Importance-Satisfaction-Gap (ISG) Segmentation of Thread Customers in Hong Kong

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Declaration

The research embodied in the thesis *"Importance-Satisfaction-Gap (ISG) Segmentation of Thread Customers in Hong Kong"* represents my original work. This action learning research was conducted to fulfill the requirements for the degree of Doctor of Management at International Management Centres, UK, in association with Oxford Brookes University, UK, and validated by Southern Cross University, Australia

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Abstract

This action learning research has re-visited the important marketing concept of customer segmentation. The company sponsoring this study, has been facing growing challenges from the Asian financial turmoil starting from the end of 1997. Despite its long establishment and good reputation in the thread market, Coats China has to tackle the burning issue of turning the business around using more advanced and sophisticated marketing techniques.

The Associate's doctoral study was supported by the management. An Importance-Satisfaction-Gap (ISG) Questionnaire was designed with the help of her colleagues in the company. Some 65 different marketing segmentation approaches have been identified through searching relevant literature. So far, no segmentation has been focused on gaps, which are operationally defined as the differences between importance scores and satisfaction scores. The rationale of analyzing gaps rests with the argument that improvement is needed only on items, which are perceived to be important and yet the customers are not satisfied with. No gaps would exist if the customers are satisfied with important attributes or if the dissatisfied items are not important.

Adopting a triangulation approach to establish the validity of her segmentation study, the Associate has used multi-research methodological approaches. Cluster analysis and Chi-squared Automatic Interaction Detection (CHAID) have been used to segment the 238 respondents, who are customers of Coats.

The needs of thread customers are predicted by discriminant analysis, CHAID, regression analysis, and utility analysis (on decentring basis). These four methodologies predicted rather similar quality attributes for thread viz. responsiveness

of sales, special color services, product performance, effective communication, and delivery services.

Factor analysis has been applied. Five factors have been identified for importance scores: Logistic Reliability, Supplier Support, Professional Partnership, Product Feature, and Tailored Services. Satisfaction scores have four factors: Partnership, Product, Logistics, and Others. Gap scores have five factors: Relationship, Place, Product, Promotion, and Price.

Among the various tools, Artificial Neural Network (ANN) has the highest prediction accuracy of 73% on satisfaction level.

Multidimensional scaling analysis (MDS) has provided perceptual market positioning of the key thread suppliers in Hong Kong. The two dimensions MDS suggested are: Dimension 1 - Embroidery vs. General Thread, and Dimension 2 - Large size vs. Small size.

To supplement the quantitative data analysis, one to one interviews are conducted and the results are analysed using the computer software called Non-numerical Unstructured Data Indexing Searching Theorizing (NUD.IST). NUDIST adopts the grounded theory strategy revolving around two inter-related elements: theoretical sampling and constant comparative analysis. The qualitative analysis helps enrich the interpretation of some quantitative analyses.

In order to resolve the burning issues (i.e. to reveal the "real" needs of thread users and use the limited resources more effectively), ten business / research objectives are identified. These objectives are largely accomplished by this action learning research project.

The hypothesis testing conducted in this action learning project suggests the followings:

- The higher the quality expectation, the higher is the price sensitivity.
- The more satisfied is the customer, the higher is the share of customer wallet.
- The higher the share of customer wallet, the higher is the price sensitivity.

This action research has illustrated the usefulness of using ISG approach in segmenting the thread market. More researches should be done in future to establish the validity and usefulness of ISG segmentation approach in other industries. The Associate firmly believes that segmentation using utility analysis would offer a new horizon of research agenda in the future.

As demonstrated by this study, the multi-disciplinary approach to segmentation is highly recommended.

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Action learning would not be possible without the support of fellow set Associates. We have mutually learnt from and supported each other.

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1.1   Background to the action learning research

"I hear and I forget, I see and I remember, I do and I understand."
(Confucius, 551-479 BC)

"What we have to learn to do, we learn by doing."
(Aristotle, 384-322 BC)

The grand philosophers from the East and the West demonstrated the importance of action learning in our quest of knowledge. The concept of action learning was structurally applied in management education by Reg Revans as early as 1945.

Mumford (1995) suggests the following essential elements for action learning:

1.   Learning should mean learning to take effective action

2.   Learning to take effective action involves actually taking action not just recommending action

3.   The action learning project must be significant to the learners themselves

4.   Learners learn best from one another

Day and Peters (1994) describe action learning as:

> *"Action learning says that if you put together people who have a real problem or challenge which they care about; guide them to any known precedent, sourced in books or articles which relate to the problem; help them through adapting and applying that precedent in their own context; help them to frame the right questions which will assist them to tackle their problem or challenge; and take them through the successes and failures of implementation, THEN YOU ARE REALLY LEARNING"*

Molly et al. (1997) suggest that the effective delivery of action learning requires the deconstruction of the normative curriculum to allow the customer to drive its recreation from challenges that are meaningful and actionable in the action learner's own context.

On the benefits of action learning, Smith and Peters (1998), claim that it is an unusually practical approach to business education focussing on:
- people learn best about their work at work;
- people learn best by doing real things;
- people learn best with and from others in similar situations;
- people learn best within a framework which captures and digests experience.

Action learning can fulfill an organization's diverse development-related objectives, and has the elasticity to fulfill requirements for virtual availability. In particular, by linking capability development directly to business demand dynamics, action learning keeps management and executive capability ahead of business demand. The learners need to know not only how they should act, all things being equal, but how they really do act and can act. And as a development approach, that means that they need to design learning around real work related problems - with real risks of failure, in real time, in a real environment, which will allow them the opportunity of investigating how they really act and make decisions. Clark (1980) argued that action learning can preserve the best aspects and values of the scientific model, while at the same time being turned to real life situations, appreciating their uncertainties, complexities and dynamic properties.

Hult et al. (1980) claim that action research simultaneously can assist in practical problem solving and expands scientific knowledge, as well as enhances the competencies of the respective actors, being performed collaboratively in an immediate situation using data feedback in a cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change processes in an organization and undertaken within an actually acceptable ethical framework.

As the employment market has become more difficult after the Asian financial turmoil since October 1997, more and more people realize the importance of continuous self-development in order to keep update of the rapid changes which they cannot overlook. Action learning is particularly pragmatic in applying what people learn. Unlike the traditional approach where learning success is measured by the amount of programmed knowledge acquired by the learners, the key objective of action learning is to generate something useful to both the learners and their employers (Koo, 1998a).

The Associate's employer, Coats China, realizes the benefits of action learning and has supported this market segmentation research project. Although being one of the largest thread suppliers in the world, Coats China has not had a proper market segmentation strategy in Hong Kong yet. Many of the marketing functions in Hong Kong are influenced by the head office in United Kingdom. The management team of Coats China sees the opportunity of conducting a market research on segmentation in order to increase the market share in today's competitive market scenario.

1.2 Background of Coats China

Coats China is a wholly owned subsidiary of Coats Viyella Group in the United Kingdom, an international textile group and a market leader in sewing thread industry. The Coats Viyella Group has an annual turnover of USD 3.6 billions, and an employee size over 60,000 worldwide in 1997. It has five major product categories, viz.: (a) Thread; (b) Precision Engineering; (c) Clothing; (d) Home Furnishings; (e) Fashion Retail. There are some restructuring programs in Coats Viyella in 1998 (e.g. dividing Coats Viyella into two major groups: Coats Plc., including Thread and Precision Engineering businesses, and Viyella Plc., including Clothing, Home Furnishings, and Fashion Retail businesses). Such restructuring programs have no major impact on the operations in Hong Kong.

Coats has over 160 years of experience in manufacturing and distributing industrial and home used sewing thread. It operates in more than 60 countries all over the world. Coats China is controlled by Coats Asia Pacific Ltd. which oversees the operations in Hong Kong, China, Philippines, Indonesia, Korea, Malaysia, Singapore, Bangladesh, Vietnam, Sri Lanka, Dubai, Australia, and New Zealand.

In turn, Coats China is responsible for China, Hong Kong (now a Special Administration Region of China) and Macau regions. Coats China consists of five establishments: (a) Coats Hong Kong Ltd., (b) Coats Guangzhou Ltd., including Dongguan, Zhongshan, Fuzhou Office, (c) Coats Tianjin International Trading Co. Ltd., (d) Coats Shanghai, (e) Coats Hong Kong (Macau Branch). Of the five establishments, Coats Hong Kong Ltd. and Coats Guangzhou Ltd. make the most contributions to the Group.

Coats Hong Kong Ltd. was formed by merging two businesses which had a long and valuable experience in the international industrial thread markets – Coats Patons (HK)

Ltd. and Tootal Thread Hong Kong Ltd. Coats Hong Kong is now mainly a trading company, which sells sewing thread in Hong Kong, Macau and exports to overseas.

Coats Guangzhou Ltd. is a joint venture company with the Chinese Government. Coats owns 70 % of the company which has a production plant for dyeing and finishing works of industrial and home used sewing threads for Coats China in all regions. Coats Guangzhou Ltd. has obtained two international certificates: ISO 9002 and Öko-Tex Standard 100.

Coats China is a leading supplier and distributor of high quality garment and footwear accessories. Coats has built its first spinning mill in China since 1920s.   Armed with this long association experience, Coats has acquired good knowledge and exposure in dealing with concerned parties in China. Target customers are high quality garment and footwear manufacturers in Hong Kong and China.

The major role of Marketing Department in Coats China is to find the most effective ways to influence the specifiers (operationally defined as those big buying offices / decision-makers who can "specify" to their manufacturers / sub-contractors to use a specific garment accessory) to use the Coats' products. The "specifiers program" was approved by Coats' top management in the annual meeting in 1996. The Sales Teams are responsible for selling various Coats' products to manufacturers directly. The Marketing Department supports the Apparel, Embroidery and Footwear Divisions of Sales Department in Hong Kong and coordinates the marketing activities in export markets such as Shanghai, Guangzhou, and Tianjin.

About 80 % of sales is made by the Sales Department, and the remaining 20 % of sales is achieved by the Marketing Department through influencing the specifiers. The Sales Department and Marketing Department are working very closely with each other to reap synergy benefits.

Coats has so far secured 35 out of 500 potential specifiers to nominate their sub-contractors to use Coats's products in Hong Kong. The proportion of sales turnover in Coats is 90 % in Hong Kong, (including some garment manufacturers who export their products to other countries) and 10 % in China and Macau respectively. The management is measuring the success of the Marketing Department by the volume of indirect purchase from manufacturers and specifiers.

The marketing activities in Hong Kong are independent from the parent company, Coats Viyella in United Kingdom. Among the 4-Ps of the marketing mix, the Marketing Department in Coats China has at best indirect influence over the Product and Price strategies. At present, the product design and development are centrally controlled by the Research and Development Department in Coats Viyella in United Kingdom. The pricing strategy is largely determined by the sales teams by reacting to the changing market situations. The current major active marketing responsibilities are to promote proper product brand names, and company image among the existing and potential clients and to devise an appropriate place strategy through identifying and anticipating various thread users' needs.

The major thread types of Coats China available in Hong Kong, Macau, and China are as follows:

Thread Type	Product Brand Name
Spun Polyester	ASTRA
Polyester Corespun	EPIC
Polyester Cotton Corespun	KOBAN
Continuous Filament Nylon Bonded	TRISTAR
	APTAN
	STAR
Soft Nylon	TIGER
Bulked Polyester	DELTA

Continuous Filament Polyester	GRAL
Embroidery – Polyester	RAPOS
	SYLKO
Embroidery – Rayon	GOLDEN LION
Locked Filament Polyester	ULTIMAX

Different types of thread are designed for different garment manufacturing usage. A summary of the main uses of the major products of Coats China is attached in the Appendix 3.

1.3   Burning issues for the research

Like many other business organizations, Coats China is facing many and varied challenges (e.g. rising costs, keener competition, more demanding customers, changing technology, tougher regulatory control, growing concern over environmental and business ethic issues). Being just able to satisfy customers is no longer enough. In order to outperform competitors, one has to do better than just to meet the basic needs of the customers. It is important to reveal the "real" requirements of the customers. The "real" needs include both explicit needs claimed by the customers as well as their "hidden", "implicit" or "intrinsic" needs. It is particularly difficult to identify customers' hidden needs.   In order to delight the customers and win them over as specifiers for Coats products, the Marketing Department has a burning issue of revealing the "real" needs of thread users.

The second burning issue concerning Coats China is the effective use of limited resources. Having identified customers' needs, the Marketing Team needs to devise the most effective marketing strategies to meet customers' "real" needs. Different customers have different needs. To adopt a universal package for all thread users is inevitably not cost effective. Customers have similarities and dissimilarities. They can and should be segmented appropriately according to their needs and other characteristics.   There are many approaches to segment the market. Coats China needs to find out the best approach to segment its customers.

