture resistance. These product attributes are potential selling points for improved product performance, and are therefore recommended for further investigation by the sales and marketing department.

A customer complaint management system that is suggested by Behrens et al (2007) is comprehensive and takes into cognisance eight disciplines in the handling of complaints is suggested. These disciplines are building the core team, describing the problems, taking containment action, performing a root cause
analysis, planning and taking corrective action, stopping the reoccurrence of the problems and issuing a closure report.

The QFD matrix points out that grit content which was important for the customer did not have a technical specification. It is therefore recommended that a technical measure, together with a technical specification be implemented for this customer need. A specification on other aesthetic features that may be important to customers also needs to be investigated.

Investigations are also recommended into evaluating the problems related to moisture and weight inconsistencies. Mill and customer audits are recommended. Tolerances on specifications and moisture variability in the sheet are suggested as possible focus areas in the audit. Porosity also focuses in this area in need of better process control.

Cull and the reasons or criteria for which paper is culled needs to be investigated and standardized across all mills. Error proofing methods such as design for manufacturing are suggested by Mannivannan (2006, p99) for reducing waste and rework. He adds that this system of preventing errors before they occur increases a company’s competitive edge by reducing costs associated with rework and defects.

According to Paris (2002, p104) waste and the cost leading from it is related to employee incentives. He explains that the lack of training, rewards and recognition of employees can result in increased costs and decreased profitability, in the form of higher scrap and rework rates, careless mistakes, ignored problems and late deliveries. He therefore suggests an incentive plan including education, training, recognition and respect of employees that rewards the employee and benefits the employer who sees higher profitability from less waste and rework.

In studying the process, it was noted that the data recorded and stored at mills vary. It is suggested that the parameters recorded by mills be standardized and a
standardized database be implemented across all mills for process measurement and for customer complaint management. Many of these could be valuable for process improvement activities.

Variability in the data noted for customer ratings also indicate that there may be other factors not studied here that may be contributing to customer satisfaction. These could be the dimensions of quality, such as serviceability and other perceptions that are suggested for further research.