In order to resolve the burning issues faced by Coats, this action learning research aims to achieve the following practical business objectives: (cf. End of Section 2.3 Importance / Benefits of Market Segmentation)

1)   To identify the explicit and implicit thread users' requirements
2)   To increase market share of Coats China in Hong Kong, Macau, and China

3) To identify Coats China's position in the thread market as perceived by the customers

4) To differentiate Coats China from its competitors

5) To portray a proper brand image to all thread users

6) To devise an effective place (distribution) strategy

7) To segment the market accurately and reliably

8) To develop an appropriate market information system to facilitate marketing planning

9) To develop an effective target marketing approach through tailor-made services for selected customer segments

10) To develop a prediction model of customer needs

These ten business objectives are relevant to Coats China but are equally applicable to other organizations. In other words the findings of this action research project are generalizable to a much wider context. The research methodologies relevant to these objectives are summarised in Appendix 5.

1.4   Hypotheses

By and large this action learning research Project is of exploratory nature. From a detailed Customer Survey Questionnaire, the marketeers can identify the important product attributes used by thread customers to select a particular thread manufacturer. The "hidden" needs of the thread users can be estimated by means of Utility Analysis (i.e. Conjoint Analysis). Despite the difficulty in formulating meaningful hypotheses for an exploratory type of research, the following six hypotheses should provide useful insight to marketeers in developing their marketing plans. It is believed that the findings can be generalized to other industries.

Hypothesis 1:

Thread customers with higher quality expectation are less price sensitive.

Hypothesis 2:

Thread customers who export to Europe have higher quality expectation than those who export to other countries.

Hypothesis 3:

Larger thread customers are more quality oriented than those smaller thread customers.

Hypothesis 4:

Firms with high Purchase Decision Involvement (PDI) are more conscious of quality requirement in selecting their thread suppliers than those with lower PDI.

Hypothesis 5:

Customer satisfaction is positively correlated with share of customer wallet, which in turn is positively correlated with price sensitivity.

Hypothesis 6:

Thread customers who experience more problems with thread usage are more interested in Technical Advisory Services.

These null hypotheses are developed to verify the common beliefs held among the sales representatives and management of Coats China. The results of testing of these null hypotheses would shed much practical insight to the management of Coats China for their future marketing efforts.

1.5   Overall research approach

In the process of developing the customer survey questionnaire, a series of focus group discussions and in-depth interviews are conducted within Coats China. The participants will first brainstorm the internal strengths and weaknesses of Coats China as well as the external opportunities and threats. From these discussions and SWOT analysis, the Associate finds out how her colleagues at Coats see the features and benefits of the Coats products and also the perceived expectation of thread users. With these information, the customer survey questionnaire is designed and piloted. The key thread attributes to be identified from the questionnaire, are used to develop the Orthogonal Array Profile Score-sheet for the Utility Analysis. The respondents are segmented by Chi-squared Automatic Interaction Detection (CHAID), triangulated by Cluster Analysis. The segmentation results can be used to develop the Marketing Information System.

The Customer Survey Questionnaire (see Appendix 1) is designed to cover the following categories:

  (a)   General information;
  (b)   Quality information;
  (c)   Service information;
  (d)   Others information, including Purchase Decision Involvement (PDI).

PDI is the extent of interest and concern that a consumer brings to bear upon a purchase-decision task (Bearden et al. 1993). The Customer Survey Questionnaire can reveal where "perceived gaps" exist for Coats China. Gap is operationally defined as the difference between the perceived importance and their respective satisfaction levels of various thread attributes.

To encourage higher response rate, a covering letter is issued by the Managing Director of Coats China to ensure confidentiality and explain the rationale of the survey to the respondents. The questionnaires are delivered by hand to the targeted respondents by the Sales Representatives during the period from January to June 1998.

Collection of completed questionnaires was by phases. The initial phase covers the important customers of Coats, who contribute the bulk of the company's sales turnover. The second phase deals with the less important customers of Coats.

Briefings are given to the sales representatives of the company who may have to respond to inquiry from the customers regarding the questionnaire survey.

1.6   Thesis Outline

This thesis comprises of six chapters.

The first chapter outlines the background of this action research and explains why this project is beneficial to the employer, Coats China. The research methodology is then briefly described. Some of the terminology are defined. As in most other marketing researches, there are constraints on the scope and key assumptions to be made.

The second chapter attempts to exhaust the body of knowledge relating to market segmentation in recent years. This chapter begins with a brief introduction on the thread / textile industry in Hong Kong to set the scene of this project. Different definitions of market segmentation are given. This is followed by the benefits and importance of segmentation. To present a more balanced view, the drawbacks and limitation of market segmentation are noted. From the literature review, various types of market segmentation are revealed. Some literature reviews of the different research methodologies to be used in this action research are also dealt with.

The third chapter covers both qualitative and quantitative research approaches, which are adopted in this research. The qualitative approach covers face-to-face interview, and SWOT analysis. Qualitative comments are non-numerical and unstructured data, which can be analysed by NUD.IST. The quantitative approaches used in this research, are many and varied. The quantitative statistical methods include: Independent-Samples T-Test; One way Analysis of Variance; Factor Analysis; Multiple Linear Regression; Multidimensional Scaling Analysis; Artificial Neural Network, Discriminant Analysis, Utility Analysis, Cluster Analysis, and Chi-squared Automatic Interaction Detection.

The fourth chapter contains both descriptive and inferential statistical analyses of the Customer Survey Questionnaire results. These quantitative analyses are supplemented by qualitative comments from interviews with veterans and professionals in the thread industry. The analyses will help generate a list of importance thread attributes for segmentation of thread industry in Hong Kong by cluster analysis. Alternatively as a triangulation approach, CHAID is used to segment the thread market in Hong Kong. The six hypotheses outlined in Section 1.4 will be tested. The hypothesis testing results will be discussed.

The fifth chapter summarizes key findings of the research project. Conclusions are drawn on the various hypotheses. The chapter then discusses how the burning issues faced by Coats can be resolved. This is followed by the discussion on the practical implication and application of the findings from this market research. Limitations are also examined. After some deliberations on future researches, the chapter concludes with an overall summary.

The last chapter discusses the learning experience arising from this action learning research. The Associate will share her personal learning experience using her learning style as an example. She would demonstrate how action learning can benefit herself as an individual and her organization as a sponsor in the program.

1.7 Definitions

1.7.1   AATCC - American Association of Textile Chemists and Colorists (US – Test Agent)

1.7.2   ANN - Artificial Neural Network, being composed of simple non linear processing units (Neurons) connected into network, is a system which can adapt its functionality as a result of exposure to information (Training).

1.7.3   ANOVA - Analysis of Variance is used to determine which population means are different from each other. When multiple comparisons are made, One-way ANOVA is better than independent-samples T-Test

1.7.4   CHAID - Chi-squared Automatic Interaction Detection (CHAID) is a fast, statistical multi-way tree algorithm to explore data efficiently (e.g. in market segmentation)

1.7.5   CLU - 10,000 Meters

1.7.6   CWF - Cool White Fluorescent (a light source for color matching)

1.7.7   D65 - Daylight Temperature 65 (a light source for color matching)

1.7.8   Delta E - Color Difference Unit

1.7.9   Factor Analysis **-** Factor analysis refers to a variety of statistical techniques whose common objective is to reduce a set of variables to a smaller number (i.e. more parsimonious) of hypothetical variables. It helps make order out of the apparent chaos of environment. It usually involves four steps:

    1.7.9.1   Computation of correlation matrix of all variables;

    1.7.9.2   Factor extraction;

    1.7.9.3   Factor rotation; and

    1.7.9.4   Computation of factor scores.

1.7.10   Horizon - Name of the light source for color matching

1.7.11   ISO - International Standardization Organization (EU – Test
          Agent)

1.7.12   MDS - MultiDimendional Scaling (MDS) is designed to analyse
          distance-like data called dissimilarity data, or data that indicate
          the degree of dissimilarity (or similarity) of two things. It can be
          used to determine the hidden structure of data bases. The output
          is a spatial representation, consisting of a geometrical
          configuration of points, as on a map making the data easier to
          comprehend.

1.7.13   NUD.IST - Acronym for Non-Numerical Unstructured Data
          Indexing Searching and Theorizing. It is a computer package
          designed to handle non-numerical and unstructured data in
          qualitative analysis.

1.7.14   Oko-Tex Standard 100 - A quality system used in the thread
          industry

1.7.15   PDI - Purchase Decision Involvement

1.7.16   Specifiers Program - A partnership programme where the
          "specifiers" prescribe to their manufacturers to use a particular
          brand of thread

1.7.17   SPSS – Statistical Package for Social Science (a popular and
          powerful statistical software for quantitative analysis)

1.7.18   SWOT (Strength Weakness Opportunity Threat) - A strategic
          development technique of scanning the external opportunities,
          and threats and reviewing internal strengths and weaknesses.

1.7.19   TL84 - Throne Limited 84 (a light source used for color
          matching)

1.8   Delimitation of scope and key assumptions

Since 1st July, 1997, Hong Kong has become a Special Administrative Region (SAR) of China. The relationship between Hong Kong and China has become more and more integrated. Most garment manufacturers have moved into China, in order to reduce their costs of production. The garment manufacturers only hire a few people based in Hong Kong to do the order transactions and quality inspections, but they may employ thousands of people working in China. People working in Hong Kong may not have a good understanding of the detailed operations in China. The cultural difference has not been taken into consideration in this research. It is too expensive and difficult to get all the information about the Hong Kong and China garment industry. Since comprehensive coverage is difficult, this research covers only existing customers of Coats China.

In 1997, Coats Hong Kong has over 2,000 apparel and embroidery group accounts. Some of these are dormant accounts. Group accounts can comprise of a number of individual related companies formed for different purposes. The unit of analysis for this survey questionnaire is largely on group account basis.

About 1,500 sets of Customer Survey Questionnaire were delivered by hand to the customers, during the period from January 1998 to June 1998. Despite the importance of specifiers program for Coats, specifiers are specifically excluded from this survey, because they are not direct thread users and do not buy thread. Footwear manufacturers are also excluded because they are too few in numbers for meaningful analysis.

The responses to this Customer Survey Questionnaire are entirely voluntary. Some respondents choose to return the questionnaire through the Sales Representatives of Coats and some choose to return it by mail. The questionnaire is on named basis. For

this particular reason, more missing values are expected for sensitive questions, such as respondents' annual turnover, factory ownership, major garment brands they are selling to.

It is assumed that the respondents who are based in Hong Kong have good understanding of the thread requirement for their manufacturing operations in China. The respondents are assumed to know their business fairly well, including some technical jargons, which are used in the Customer Survey Questionnaire. With the assurance of confidentiality by the Managing Director of Coats China, the respondents are assumed to be honest and candid about their responses.

Last but not the least, since Coats China is the leading thread supplier in the industry, its clientele base is assumed to be representative of the garment industry in Hong Kong and China. Therefore this research findings should be generalisable to cover all thread users, including those who are not Coats' customers. Moreover Coats China and many of its customers have operations also in South East Asia, thus the findings should be generalisable to cover a much wider international context. The research methodologies adopted in this action research are generalisable in other countries and even in other industries. The segmentation approach should have no geographic boundary. The generalisabilty of the research and segmentation approach will be substantiated by triangulation.

1.9   Chapter Conclusion

In a fierce competitive thread market, (Coats has identified over 50 competitors in Hong Kong), the need to effectively segment the customer base is obvious. Apart from academic contribution to supplement the body of knowledge on market segmentation, the action research can bring about practical value for Coats who is the supporter of this action learning research. The uniqueness and usefulness of action learning have been discussed.

The methodology to be used, covers both qualitative and quantitative approaches. The qualitative and quantitative approaches can be broadly classified as idiographic (describing things individually) and nomothetic (law making). This nomothetic-idiographic distinction is useful in depicting the major difference between the quantitative and qualitative approaches. Many of the common and useful market segmentation research techniques are mentioned. This is then followed by definition of some terms. The chapter concludes with a discussion of delimitation of scope and key assumptions.

Chapter Two   Literature Review

2.1   Thread Industry in Hong Kong

The development of thread market bears close resemblance to the development of clothing market in Hong Kong since "thread" is an indispensable accessory for every garment. Threads are universally considered the "most critical to production" among all the trims (i.e. production cannot begin without the right thread). (A. F. Ferguson Report, 1995)

The report states the followings about the importance of thread manufacturers to garment manufacturers in Hong Kong.

> "Hong Kong manufacturers enjoy a ready local supply of supporting accessories – such as threads, buttons, lining, zippers and fasteners. The easy availability of a wide variety of these items is crucial in maintaining Hong Kong's dominant position as a garment supplier, especially in an environment where quick turnround is becoming the norm."

The clothing industry expanded rapidly during the 1950s, taking advantage of the influx of capital, entrepreneurial skills and cheap labor from China. In 1960s, it overtook the textile industry to become Hong Kong's largest manufacturing sector.

Over the years, in order to cope with the issue of rising labor cost and growing competition from other low labor cost Asian countries, the clothing industry in Hong Kong has gradually moved upmarket and established a high quality fashion image. Hong Kong has since become an international and reputable garment-sourcing centre.

Some local manufacturers have even established their own brand names (such as Tommy Hilfiger, Laws Fashion, Esprit, G2000, Theme) and gotten involved in direct selling to overseas markets. These manufacturers have opened retail outlets in major cities such as New York, San Francisco, Singapore and Taipei.

Reciprocally, many buying offices of the top international designer labels (such as Calvin Klein, DKNY, Disney, Warner Brother, Episode, Levi Strauss, The Gap, The Limited, Guess, Polo Ralph Lauren, Eddie Bauer, Liz Claiborne, YSL, AMC); national department stores (such as R H Macy's, J C Penny,); national discount stores (such as K mart, Walmart, Woolworth) have their products manufactured in Hong Kong. Hong Kong garment manufacturers are thus obliged to use high quality threads in manufacturing these high quality garments. Some of the buying offices are nominating Coats' threads as their preferred accessory for their high quality garments.

According to Hong Kong Government Statistics, there were a total of HK$84.9 billions worth of domestic export for "Article of apparel and clothing accessories" and "Textile yarn, fabrics, made-up articles and related products" in 1997. Assuming the thread to comprise of about half a percent of the production costs, the thread industry has an annual turnover of around HK$400 millions. Coats has about 50 percents of the market share. A good market segmentation policy will help maximize the resource utilization.

Coats has identified over 50 competitors in the thread market. According to a competitor analysis conducted by Coats in 1996, the followings are some information about the major thread competitors in apparel and embroidery sectors:

Gunzetal Limited
- Spinning established in Shanghai. Commenced dyeing in Shanghai during 1995. Production around 1.5 to 1.7 million cones to Hong Kong per month.
- Dyeing in Hong Kong for service. No plan to stop using Hong Kong dyeing. Claimed lead-time of 24 hours lab-dip match service.
- Now have two bonded warehouses, one in Panyu and the other in Dongguan.
- Set up another bonded warehouse in Zhongshan or Zhuhai by end of 1996 / 1997.

- Offer price discount around 5 % to customer accepting China Local Delivery.
- Flexible Book clearance procedure.
- Trilobal embroidery thread (100,000 CLU per month) sold through a subsidiary company called Fivex.

Tse Yu International Trading

- 100 % privately owned Hong Kong company
- Established in mid 1970.
- Established thread production in Guangzhou in 1994.
- Set up local distribution in Guangzhou and Panyu, without book clearance.
- Price slightly lower than Gunzetal
- Now more aggressive to sell grey yarn and plastic cone centre to the rewinders
- Have less interest to sell finished goods to the garment factories.

Goldlink Thread Limited

- Established in 1987, employing mainly sales people from Gunzetal
- Owned by a large textile corporation, Fountain Set
- Production in Tuen Mun in Hong Kong
- Low price, about 70% of Astra
- Have no interest in selling directly to the garment factories in China. Providing only Hong Kong Delivery and Payment.
- Have a sales depot in Vancouver to sell fabric and sewing thread.

American & Efird (HK) Ltd. (A&E)

- Provide good quality and services. They source their grey yarn from North China.
- Exposed to increasing costs and possibly supply difficulties
- Very keen to develop the business in China, such as Guangzhou, Zhongshan, Zhuhai.

Paris Thread

- Selling both Rayon and Trilobal Polyester
- Concentrate on Trilobal
- Brand "Alien"
- Low price and expanding business in China
- Estimated sales is 240,000 CLU per annum

These five major competitors together with Coats have captured the lion share of the thread market in Hong Kong and China. This explains why the questionnaire has been designed to cover the attitude of the respondents towards these thread suppliers as well. The findings of this action research study can fill in the important information gaps from the previous marketing researches on Coats' competitors. Coats can better benchmark its marketing position vis-a-vis its major competitors from the customers' perspectives.

2.2   What is Market Segmentation?

"Market Segmentation" is first recognized by Wendell R. Smith in 1956. It has evolved from an academic concept into a practical marketing planning strategy.

"Segmentation" (Weinstein, 1987) is the process of partitioning markets into segments of potential customers with similar characteristics who are likely to exhibit similar purchase behaviors. Segmentation helps:

    (a)   designing responsive products;

    (b)   determining effective or efficient promotional strategies;

    (c)   evaluating competition and marketing position; and

    (d)   providing insight on present marketing strategies.

"Market Segmentation" is a foundation for overall marketing strategy.   It analyzes the markets, finds a suitable market niche, and develops and capitalizes on a superior competitive position. It helps match goods and services to customer needs and wants.

The major difference between industrial and consumer segmentation analyses is on the segmentation bases. According to Weinstein (ibid.), industrial marketing takes the 4-Rs into consideration as criteria for segmentation: rating the market, realistic in size, reach, and responsiveness.

"Behavioral Attribute Segmentation" has three major approaches. They are: (a) Psychographics; (b) Product Usage; (c) Benefits.   Depending on the circumstances, segmentation can also be based on perceptions, preferences, situations, occasions, media exposure, or marketing mix factors.

    - "Psychographics Segmentation" relates to consumers' personality traits, life styles, attitudes, interests and opinions.

- "Product Usage Segmentation" classifies users into specific consumption categories for industrial markets.
- "Benefit Segmentation" focuses more on the sum of product advantages and satisfaction that meet a specific need or want, than a feature or attribute for industrial markets.

Segmentation can be considered as the process of partitioning a market into distinct subsets of customers who are similar in designated ways and who are likely to exhibit similar purchase behavior. These subsets may conceivably be selected as a target market to be reached with a distinct marketing mix (Kotler, 1994a & b; Crask et al. 1995; Davies 1996; Danneels 1996; Moschis et al. 1997; Romano et al. 1995). A market segment is a group of present or potential customers with some common characteristics which are relevant in explaining or predicting their response to a supplier's marketing stimuli (Smith, 1995). Segmentation is a top-down approach to break down a large market into smaller pieces. Niche market, on the contrary, is a bottom-up approach starting from the needs of a few customers and gradually building a large customer base. Niche marketing is therefore, also called inverted or reversed segmentation.

According to Haley (1991), a market segment is the total configuration of benefits sought which differentiate one segment from another; as opposed to one segment seeking a particular benefit, and another a different benefit. In brief, it is the totality of a mix of benefit that differentiates one segment from another. Hayes (1996) says that market segmentation is based on the overt recognition that customers within the market are heterogeneous. It rests on three basic premises (Matear et al., 1995):

1. Customers are different
2. These differences influence demand
3. Segments of the customers can be isolated within the overall market

Market segmentation underlines the view that markets, and their segments are clusters of potential customers. It is also viewed as a proactive process involving the application of analytic techniques to identify these segments (Jenkins et al. 1997).

Market segmentation is a strategic marketing management tool for resource allocation, which seeks to enhance customer satisfaction and improve organizational profitability. The process of market segmentation includes an understanding of how and why customers buy, how a company can fit its competence with customer needs, and how to develop strategies and marketing programmes to satisfy customers profitably (Murphy et al., 1994). Segmentation is based on the development of the demand side of the market and represents a rational and more precise adjustment of products and marketing efforts to consumer or user requirements (Sharma et al., 1994).

Yelkur et al. (1997) point out that it is neither the people, nor the situation that are segmented, but the demand curves. These demand curves reflect the needs that arise from customers' interactions with usage situations.

The above discussions on market segmentation apply vividly to thread industry in Hong Kong. Different thread users have different reasons for choosing a particular brand / type of threads. Knowing how they differ and grouping them according to appropriate segments are the keys to a successful marketing strategic planning. Thus the development of a capability to effectively segment the thread market can help Coats China to achieve its burning issues of revealing the 'real' needs of its customers and to use its resource effectively.

2.3   Importance / Benefits of Market Segmentation

Market segmentation is considered by Berry et al. (1995) as an important step in formulating a marketing strategy.

Bickert (1997) suggests that market segmentation is important because it helps an organization to :
- identify key consumer segments
- recognize the varying importance of those segments to the company
- understand individual consumers to bridge the gap between mass marketing and "one-to-one" emphasis
- predict how consumers will react to new product, change brand loyalty and respond to diverse media etc...
- target new prospects more effectively; and
- communicate more effectively with customers and prospects to establish and enhance relationships

Positioning strategy refers to the choice of target market segment, which describes the customers whom a business will seek to serve. Brooksbank (1994) claims that the market segment approach can offer the choice of differential advantage, which defines how the company will compete with rivals in that particular segment. Segmenting reduces rivalry in the market place because there should be fewer competitors in any given segment (Cahill, 1996).

Dibb et al. (1997) list the following benefits of successful market segmentation:
- putting the needs and satisfaction of the customers as top priority
- providing more efficient use of resources and maximizes strengths over competitors
- better understanding of the market

- more effective marketing information system

- fresh customer focus

- instant tactical improvement

- relationship building across departments.

According to Matear et al. (1995), segmentation helps determine why a customer buys a product and therefore, why similar people buys a product if the benefit is communicated to them. This would help improve the sales of the company. Sherman (1996) claims that segmentation can help a company organize its perceptions of consumers. The company also needs to understand consumers' perceptions of the company in determining its market focus.

McCarthy (1994) outlines a unique benefit of segmenting non-customer group. This segment would allow the company to market its service better by uncovering some dissatisfaction of its potential customers, which the company is unaware of.

Smith (1995) describes the benefits of market segmentation as follows:
- gaining a competitive edge
- concentrating marketing efforts
- monitoring competitive activity through identifying reasons for success
- improving efficiency (e.g. applying Pareto Principle)

Yankelovich (1964) sees the following benefits that arise from the implementation of segmentation analysis:
- directing the appropriate amounts of promotional attention
- designing product lines that truly parallel market demands
- detecting market changes
- determining the concepts most effective in advertising
- choosing advertising media more wisely
- correcting the time for advertising efforts

- better understanding demographic market information

Summarizing the above benefits of Market Segmentation, it is obvious that the following ten objectives of the DMgt action learning project can be achieved: (cf. Section 1.3 Burning issues for the research)

1. To identify the explicit and implicit thread users' requirements
2. To increase market share of Coats China in Hong Kong and China
3. To identify Coats China's position in the thread market as perceived by the customers
4. To differentiate Coats China from its competitors
5. To portray a proper brand image to all thread users
6. To devise an effective place (distribution) strategy
7. To segment the market accurately and reliably
8. To develop an appropriate market information system to facilitate marketing planning
9. To develop an effective target marketing approach through tailor-made services for a selected customer segments
10. To develop a prediction model of customer needs

The extent and how these ten objectives are achieved by various research methods and approaches are succinctly summarized in the Appendix 5 of this thesis. The matrix table of Appendix 5 also explains the needs and benefits of applying multiple research techniques. These tools can be generalisable and applied to other industries and in other countries. A research "cook book" for market segmentation can be developed from this summary table for the Associate's future career as a consultant or an academic in a university.

2.4   Drawbacks / Limitations of Market Segmentation

Firat (1997) says that under condition of fragmentation, marketing techniques which allow consumers to construct different styles, forms, types and versions of the same product for use in representing different self-images in different situations (spectacle marketing), are likely to become necessary. However, fragmented markets make segmentation strategies less useful. Under fragmented market situation, there is growing consumer desire for fluid movements among different experiences, images, and meaning in and through life. This is one of the limitations of market segmentation. In the case of thread industry, the market is not fragmented, making market segmentation a feasible strategy.

Hoek et al. (1996) criticize that only very few researchers have established the validity of the outcomes of their studies. They suggest that the research data can be split and each half should be analysed independently (i.e. Split-Halves Method (Carmines et al., 1979)). Their literature search fails to reveal criteria to select the most appropriate segmentation analysis approach. They further cite some segmentation problems relating to interpretation in :
- stability of segmentation finding over time; and
- decision guidance (e.g. managers still need to select particular segments to target)

In the case of action learning like current one, the researcher can advise the organization how to implement the segmentation plan and provide useful decision guideline to select particular target segments.

According to Hoek et al. (ibid.), a common reason for lack of applicability (of segmentation study) is over-emphasis with the techniques and method of segmentation. In too many instances marketing researchers have failed to analyze the

marketing environment and competitive structure before applying their favourite methodological approach. In general, marketers using segmentation have no guarantee that they will be able to predict behaviour, or identify the outcomes that will maximize their profitability. (nota bene: This difficulty can in fact be addressed through the use of utility analysis which will be discussed later) Young (1996) points out that market segmentation has been difficult to implement because of lack of linkage of expertise in marketing and statistical personnel. Segmentation often fails because of two reasons :

1. Marketer dominated approach often lacks research data to support its recommendation

2. Statistical approach, which having identified consumer differences, fails to align with company's objective.

To overcome this problem, Young (ibid.) advocates the importance of integrating marketing and statistical knowledge. (nota bene: This is exactly what action learning can help achieve!)

Matear et al. (1995) point out that some limitations for benefit segmentation in industrial market viz.:

- Data required are expensive to collect
- Identification (profiling) and accessibility of benefit segments are more complex.

Regarding segmentation and target marketing, Wright (1996) has the following three criticisms :

1. Segment identification - segment membership is not stable over time. Real segments exist if several different algorithms locate the same segment (i.e. Triangulation).

2. Logic of targeting - There is no logical reason to conclude that targeting the highest response segment will necessarily generate the greatest overall response. For example, there can be "leakage" to other non-targeted segments.

3. Empirical evidence in falsifying segmentation and targeting theory. It is difficult to demonstrate that segmentation and target marketing lead to higher sales or there are discrete groups of consumer preferring particular brands.

On the whole, these drawbacks / limitations of market segmentation can be reduced by action learning approach. Changes over time can be monitored by the action learner who is associated with the company, who can and should reflect, as a reflector, the outcomes which are different from what have been expected from research findings.

2.5   Types of Market Segmentation

There are many types and approaches to market segmentation. The following are results of literature review on market segmentation over the last few decades. The purpose of searching the various types of market segmentation approaches is to find out which of those are more suitable for Coats China on the one hand and to build on them to develop a better segmentation approach on the other hand. The development of an innovative segmentation method would have contribution to the existing body of knowledge on market segmentation. Since market segmentation have been around for a few decades, it is useful and important to know what are currently available in order to avoid the pitfall of reinventing the wheel.

The Associate has made a conscientious effort by searching standard textbooks on market segmentation and browsing through the electronic library (e.g. Emerald) for the latest publication in the last few years.

From her literature search, the market can be segmented by the following approaches. These market segmentation approaches can be broadly classified into:

1. Desk Research Type of Segmentation Approach, involving secondary data available in-house, for example, Marketing Information Database (**D**);

2. Field Research Type of Segmentation Approach, involving primary data collection, for example, questionnaires and interviews(**F**).

Alternatively, the classification can also be by types of customer groups :

1. Industrial Groups (**I**);

2. Personal Groups (**P**);

3. Both Industrial and Personal (**IP**).

The follow symbols are used for classification on the 65 segmentation approaches identified from literature review:

- **"DI"** - Desk research for Industrial customers
- **"DIP"** - Desk research for Industrial and Personal customers
- **"DP"** - Desk research for Personal customers
- **"FI"** - Field research for Industrial customers
- **"FIP"** - Field research for Industrial and Personal customers
- **"FP"** - Field research for Personal customers

Brief explanations are given for the following segmentation approaches. However, explanations are not given for some approaches since the terms used are readily self-explanatory.

1. **DI** - Centralized buying (Smith, 1995)
2. **DI** - Characteristics of the buying centre (e.g. composition by role, stage in big process, method of conflict resolution, type of uncertainty in buying centre) (Sudharshan et al., 1998)
3. **DI** - Characteristics of the buying organization (e.g. types of industry, employees, use of product, existence of buying contract) (Sudharshan et al., 1998)
4. **DI** - Customer profitability (Clieaf, 1996)
5. **DI** - Identifiable competitors (Berry et al., 1995)
6. **DI** - Industry (Smith, 1995)
7. **DI** - Operating Variables - (e.g. Technology; User/Non-User status; Customer capabilities) (Kotler, 1994a; Matear et al., 1995; Murphy et al., 1994)
8. **DI** - Order value (Smith, 1995)
9. **DI** - Participation (Buckles et al., 1996)
10. **DI** - Product type (e.g. Capital goods) (Buckles et al., 1996)
11. **DI** - Purchase history (DeTienne et al., 1996)
12. **DI** - Purchase processes (Berry et al., 1995)

13.   **DI** - Purchase volume (Berry et al., 1995)

14.   **DI** - Purchasing approaches (e.g. Purchasing function; Power structure;
      Existing relationship; General purchase policies; Purchasing criteria)
      (Kotler, 1994a; Matear et al., 1995; Murphy et al., 1994)

15.   **DI** - Roles (Buckles et al., 1996)

16.   **DI** - Similar sales or distribution channels (Berry et al., 1995)

17.   **DI** - Situational Factor (e.g. Urgency; Specific application; Size of order)
      (Kotler, 1994; Matear et al., 1995; Murphy et al., 1994)

18.   **DI** - Size of company (Smith, 1995)

19.   **DI** - Standard or custom design (Buckles et al., 1996)

20.   **DI** - Strategic importance of business (Smith, 1995)

21.   **DI** - Structure (Buckles et al., 1996)

22.   **DI** - Susceptibility to change (Yankelovich, 1964)

23.   **DIP** - A Priori Approach - A priori approach in which the segmentation and
      their categories are predetermined or decided prior to the data
      collection or analysis stage. Traditional segmentation based on
      geographic or socio-demographic variables belongs to this category.
      (Hayes, 1996; Harrison, 1994; Rao et al., 1995)

24.   **DIP** - Buying behaviour (e.g. frequency of purchase; value of purchases;
      brand choice) (Smith, 1995)

25.   **DIP** - Common user requirements (Berry et al., 1995)

26.   **DIP** - Geodemographic - Geodemographic segmentation systems organize
      small well-defined geographic units into groups that are similar with
      respect to the demographic, housing and socioeconomic characteristics
      of the households comprising the units. Geodemographics can link
      different data sets which have been geo-coded; cover all addresses; be
      multifaceted (i.e. not relying on one-dimension); and link "above the
      line" and "below the line" marketing activities. (Crask et al., 1995;
      Mitchell et al., 1994a; Tonks et al., 1995)

27. **DIP** - Geographic - Geographic segmentation divides the market into different geographical units such as local town, region, or country as a whole. (Berry et al., 1995; Minhas et al., 1996)

28. **DIP** - New customers (Smith, 1995)

29. **DIP** - Principle of Differentiation (PD) – Each principle of differentiation (PD) defines a distinct notion of product similarity according to the presence or absence of some key product characteristics. (Bresnahan et al., 1997)

30. **DIP** - Product characteristics (Buckles et al., 1996)

31. **DIP** - Purchase behaviour (RFM) (i.e. Recency of purchase; Frequency of purchase; Monetary value of purchase) (Bickert, 1997; Clieaf, 1996; DeTienne et al., 1996)

32. **DP** - Astrology - Astrology is the art or science, describing the character or destiny of a person by observing the position of the star at the person's birth. As a significant proportion of the population believe in astrology, astrological segmentation can be used to create communication strategy to appeal to specific segments; suggest appropriate media; design promotion campaign; and adopt appropriate symbol to attract specific segments. (Mitchell, 1995)

33. **DP** - Birth Order – Birth order is defined as a person's rank by age among his or her brothers and sisters (Claxton, 1995). Claxton suggests that birth order may affect many important socio-developmental processes that eventually shape the individual cognitive, affective and cognitive responses to consumption choices.

34. **DP** - Characteristics of individual participants (e.g. demographic, roles, psychographics of individual actors) (Sudharshan et al., 1998)

35. **DP** - Demographic (e.g. age, sex, , marital status, education, religion, social class, income, occupation, industry, company size, location) (Kotler, 1994a & b; Berry et al., 1995; Boedeker, 1995; Clieaf, 1996; Duclaux, 1996; Firat et al., 1997; Matear et al., 1995; Minhas et al., 1996; Murphy et al., 1994; Worcester, 1972)

36. **DP** - Life cycle (Life event) – (e.g. marriage, divorce, first child, pre-retirement, etc…) (Duclaux, 1996; Silvers, 1997)

37. **FI** - Purpose (Yankelovich, 1964)

38. **FIP** - A Posteriori Approach (Post Hoc) - A posteriori approach is a clustering-based segmentation design in which the segments are investigated by a range of sophisticated statistical techniques such as cluster analysis and discriminant model. (Hayes, 1996; Harrison, 1994; Rao et al., 1995)

39. **FIP** - Aesthetic concept (Yankelovich, 1964)

40. **FIP** - Attributes (Smith, 1995)

41. **FIP** - Benefit segmentation - Benefit segmentation involves partitioning the market into subgroups according to similarities in the benefits individuals seek. The benefit segmentation approach is based upon being able to measure consumer value system in detail, and what consumers think about different brands in the product category of interest. Through related potential consumer benefits, clusters emerge as groups of people with similar importance to various benefits. Benefit segmentation partitions customers according to the benefits they seek when buying a product or service. These factors have a causal relationship to future purchase behaviours. (Crask et al., 1995; Haley, 1991; McDougall et al., 1994; Minhas et al., 1996; Sharma et al., 1994)

42. **FIP** - Choice criteria (Boedeker, 1995)

43. **FIP** - Conversion model - The conversion model is used as a marketing tool to identify commitment to different brands of goods and services. It helps marketers establish which factors can be built on to retain disaffected (neutral) customers and attract disaffected users of competitors. The conversion model provides a measure, which is predictive of future behavior, while identifying factors which drive commitment and loyalty. According to Richards (1996), satisfaction is

a poor predictor of behavior (e.g. satisfied customers will leave and dissatisfied customers will stay). It is more important to develop customer commitment than customer satisfaction. Followings are the four factors driving commitment: Satisfaction; Customer Involvement; Attraction of alternatives; and Extent of ambivalence caused by the range of choices. Customers can be segmented according to their commitment level and their availability level.

44. **FIP** - Customer competency - Competency is defined as the relationship between customer knowledge, skills, and motivation and specific tasks embedded in the design of service processes in an industry or a firm (Canziani, 1997).

45. **FIP** - Customer potential (Clieaf, 1996)

46. **FIP** - Customer value (Clieaf, 1996)

47. **FIP** - Decision-making style (Sharma, 1996)

48. **FIP** - Image (Clieaf, 1996)

49. **FIP** - Influences (Buckles et al., 1996)

50. **FIP** - Purchase Decision Involvement - Purchase Decision Involvement (PDI) is defined as the extent of interest and concern that a consumer brings to bear upon a purchase-decision task. (Bearden et al., 1993)

51. **FIP** - Quality cues - Quality cues are defined as any stimuli received through five senses which convey information about the quality of products or services prior to consumption. Tangible cues include: personnel appearance, physical facilities. Intangible cues include personnel attitudes. The most important quality cues are the best bases for market segmentation. (Amirani et al., 1995)

52. **FP** - Activities and Interest (Firat et al., 1997)

53. **FP** - Behavioural factors (e.g. user loyalty, benefits sought, purchase occasion, heaviness of buying in product field, brand purchasing within product fields, different ways of using same product) (Berry et al., 1995; Worcester, 1972)

54. **FP** - Buyer motivation (Berry et al., 1995)

55. **FP** - Convenience Orientation - Convenience Orientation refers to the value placed on, and the active search for, products and services that provide personal comfort and / or save time in performing various activities. It can have the following dimensions: time; space; acquisition; use and execution along two universal human tendencies (i.e. time saving orientation and comfort orientation) (Luqmani et al., 1994).

56. **FP** - Individualized needs (Yankelovich, 1964)

57. **FP** - Lifestyle (Boedeker, 1995; Clieaf, 1996; Firat et al., 1997; Minhas et al., 1996)

58. **FP** - National innovativeness - National innovativeness (generalized in the study to cover ownership of answering machine, home computer, video camera, micro wave, compact disc player, cordless phone) is related to the national levels of individualism, uncertainty avoidance and purchasing power. Introducing this construct of national innovativeness, Lynn et al. (1996) advocate the usefulness of Hofstede's value indices in consumer research.

59. **FP** - Opinion and Belief (Firat et al., 1997)

60. **FP** - Personal Characteristics (e.g. Buyer-seller similarity; Attitudes towards risks; Loyalty; National Account; Field Acount; Dealer Account) (Kotler, 1994a & b; Matear et al., 1995; Murphy et al., 1994)

61. **FP** - Personality (Boedeker, 1995)

62. **FP** - Psychographic (e.g. lifestyle, personality) – The psychographic approach is used to define and measure the lifestyles of consumers. It is used interchangeably with activities, interests and opinions measures (AIO). (Berry et al., 1995; Boedeker, 1995; Duclaux, 1996; Minhas et al., 1996; Schmidt et al., 1996; Tam et al., 1998)

63. **FP** - Psychological (use of psychometrics instrument) (Worcester, 1972)

64. **FP** - Self confidence (Yankelovich, 1964)

65. **FP** - Values and Attitudes (Clieaf, 1996; Firat et al., 1997; Yankelovich, 1964)

Of the 65 types of market segmentation approaches, some are similar (e.g. Demographic, Geographic, and Geodemographic). There are no structural guidelines to approach market segmentation. Selection of segmentation approaches depends very much on the objectives of market segmentation, as well as the opportunity and constrain prevailing at the time.

In the case of Coats China, some forms of market segmentation already exist, such as demographic, order value, product characteristics, product type, purchase behavior, purchase history, purchase volume. However, many of these data are rather raw and not processed for meaningful interpretation and marketing application.

Many segmentation approaches mentioned above are not used for the current action research, because either they are irrelevant or too difficult to conduct. These approaches include activities and interest, aesthetic concept, astrology, birth order, centralized buying, characteristics of individual participants, characteristics of buying centre, characteristics of the buying organization, common user requirement, convenience orientation, conversion order, customer competency, customer potential, customer profitability, customer value, identifiable competitors, individualized needs, influences, life cycle, lifestyle, national innovativeness, new customers, participation, personal characteristics, personality, principle of differentiation, psychological, purchase processes, purchase approaches, purpose, roles, self confidence, similar sales or distribution channels, standard or custom design, strategic importance of business, structure, susceptibility to change.

At the beginning of the design of this action research project, the Associate originally intended to use Utility Analysis to identify the intrinsic needs of the thread customers as a segmentation criterion. This unfortunately was not supported by the senior management of Coats China. As a result, the Associate had to review the 65 market segmentation approaches again and introduced an innovative segmentation approach

of analyzing the market by three interrelated dimensions, viz. Importance, Satisfaction and Gap.   This illustrates the importance of conducting a thorough literature review so that the Associate knows where contribution to the body of knowledge can be made and that she is not merely repeating an existing marketing segmentation approach.

To a larger or smaller extent, the current study can use a posteriori approach using the following existing methodologies as revealed from the literature review:

Customer Survey Questionnaire
- Attributes (Q29)
- Benefit segmentation (e.g. Importance score in Q29)
- Buyer motivation (e.g. PDI in Q31-Q34)
- Choice criteria (e.g. PDI in Q31-Q34)
- Decision-making style (e.g. PDI in Q31-Q34)
- Image (Q30)
- Operating variables (e.g. ISO and Oko-Tex in Q13-Q14)
- Opinion and Belief (e.g. PDI in Q31-Q34)
- Psychographic (e.g. PDI in Q31-Q34)
- Quality cues (e.g. ISO and Oko-Tex in Q13-Q14)
- Situational factor (Q20-Q24)
- Size of Company (by number of sewing machines in Q5)
- Values and attitudes (e.g. PDI in Q31-Q34)

As these approaches are too numerous to be all adopted in this action research, the focus will be on segmentation through Importance, Satisfaction, and Gaps (ISG) criteria.

2.6   Pre-requisites and Characteristics of Market Segmentation

Brooksbank (1996) suggests that effective segmentation require the followings:
- Homogeneity within segments
- Heterogeneity between segments
- Targetability via marketing mix (i.e. easily reached and served)
- Viability in commercial terms (i.e. large and profitable enough)

He (ibid.) suggests a six-point checklist for marketing positioning strategy:
1. It is based on a comprehensive situation analysis of yourselves, your competitors, and your market?
2. Is it, as far as possible, built around your company's particular strengths?
3. Does it precisely define your customer targets with a thorough understanding of their requirements?
4. Does it precisely define your competitor targets, reflecting a coherent competitive strategy?
5. Does it precisely define a sustainable competitive advantage?
6. Is it actionable - does it translate into a distinctive marketing mix?

Clieaf (1996) proposes that marketers should develop a multi-factors customer analysis and segmentation strategy. This approach assesses both past transactional consumer behavior over a multiyear period and customer potential based on income, attitudes and life stage. Kangis et al. (1996) states that the identification of segmentation parameters and target markets is a prerequisite to initiating a coherent process in which the product is closely linked to the target market.

DeTiene et al. (1996) believe that the data selection for market segmentation should:
- Correlate with market behavior

- Lead readily to product manipulation and development of message strategies; and
- Provide direction for media buying.

According to Dibb et al. (1997), Michael et al. (1995), Sharma et al. (1994) and Kotler (1994b), market segmentation ought to be:
- Measurable (allowing marketers to evaluate segment size and future potential)
- Substantial (large or profitable enough to warrant attention)
- Accessible (possible for marketers to focus marketing effort on)
- Actionable (allowing marketers to develop effective programs to serve the segment)
- Differentiable (The segment should show clear variations in market behavior in comparison with other segments - the response of the segment to promotional variables must be different)

Rao et al. (1995) suggest that strategic segments should be :
- Sufficiently distinctive in cost and capital requirements, and customer purchase criteria and behavior
- Substantial enough to justify the incremental costs of a tailored strategy
- Measurable as to size of present sales volume and rate of growth
- Durable enough that the differences used to justify a distinct strategy will not disappear before the profit potential is realized

Mitchell (1995) argues that effective segmentation variable should have the seven characteristics:
1. Mutual exclusivity
2. Measurability
3. Substantiality
4. Exhaustiveness
5. Actionability

6.   Stability

7.   Responsiveness

According to Segal et al. (1994), customers exhibit heterogeneous needs and purchase patterns, and thus respond differently from different stimuli. Useful market segmentation has four characteristics: measurability; substantiality; accessibility; and accountability.

Jenkins at el. (1997) suggest the following these key elements:
- Market segmentation is dependent on organizational configuration
- Market segmentation is dependent on organizational culture and mind-set
- Market segmentation is dependent on industry culture and mind-set

Kotler (1994b) proposes that there are three patterns of market segments:
- Homogeneous preference (consumers with roughly same preference)
- Diffused preference (consumers' preferences vary greatly)
- Clustered preference (distinct preference cluster)

Smith (1995) proposes the following four guidelines (criteria) for segmentation:
1.   Size - large enough to warrant marketing efforts
2.   Identity - predominant characteristics to distinguish from other segments
3.   Relevance - to the product / service
4.   Access - ability to communicate in a cost-effective way

He (ibid.) further suggests that there are three strategies for targeting market segments:
1.   Full coverage (i.e. No segment)
2.   Multiple segment
3.   Single segment

Decision regarding segmentation can be made after considering (Smith, ibid.):

- Worthiness to segment

- Timing (e.g. Is product too new for segmentation?)

- Does product appear to be a commodity? (The more it is like a commodity, the less useful segmentation becomes)

- Competitive advantage in segmenting

- Staff and financial resource constraints

There are four criteria for segmentation:

1. Discriminate between consumers themselves

2. Pick out differences in market patterns

3. Increase the understanding of the market, particularly consumer needs

4. Be fully exploitable in practice

Yelkur et al. (1997) remark that market segmentation requires an understanding of what, when, where, how, and why of demand. Thus "usage situation" can provide useful guidelines for marketers to segment their customers. (as customers' perception can vary depending on usage situation)

The current action research on segmentation in thread industry has taken the foregoing pre-requisites and characteristics into consideration. The uses of advanced technique, such as cluster analysis and CHAID can help achieve segmentation to meet the following characteristics:

- Mutual exclusivity

- Measurability

- Substantiality

- Exhaustiveness

- Actionability

- Stability

- Responsiveness

2.7   Methodologies for Market Segmentation

The following are some popular research methodologies used for market segmentation. The rapid development of information technology in the last few decades has facilitated more complex and advanced research tools for practitioners and researchers.

2.7.1   Cluster Analysis

Cluster analysis is a statistical procedure to group similar objects together into clusters. In marketing field, cluster analysis is widely used to identify people with similar buying behaviors. From these similar characteristics, it may be able to target future market strategies more efficiently. The aim of cluster analysis is to identify homogeneous groups or clusters. However, if relevant variables are excluded, poor and misleading findings may result. The initial choice of variables determines the characteristics that can be used to identify subgroups.

There are many criteria for selecting which cases or clusters should be combined at each step. These criteria are based on a matrix of either distances or similarities between pairs of cases. Distance is a measure of how different two objects are, and similarity measure closeness.

Once the distance matrix has been calculated, the actual formation of clusters can start. The figure of complete linkage method is called a vertical icicle plot because it resembles a row of icicles hanging from caves. The columns of vertical icicle plot correspond to the objects being clustered. They are identified by a sequential number. Rows of vertical icicle plot represent steps in the cluster analysis. The icicle figure is read from bottom to top. The bottom row is the step one in the analysis and the top row represent the last step, where all cases merge into a single cluster.

Another way to depict the clusters is to use dendrogram, which shows the steps in a hierarchical clustering solution. The dendrogram identifies the clusters being combined and values of the coefficients at each step. SPSS does not plot the actual distance on dendrogram but re-scales the number between "0" to "25".

Cluster analysis is a purely empirical method of classification because it makes no prior assumption about important difference within a population (Mitchell, 1994). According to Boedeker (1995), segments can be derived by Cluster Analysis, using factor scores obtained in the factor analysis. Cluster Analysis is a technique for grouping individuals or cases into clusters so that cases in the same cluster are more like each other than they are like cases in other clusters (Sharma et al., 1994). Cluster Analysis is a statistical method used to create groups, whereas discriminant analysis is used to assign cases to the existing groups (Venugopal et al., 1994). File et al. (1991) used cluster analysis of purchasing determinants to segment the market sociographically.

Although both cluster analysis and discriminant analysis can classify objects, or cases, into categories, discriminant analysis requires prior knowledge of group membership for the classification. For example, distinguishing among different disease groups, cases with known diagnoses must be available before hand. Based on cases whose group membership is known, discriminant analysis derives a rule for allocating undiagnosed patients.

As a contrast, group membership for all cases is unknown in cluster analysis. In fact, the number of groups is often unknown. The aim of cluster analysis is to identify homogeneous groups or clusters.

2.7.2   Chi-squared Automatic Interaction Detection (CHAID)

CHAID is a relatively new statistical application which performs segmentation model. It is useful in dividing a population into segments that differ with respect to a designated criterion. CHAID displays the segments on an easy to understand tree diagram. The segments that CHAID derives are mutually exclusive and exhaustive (Magidson, 1993).

CHAID is a tool for choosing appropriate segments to eliminate the potential problems from artificial segmentation. It is a decision tree method that separates data into sets of rules, which are likely to have different effects on a target variable. It helps develop an efficient and effective segmentation scheme for forecasting market demand. An efficient segmentation model uses the fewest segments possible. An effective segmentation model captures all significant differences (Martin et al., 1998).

In a SPSS White Paper on "Better Segmentation using SPSS CHAID – Finding an efficient and effective segmentation model to improve demand forecasting and market planning", Martin et al. (ibid.) suggests that segmentation by CHAID can bring forth three major benefits for forecasting and market planning:

1.   Increase revenue by focusing marketing and sales efforts on high demand customers;

2.   Allocate resources more efficiently to meet the demand for each segment;

3.   Obtain a better overall forecast by removing any biases in surveys used to obtain forecast.

2.7.3   Discriminant Analysis

Kivela (1997) suggests the use of determinant attribute analysis to isolate critical product attributes in order to penetrate new markets and re-examine current market needs. The determinant choice analysis, a measure of importance together with perceived differences among competing companies, is a useful marketing tool to identify which choice variables (i.e. customers' preferences) are most important in the selection process and can be used in market segmentation.

Discriminant analysis is appropriate when the dependent variable is categorical (i.e. nominal or ordinal data) and the independent variables are metric (i.e. interval or ratio data). There are three major stages:

1.   The derivation stage determines whether or not a statistically significant function can be derived to separate the two or more groups and has several steps: variable selection, sample division, the computational method and statistical significance.

2.   The validation stage develops a classification matrix to evaluate further the predictive accuracy of the discriminant function.

3.   The interpretation stage involves determining which of the independent variables contribute the most to discriminating between the groups.

The discriminant loadings (or structure correlations) measure the simple linear correlation between each independent variable and the discriminant functions. They can be interpreted as factor loadings (Mitchell, 1994c).

Discriminant analysis uncovers the relationship between a categorical dependent variable (e.g. group or segment membership) and several metric independent variables (e.g. organizational demographic and material management policy data) (Sharma et al., 1994).

Discriminant analysis is a multivariate technique used when the dependent variables (y) are categorical and the independent variable (x) are metric. Discriminant analysis is used to determine if significant differences exist between two or more identified groups. It also allows for the determination of which independent variables account for most of the variance or which variables are best at discriminating between the different groups (Stafford, 1996).

2.7.4 Artificial Neural Networks (ANN)

Human brain is the most powerful computer. Physiological and psychological research has revealed many of the brain mechanism, including the powers of association, generalization, and self-organization. Unlike conventional computers, the brain does not have a single central processing unit connected to a memory store. It distributes its processing tasks among millions of simple nerve cells, called neurons. It routinely handles communications among millions of cells, each of which is constantly sending and receiving information.

A neural network consists of many processing elements, or neurons, joined together with weighted connections. Neural networks are trained to find patterns in a set of training data. Neural networks with their ability to generalize and to learn by example, make good pattern recognition systems.

Artificial Neural Networks is a computing technique, which simulates the way biological systems, such as human brains, work. The human brain has many neurons connected in a network that adapts and changes as the brain learns. In ANN, processing elements simulate the neurons and these elements are linked together to form neural networks with the ability to learn patterns and interrelationships in data. According to Venugopal et al. (1994), ANN can be used in determining segments. ANN is characterized by the following properties:

- structure of the network (topology)
- how and what the network computes (computational property)
- how and what the network learns to compute (learning or training property)

Unlike other statistical procedures, each datum in ANN is presented repeatedly until the network learns the association of input to output. ANN can handle nominal, ordinal, interval, and ratio data, the algorithm can be used for forecasting and classification purposes.

Wezel et al. (1995) says that neural network is the most powerful model as it makes no a priori assumptions about the functional dependence between input and output pairs.

For supervised learning (with known outcome), Multi-Layer Perception (MLP) and Radial Basis Function (RBF) are two popular ANN models for forecasting. The Kohonen Network Tool is an unsupervised neural network technique. It builds its own representations of the data and can be used as a clustering or segmentation tool or to remove nondiscriminatory information from the data set.

2.7.5   Utility Analysis (Conjoint Analysis / Trade-off Analysis)

The use of Utility Analysis is appropriate in measuring the level of importance attached by a specific customer group on some particular attributes of thread. Knowing the utilities of different customer groups, marketeers can devise effective business strategies best suited to serve these specific market segments. Utility Analysis measures how much customer satisfaction a change in thread or service attributes will offer relative to another kind of change. It helps determine which of the two potential changes is the more valuable and effective (Toombs and Bailey 1995).

Knowing which utility cues are most important to a particular customer group, the marketeers can determine what should be promoted in order to lure these desired customers from their competitors. The marketeers can also make predictions about customers' purchase intentions in response to changes to these utility cues. By using these utilities in conjunction with other customer information from the Customer Survey Questionnaire (such as nature of the business, size of business, and type of garments), the marketeers can more effectively segment the market (Amirani and Baker 1995).

Traditional research techniques in assessing consumer preference tend to treat each attribute independently. These kinds of attribute preference data provide very little information on how customers are likely to make a favourable or unfavourable buying decision. Customers do not consider each of these attributes singly and independently when making a choice. Instead the customer would consider the whole range of thread attributes in totality and not individually. Utility-based approach can help understand how customers trade off one thread attribute against another. Utility analysis which engages the respondents in a more realistic judgment stance than do other research methods, can better predict the overall customer preference through aggregating the utility scores of all individual product attributes (Levy 1995). It has

become a popular method for identifying and understanding the combined effects of product attributes on preferences for products or services (Hobbs 1996). It enables not only the assessment of thread attributes in a multi-cue setting, but also quantification of the effect in terms of dollarmetric (utility) values. The incorporation of customized set of attributes for different respondents enables the impact of different product attributes to be analyzed in the context of cues directly relevant to particular market segments (Diamantopoulos et al. 1995).

Ness and Gergardy (1993) write the followings about Utility Analysis:

"Conjoint analysis is a technique which models the nature of consumer trade-offs among multi-attribute products or service. The model assumes that alternative product concepts can be defined as a series of specific levels of a common set of attributes. It also assumes that the total utility the consumer derives from a product is determined by the utilities (part-worths) contributed by each attribute level.

The aim of conjoint analysis are to identify attribute combinations which confer the highest utility to the consumer and to establish the relative importance of attributes in terms of their contribution to total utility. Subsequent analyses provide a means of identifying consumer segments with similar preference and the simulation of choice among alternative product concepts using choice simulation models."

The possible drawback of Utility Analysis is the selection of factor (i.e. general attribute such as color and size) and factor levels (i.e. features such as blue and big). Even with the help of orthogonal array design, the number of profiles can still be very large. The researchers need to choose the appropriate factors and factor levels. If important factors are omitted, then the application of the Utility Analysis findings would be greatly affected.

Therefore proper research planning is vitally important before administrating the utility orthogonal array profile score-sheet with the respondents.

Utility analysis requires the following assumptions:
- Products can be defined as a set of attributes
- Alternative version of the same product can be defined as a set of different attribute levels
- Consumers evaluate the utility of attribute level combinations when making a purchase decision
- When consumers choose between alternative products, they trade off attribute level combinations.

Utility analysis models the nature of consumer trade-offs among multi-attribute products or services. It assumes that alternative product concepts can be defined as a series of specific levels of a common set of attributes. The total utility the consumer derives from a product is determined by the utilities (part-worths) contributed by each attribute level. The aim of Utility Analysis is to identify attribute combinations conferring the highest utility to the consumer and to establish the relative importance of attributes in terms of their contribution to total utility. Subsequent analyses provide a means of identifying consumer segments with similar preferences and the simulation of choice among alternative product concepts using choice simulation models. The trade-off analysis models the process of product evaluation and choice more so than attribute-based methods, which require consumers to express preferences by scoring attributes independently (Ness et al., 1994).

The power of Utility Analysis (conjoint analysis) is that it asks the respondent to choose a product as the consumer does - by trading off feature, one against the other. A Utility Analysis provides diagnostic information concerning which cues to emphasize in shaping consumers' service quality expectations and decisions (Amirani

et al., 1995). The partworths (i.e. utility) estimated at the individual level can be used in the market segmentation (Arias, 1996).

Bauer et al. (1995) states that the purchase act is considered to be a function of a group of utilities. The purchasing pattern is determined by the utility in a particular situation rather than by the utility, which is inherent in the product. Marketers should be cautious of this fact when using utility to segment the market. Utility Analysis appears to be an attractive methodology for studying market segmentation. A conjoint approach enables not only the assessment of product attributes in a multi-cue setting, but also the quantification of the effect in terms of dollarmetric values. The incorporation of customized sets of attributes for different respondents enables the impact of different product attributes to be analysed in the context of cues directly relevant to particular individuals (Diamantopoulos et al., 1995).

The Utility Analysis is used to benefit segment the Australian wine market. The attributes used are: Price, Origin and Grape Vintage year (Gil et al., 1997). It is assumed that:
- A product can be described as a combination of levels of a set of attributes
- These factor levels (product attributes) determine consumers' overall judgment of the product.

Utility Analysis has become a popular method for identifying and understanding the combined effects of product attributes on preferences for a product. A retailer is assumed to evaluate the "total worth" of a supplier by combining the separate evaluation of the "part-worth" (Hobbs, 1996).

In a Utility Analysis on credit card for youth market, Kara et al.(1994) use the following factors :
- Brand name (Visa/Master; AE; Diners)
- Credit line ($1000; $3000; $5000)

- Type of Credit Card (Gold; Platinum; Classic)
- Annual Fee (None; $20; $50)
- Interest Rate (9%; 13%; 20%)
- Types of payment (All at once; Deferred)

The full product profile would amount to (3 x 3 x 3 x 3 x 3 x 2) or 486 combinations. A fractional factorial design reduced the number to 18, which was reasonable for the subjects to evaluate. Simulation was performed to predict the market share by using the utility scores.

Utility Analysis can help marketers determine which of the product's or service's qualities are most important to the consumer. The conjoint technique forces respondents to make a trade-off in their decisions. This is similar to the way consumers behave in a real-world situation. It enables the researcher to model the decision-making process in a realistic manner. Utility Analysis can predict what product or service, that people will choose and assess the weight given to various factors that underlie their decisions. It reveals whether the market is sensitive or indifferent to the various features of a product, including price. Levy (1995) uses conjoint analysis and the traditional/hierarchical approach. The discrepancy found between the two approaches reinforces the view that the decision-making is a complex one.

In the traditional survey approach, when asked which attributes customers would like to have, they would ask for everything on the wish list. Utility Analysis helps establish the relative value of particular attributes. Utility Analysis identifies the trade-offs the customers are likely to make in buying a given product or service. A utility measures how much satisfaction a change in the product or service will offer the customer relative to another type of change. Utility Analysis helps manager determine which of the two potential changes is more valuable (Toombs et al., 1995).

The Utility Analysis approach is most relevant to the present market segmentation study of thread industry in Hong Kong. It definitely has an edge over the traditional approach of asking customers to rate the importance level of different product attributes.

2.7.6   Multi-Dimensional Scaling Analysis (MDS)

The purpose of MDS is to construct a map of the location of objects relative to each other from data that specify how different (or dissimilar) the objects are.

MDS is a statistical technique which has its origins in psychometrics. It can be used in many fields to analyze proximity data called dissimilarity or similarity data. MDS displays the structure of a set of items from data that approximate the distance between pairs of the items. Each item is represented by a point in a multidimensional space. Two similar items are represented by two points that are close together and two dissimilar items are located by two points that are far apart.   For ease of conceptualisation, the space is usually a two- or three- dimensional Euclidean space. The Euclidean distance d_{ij} between points i and j is defined as:

$$d_{ij} = [S(x_{ia} - x_{ja})]^{1/2}$$

where x_{ia} specifies the co-ordinate of point *i* on dimension *a*.

MDS can construct a conceptual map of the locations of items relative to each other from similarity or dissimilarity data (Koo, 1997). This is a useful tool to depict market positioning among the competitors.

2.7.7　Independent Samples T-Test

Independent Samples T-Test is used to test the hypothesis whether the difference of means of two sub-groups are statistically significant. In social science, significance level is usually set at 0.05, which means 95% confidence level. In other words, if the means of the two sub-groups are different at 0.05 significant level, one is wrong once out of twenty times.

The significance is determined by both the absolute difference between the means of the two sub-groups, as well as the standard deviations of the two sub-groups. Unlike Paired Sample T-test, the observations are independent.

Levene's Test for Equality of Variances is usually used for two samples T-Test. If the observed significance level of Levene's Test is small (less than 0.05), the hypothesis that the population means are equal is rejected (i.e. the variances are unequal).

T-Test can be applied to discern the difference of attributes between two segments.

2.7.8 One Way Analysis of Variance (ANOVA)

ANOVA is the abbreviation for "Analysis Of Variance". It is a collection of statistical methods and models that deal with differences in means of a variable across groups of observation. Thus "analysis of means" may be a better alternative name than "analysis of variance". It is a generalization of T-Test (i.e. T-Test is for comparing means of two sub-groups, and ANOVA is for comparison of means of more than two sub-groups).

ANOVA employs ratios of variance in order to test whether the means are different. The word "One-way" stands for only one independent (explanatory) variable in the model. Some assumptions are needed for correct application of the ANOVA test. Independent samples from normally distributed population with the same variance must be selected.

ANOVA has the following post hoc multiple comparisons:
- Least-significant difference
- Bonferroni
- Duncan's multiple range test
- Student-Newman-Keuls
- Tukey's honestly significant difference
- Tukey's b
- Scheffe

2.7.9   Multiple Linear Regression

Multiple regression analysis is a statistical technique used to analyze the relationship between a single dependent (criterion) variable and several independent (predictor) variables. Multiple regression analysis can be used to achieve the following purposes:

1. to determine the appropriateness of using the regression procedure with the problem;

2. to examine the statistical significance of the attempted prediction

3. to examine the strength of association between the single dependent variable and the one or more independent variables;

4. to predict the values of one variable from the values of others.

A multiple linear regression can be expressed as:

$$Y_i = \beta_o + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots\ldots + \beta_p X_{pi} + e_i$$

The notation X_{pi} indicates the value of the *p*th independent variable for case *i*. The β terms are unknown parameters and the e_i terms are independent random variables that are normally distributed with mean 0 and constant variance σ^2. The model assumes that there is a normal distribution of the dependent variable for every combination of the values of the independent variables in the model.

Beta Weights are the coefficients of the independent variables when all variables are expressed in standardized form. Thus beta weights can indicate the relative importance of the respective independent variables.

The Coefficient of Determination is used as a measure of goodness of fit of the linear model. It is the square of the correlation coefficient between the observed value of the dependent variable and the predicted value of the dependent variable from the fitted line. If all observation fall on the regression line, the coefficient of

determination is 1. If there is no linear relationship between dependent and the independent variables, the coefficient of determination is 0.

2.7.10 Factor Analysis

Factor analysis refers to a variety of statistical techniques, whose common objective is to represent a set of variables in terms of a smaller number of hypothetical variables. Covariance measures the extent to which values of one variable tend to covary with values of another variable. The covariance between standardized variables (with mean of 0 and variance of 1) is the Pearson's correlation coefficient. Factor loadings are equivalent to correlations between factors and variables where only a single common factor is involved, or in the case where multiple common factors are orthogonal (uncorrelated) to each other. The communality of an observed variable is simply the square of the factor loadings for that variable (or the square of the correlation between that variable and the common factor) (Kim et al., 1978)

Factor analysis reveals the inter-relationships between a large number of variables and explains them in terms of their underlying dimensions (factors). As a general rule, there should be at least four or five times as many observations (cases) as there are variables to be analysed. To determine whether factor analysis is appropriate , Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) provides a measure of the extent to which the variables belong together. MSA exceeding 0.90, is described as marvelous; 0.80's as meritorious; 0.70's as middling; 0.60's as mediocre; 0.50's as miserable; and below 0.50 as unacceptable. For principal components analysis, only those values with eigenvalue exceeding one are considered significant. The eigenvalue approach is probably most reliable for variables ranging between 20 and 50. The scree test is used to evaluate the cut-off point, by plotting eigenvalues against the number of factors. Factor rotation improves interpretation. Varimax has been shown to be the best orthogonal rotation procedures (Mitchell, 1994b).

The aim of Principal Components Analysis is parsimony (Dunteman, 1989). The following key differences exist between PCA and Factor Analysis:
Principal Components Analysis:

- no underlying statistical model of the observed variables
- focus on explaining the <u>total</u> variation in observed variables on basis of maximum variance of principal components

<u>Factor Analysis:</u>
- has underlying statistical model
- focus on explaining <u>common</u> variance in observed variables on basis of a relatively few underlying factors

Factor analysis is used to uncover factors. Factors are linear combinations of the original variables. They also represent the underlying dimensions in the original set of variables (Sharma et al., 1994)

2.8   What after Market Segmentation?

After successful market segmentation, a marketing information system needs to be developed to help target marketing effort. Target marketing is about defining who it is that we do not care to attract and who it is that we want to attract and strive to ensure that these will be loyal, high profit customers (Cahill, 1996).

A good marketing information system can help create a competitive advantage. A good system should define the critical indicator of the business, report by exception, and set priority of items (Buttery et al., 1996).

Database marketing is the process of systematically collecting, in electronic or optical form, data about past, current and/or potential customers, maintaining the integrity of the data by continually monitoring customer purchases and/or by inquiring about changing status and using the data to formulate marketing strategy and foster personalized relationship with customers. Database marketing facilitate the next logical step in the evolution of market segmentation (DeTienne et al., 1996).

According to O'Brien et al. (1995), successful development of Marketing Information System should provide:
1.   Market planning
2.   Market research
3.   Market analysis
4.   Customer analysis
5.   Product analysis
6.   Sales lead handling and control analysis
7.   Sales analysis
8.   Promotional analysis
9.   Information access analysis

Marketing strategy formulation should be a continuous learning process. The following questions should be addressed (Feurer et al., 1995a):

1. What is the environment like?
2. Where is the current position of the organization?
3. Where does the organization want to be?
4. What alternatives exist to get there?
5. Which alternative is preferable?
6. How will this alternative affect the environment?
7. How does the environment change?
8. How fast does the environment change?

Strategy formulation process is an iterative process of data collection, hypothesis generation and validation where specific ideas are tested, strengths and weaknesses are assessed, financial implications are examined and implementation issues such as timing and availability of skills and knowledge are considered (Feurer et al., 1995b).

According to Kotler (1994b), strategic marketing can be described as STP marketing:

1. Segmentation - identifying & profiling distinct groups of buyers
2. Targeting - selecting one or more market segments to enter
3. Positioning - establishing and communicating the product's distinctive benefits in the market.

The positioning task consists of:

- Identifying a set of possible competitive advantages upon which to build a position
- Selecting the right competitive advantages
- Effectively communicating and delivering the chosen position to the market (Kotler et al., 1994a).

After having segmented the market, the managers still need additional marketing research (e.g. positioning studies, ideation session, concept tests, positioning statement evaluations, and advertising copy test) to shed light on the road to profitability. When segmenting a market, customer commonalities are grouped, sized and labeled. In the process, managers gain strategic insights about each segment, knowing why they buy, where they buy, how they use the products and why they currently do not buy the company's product (Sherman, 1996).

For good positioning decision, Zineldin (1996) suggest to have the answers for the following questions :
- What dimensions customers use to evaluate competitive marketing programs?
- How important is each of these dimensions in the decision process?
- How do we and the competition compare on these dimensions?
- How do customers make choices on the basis of the information?

In a broader sense, business strategies can be categorized as :
1.   All customers and all product ranges;
2.   Specific customers and all product ranges;
3.   All customers and specific product ranges;
4.   Specific customers and specific product ranges.

Completion of market segmentation is the start of a continuous learning cycle in creating and sustaining competitive advantages over competitors. The process of market segmentation is dynamic in the era of rapid and turbulent changes. Through proper segmentation, a company can more effectively utilize its resources. This is exactly what the present project strives to achieve.

2.8   Chapter Conclusion

The literature search attempts to critically review the existing body of knowledge on market segmentation and some topics relating to it. Most of these references cited are general and not specific to the thread industry in Hong Kong.   In fact no published academic article was traced relating to market segmentation of thread industry. This Action Learning will fill that particular knowledge gap on the one hand, and explore the possibility of using more contemporary segmentation approach as a more powerful alternative to the 65 segmentation approaches already documented, on the other hand. The utility segmentation approach should be generalisable for market segmentation in any industry.

The Action Research would use different approaches (e.g. Cluster Analysis; Discriminant Analysis; Chi-squared Automatic Interaction Detection; Utility Analysis; Factor Analysis; Artificial Neural Network; Multi-Dimensional Scaling Analysis; Multiple Linear Regression; Independent Samples T-Test; and One-way Analysis of Variance) to segment the thread market in Hong Kong. This is in line with what Wright (1996) has been advocating that real segments exist if several algorithms identify the same segment.

This action learning research adopts a multi-technique approach. This triangular approach of comparing several techniques will help establish the validity of the segmentation results. Being a full-time marketer in the company, the Associate combining the best of both worlds of practitioner and academic, will be better able to address the concerns expressed by Hoek et al. (1996) and Young (1996). This will help reduce the negative impact of the limitation and drawback of segmentation. As an insider of the world's leading thread manufacturer, the researcher can also gather qualitative data for comparison with the findings from the quantitative analyses. The

mix of qualitative and quantitative approaches provides a more comprehensive exploration of the burning issue under study.

Chapter Three   Research Design

3.1   Qualitative Research

According to Rouse et al. (1994), there is a growing recognition that qualitative research techniques are needed to capture holistic real world answers to real world problems in a way that is not possible in a quantitative context.

Qualitative research is defined any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification.

Rouse et al. (ibid.) quote the comparison of qualitative and quantitative researches in the conceptual and methodological areas by Minchiello et al. (1990) as follows:

	Qualitative	**Quantitative**
Conceptual	Concerned with understanding human behavior from the informant's perspective	Concerned with discovering facts about social phenomena
	Assumes a dynamic and negotiated reality	Assumes a fixed and measurable reality
Methodological	Data are collected through participant observation and interviews	Data are collected through measuring things
	Data are analysed by themes from descriptions by informants	Data are analysed through numerical comparisons and statistical inferences
	Data are reported in the language of the informant	Data are reported through statistical analyses
Source: Adapted from Minchiello et al. (1990, page 5)		

A grounded theory is a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon. The three components of the grounded theory are as follows:

1. The data coming from a variety of sources, such as interviews or observations;

2. The analytic or interpretative procedures on the data;

3. The verbal or written reports on the research findings.

In grounded theory, analysis involves the assignment of concepts and themes (coding) to the data gathered by the research. Three types of coding can be performed during the analysis. First, open coding involves the examination of the data and assignment of codes to the concepts discovered. The concepts are provisionally combined into the related categories. Second, axial coding involves examining each category in terms of the conditions which cause it, the context in which it occurs, actions, and interactional strategies by category. Axial coding results in a rich phenomenon being researched. Third, selective coding involves the integration of the categorized material into a theory which accounts for the phenomenon being researched.

3.1.1 Face-to-face Interview

In order to have a holistic approach to the research project, some qualitative comments are collected through face to face interview. Face to face interview is effective to collect soft qualitative data to supplement the hard quantitative data.

Carson et al. (1996) suggests that an integrated combination of compatible and complementary methods will yield substantially more satisfying results. Unlike the quantitative questionnaire survey data, face to face interview yields non-numerical unstructured data. The interview can be more in-depth and flexible. Depending on the responses from the interviewees, further clarification enquiry is possible to eliminate mis-understanding and mis-interpretation. In addition to the verbatim comments, an experienced interviewer can read the facial expression and body language from the interviewees.

It is a good practice to have a structured list of questions for the interview, so that more focused and consistent replies can be collected from various interviews. The difficulty of face to face interviews lies in the analysis of loose and ill structured data. This data analysis problem is reduced by the advent of computer software, such as NUD.IST; Ethnograph; and Metamorph (Carson et al., 1996).

In this action research, face to face interviews are conducted with a Technical Advisory Service Manager of Coats China who is an expert on thread and garment fields, two sales representatives in Coats China, and one garment manufacturer, who is a big customer of Coats China. The following list of structured questions are used for the face to face interview with the Technical Advisory Service Manager:

1.   What is Technical Advisory Service (TAS)?
2.   Why Coats has to establish TAS?
3.   What are the objectives of TAS?
4.   Do Coats' competitors has similar TAS? Why / Why not?

5. What kinds of service are covered under TAS?

6. What are the costs and benefits of TAS to Coats?

7. What is the relationship between TAS and other departments / head office?

8. What is the relationship with clients?

   - Proactive

   - Reactive

   - Frequency of use

   - Items being consulted

   - Who uses more of TAS?

9. How does TAS function / work?

10. What are the Greatest challenges / problems / difficulties of TAS?

11. What are the Greatest satisfactions / achievements of TAS?

12. Why customer uses / not uses TAS?

13. What is the future of TAS?

14. What are the characteristics of the ideal TAS?

15. Any area for improvement for TAS?

16. What kind of external environment change would impact the operation of TAS?

The following structured questions are used for the other interviews:

1. What are the strengths of Coats?

2. What are the areas for improvement (weaknesses) for Coats?

3. What external opportunities are available for Coats?

4. What kinds of external threats exist?

5. What is the outlook of thread / garment industry in Hong Kong & China?

6. What are the key successes factors for Coats?

7. What are the major difficulties Coats is facing now?

8. Should Coats segment its market? If so, how?

3.1.2 Non-numerical Unstructured Data Indexing Searching and Theorizing (NUD. IST)

A NUD.IST project has two parts, the Document System and the Index System. The Document System handles any sort of Non-numerical Unstructured Data, and the Index system stores ideas and Indexing or coding at them; these are linked via tools for Searching and Theorizing.

NUD.IST is used for wide variety of tasks from complex theory-constructing and testing to very quick analysis of small or large bodies of text in focus group summaries or open-ended answers in surveys.

NUD.IST creates an Index System in which researchers can create, manage and explore ideas and categories. The Index System stores references to the data and researchers' thinking and analysis at "nodes".

The NUD.IST Index System can help researchers to:
- Discover new ideas, make locations (nodes) to keep them stored safely;
- Store and change definitions and memos on their ideas;
- Record hunches, guesses and theories early in a project;
- Explore and code documents;
- Build up thinking about data by combining and exploring categories, re-coding documents;
- Develop ideas flexibly, altering, merging and shifting the categories, refining dimensions;
- Apply prior concepts and theories to your documentary data;
- Browse and rethink coded data;
- Clarify ideas, discover and monitor the occurrence of themes;
- Minimize the clerical routine of importing, sorting, and retrieving data;
- Automate the coding of your documents for demographic information.

3.1.3 Strengths, Weaknesses, Opportunities, Threats (S.W.O.T.) Analysis

Weihrich (1982) suggests that strategic planning is a complex process, which demands a systematic approach for identifying and analyzing factors external to the organization and matching them with the firm's capabilities. Favorable internal factors are strengths of the organization and unfavorable internal factors are the company's weaknesses. Internal factors can be manipulated and changed by their management. On the other hand, external factors are beyond the control or influences of any individual organization. A company has to respond and react to the external environment. External factors which are favorable to the organization are opportunities; unfavorable are threats.

The situational analysis using S.W.O.T is a good starting point to scan external environment and reveal internal capabilities. This is a good approach to systematically develop customer survey questionnaire, so that the findings can help the organization to develop future marketing strategies effectively.

A focus group meeting is used as a vehicle to develop the S.W.O.T. The focus group comprises of Marketing Manager, a few experienced sales representatives and the Associate. The following are the agreed strengths, weaknesses, opportunities and threats for Coats:

The *internal strengths* of Coats are as follows: (Cross Reference to Section 4.3 qualitative data analysis)

1.   Diversified product ranges.
2.   Being a market leader in a sewing thread industry.
3.   International operations in various product lines taking the geographical advantages of the countries in which the production facilities are located.
4.   Economy of scale benefit arising from large scale of Coats operations
5.   Effective communication across continents using internet technology.
6.   Close and long term relationships with customers and suppliers.

7.   High technological innovation.

8.   Loyal and committed employees.

9.   Effective training programs for staff.

10.   ISO 9000 accreditation.

The *internal weaknesses* of Coats are as follows: (Cross Reference to Section 4.3 qualitative data analysis)

1.   Rising operating costs.

2.   Diversified and different cultural settings can cause managing and integrating problems between China and Hong Kong.

The *external opportunities* of Coats are as follows: (Cross Reference to Section 4.3 qualitative data analysis)

1.   Growth opportunities in new geographic markets. (e.g. China and South East Asia)

2.   Expansion opportunities in new product lines through new technologies.

3.   Hong Kong's re-union to China on first of July in 1997. The established China experience and exposure provide an edge over Coats' competitors.

The *external threats* of Coats are as follows: (Cross Reference to Section 4.3 qualitative data analysis)

1.   Keen competition from developing countries.

2.   Customers are more demanding in quality and price than ever before.

3.   More and more difficult trading environment.

4.   Uncertainty in political and economic measures in China. Disputes between China and the Western Countries are not uncommon (e.g. Human Right).

5.   Difficulty in recruiting and retaining good managerial and supervisory staffs in China.

6.   Higher raw material costs and price.

3.2 Quantitative Research

Social science researches tend to be biased towards the use of quantitative data.   The popularity of quantitative research approach is firstly due to the ever expanding power of statistical software. Secondly, in most business researches, questionnaires are used as the research instrument which inevitably generate numerical data. Thirdly, numerical data analysis has the advantage of generating some useful and meaningful scores which can be more easily interpreted and understood, and thus more readily acted upon by the management. Many people also perceive that quantitative data are more objective and can be accurately analyzed and hence more scientific than qualitative analysis. Fourthly, the cost of obtaining quantitative data is usually lower than getting qualitative data.

The quantitative and qualitative approaches can be described as nomothetic (i.e. law making) and idiographic (i.e. describing things individually).

The choice of quantitative or qualitative research approach has to be dependent on the objectives and the prevailing circumstances. Both approaches have their merits. The two approaches are complementary to each other. Where resources permit, it would be best to adopt both quantitative and qualitative approaches.

3.2.1 In-house secondary data

As a Marketing Executive in Coats, the Associate has access to the customer data relevant to the study. This type of secondary data are accurate and objective and can supplement the primary questionnaire data which tend to be rough and subjective. Apart from the details about the customers, these secondary data include the transaction records with Coats. These information are of course confidential to outsiders. Has this research not been an action learning, it would be difficult for the researcher to obtain such kind of useful data for further analysis and comparison.

Most of these original secondary data are unprocessed raw data lacking meaningful information. When combined with the primary survey data, a more complete picture about the customers emerges. As Coats is one of the leading thread suppliers in the region, the in-house secondary data can be generalized to be representative of the thread users in Hong Kong, Macau, and China.

One very useful dependent (outcome) variable available in the in-house database is the sales volume figures of the respondents / thread customers and their growth or decline over a period of time. The association of this dependent variable with the other independent (predictor) variables obtained from the customer survey would help explain some important customer behavior patterns.

In order to link the survey data with the in-house data of the respondents, the customer survey questionnaire cannot be on anonymous basis. There must be an identification variable which can link the survey data with the in-house database. There are pros and cons for having the identity of the respondents revealed in the questionnaires. It is likely that some customers are hesitant to release some sensitive and confidential information in the questionnaire. This concern may be alleviated by assuring the respondents that the data so obtained from the survey would be treated confidentially.

The main advantage for having the respondents' identities revealed is that the researcher can link other data with the responses. The researcher can also validate some of the information obtained from the questionnaire with the database maintained in-house at Coats.

3.2.2 Customer Survey Questionnaire

A Customer Satisfaction Survey Questionnaire *(See Appendix 1)* includes four major categories, which are (a) General Information; (b) Quality Information; (c) Service Information; and (d) Other Information.

In order to ensure a higher response rate, a covering letter to ensure the confidentiality is issued by the Managing Director of Coats China. This letter is attached with the questionnaire. The questionnaire is bilingual (i.e. English and Chinese). It was designed first in English and approved by the management team. It was then translated into Chinese language and back translated to English to ensure the accuracy of translation work. The customer survey questionnaire is then piloted to test the ambiguity of the contents and understanding by the respondents.

(a) General Information

General Information includes: the Company Name, Address, Telephone, Fax, E-mail Address, name of Parent Company, name of the Contact Person, name of Purchasing Manager, and name of Managing Director.

There are 12 question items in this section on "General Information". The rationale / explanation of each item are as follows:

1. Nature of business is categorized into: manufacturer, trading firm, buying office, licensee, and others. The respondents can tick more than one choice because they may be a multi-functional company.

2. The most common types of thread purchased by respondents are categorized into: spun polyester, cotton/polyester corespun, polyester/polyester corespun, trilobal polyester embroidery, rayon embroidery, bulked polyester, and others. Respondents can choose more than one type of sewing thread.

3. Most of the garment manufacturers have shifted their production unit to China. Therefore, staff in Hong Kong office are core staff and are limited in number.

4.   The number of workers is a good estimate of the size of the production unit. This type of data provides a measure of the size of operation of the respondents.

5.   The number of sewing machines can be used to calculate the consumption of threads used by assuming an hourly consumption of one cone of 5,000 meters of thread with eight hours machine operating for shirt production each day. According to this calculation method, the consumption of threads used and the size of the production unit can be estimated. It can also be used to classify the size of the company in this research survey.

6.   Annual garment production in pieces is another way of estimating the size of the company and its thread consumption. However, it should be noted that different types of garment production consume threads differently.

7.   Annual turnover is yet another estimate of the size of the company. However, the respondent company may have other non-garment businesses, such as property investment.

8.   Because of shift of the production unit to the north, the detailed factory information asked in the question, include: factories name, address, contact person, ownership of the factories, their transaction mode and their percentage of the total production in that particular factory. The findings from this question can help Coats to provide better "China Delivery Service".

9.   The percentage of garment production to major export countries, such as North America, Europe, Japan, China & Hong Kong, and Others. Due to different countries have different type of demands (e.g. North American buyers are normally more sensitive to price, European buyers are relatively more concerned with quality, etc…), this question is included so that the relevant hypotheses can be tested. Some techniques of data entry need to be introduced to make the aggregate percentage of all countries totaling 100. The "shortfall" percentage will be grouped into Others categories to make the total percentage 100%.

10.   Garment export quota is of vital importance to the garment manufacturer. Usually only well and long established manufacturers are export garment quota holders.

11.   Quality requirement of different garment brand names would reflect how the customers perceived the particular brand name in terms of quality standard from their perspective. This would provide some clues whether the garment manufacturers are producing high quality garments.

12.   Percentages of their total production of different types of garment depict their major garment type of business. Market segmentation can be done on garment type basis. Some techniques of data entry are needed to make the aggregate percentage of all garment types totaling 100. The "shortfall" percentage will be grouped into Others categories to make the total percentage 100%.

(b) Quality Information

There are seven question items in this section on "Quality Information". The rationale / explanation of each item are as follows:

13. The need of thread suppliers to have ISO quality management standards is an indication of customers' quality demand and orientation. This question is introduced to ascertain which types of buyers are more concerned about quality.

14. Oko-Tex Standard 100 Certificate is another type of quality requirement. This question is used to ascertain whether some buyers who export to certain countries (e.g. Europe) are more concerned about quality.

15. This is an open ended question to find out what other quality standard is required by the customers / respondents.

16. The customers are asked whether they are responsible for color matching and approval. The findings of the question may shed light on new business opportunities for Coats.

17. This question on the measuring standards for color matching and approval provides better understanding of the respondents' operations (e.g. computer color matching, visual with light box, visual without light box, etc…). The information is useful for Coats's Technical Advisory Service.

18. This question provides information for Coats to better understand customers' practice in color matching. The finding from this question is useful for Coats's Technical Advisory Service.

19. Sewing threads problems are identified in the three major areas: Yarn, Finishing, Aesthetic. The Technical Advisory Service is particularly important to those garment manufacturers who have encountered problems with using the thread.

(c) Service Information

There are eight question items in this section on "Service Information". The rationale / explanation of each item are as follows:

20. Expected delivery lead time for shade card colors is used to benchmark the service standard provided by Coats. Customers expectation in this aspect can be determined and this information is useful in developing future marketing plans.

21. Expected delivery lead time for color lab-dip sample is another service aspect important to Coats in devising its future marketing plans.

22. Expected delivery lead time for special color service is still another service aspect. Customer requirements are to be matched with Coats's capabilities.

23. Since most of the garment manufacturers have moved their factories to China, Coats also needs to know its customers' practice in having the garment accessories being delivered to their factories in China.

24. Coats needs to know its customer expectation on the China Delivery Service for sewing thread, in order to have better planning to promote its service to customers in the future.

25. Technical Advisory Services is an important and unique service provided to Coats's customers. Their interest level in this service would shape the future modus operandi of Technical Advisory Services.

26. Coats intends to set up Electronic Data Interchange (EDI) with customers as a means to strengthen the partnership program. The finding helps Coats determine the timing of the EDI program.

27. The frequency of customer visits by sales representatives suggests how close the respondents are working with Coats. The findings are useful for the Sales team in Coats.

(d) Other Information

There are seven question items in this section on "Other Information". The rationale / explanation of each item are as follows:

28. The percentage of purchase the respective sewing thread suppliers (i.e. Coats, Gunzetal, Goldlink, A&E, Tse Yu, Others) to the customers' total purchase of sewing thread can help estimate the share of customer wallets. It is believed that the share of customer wallets is positively correlated with customer satisfaction level.

29. The importance level of different thread attributes has been asked in this question. This helps Coats identify which several attributes are the most concerned by customers. The importance ratings can also be used in determining the performance gaps of the various attributes.

30. The satisfaction levels of different thread attributes (same attributes as in Q.29, except for the last sub-item) for five major thread suppliers in Hong Kong are asked. The Performance Gaps (i.e. difference between the Importance scores and the Satisfaction scores) can be calculated. The correlation between satisfaction level of overall performance and the share of customer wallet can be calculated.

31. This is a bipolar question adapted from Purchase Decision Involvement (PDI). This measures the extent of care exercised by the customers in selecting a particular brand / type of thread.

32. This is also a PDI question item. This measures customers' perception on whether the various brands / types of thread are alike or different

33. This PDI question measures the importance of making a right choice of thread.

34. This last PDI question deals with the perceived concern on outcome of choice.

By and large the questionnaire is quantitative in nature. There is no designated space to solicit qualitative comments. The only qualitative data are names, addresses, and additional information under "Others".

3.2.3   Sampling of Respondents

Since Coats China is the leading thread supplier in the industry, its clientele base is assumed to be representative of the garment industry in Hong Kong, Macau, and China. Therefore this research findings should be generalisable to represent all the thread users, including those who are not Coats' customers. Because of the above reasons, the Associate are using the existing customers of Coats China as the customer survey sample.

Coats Hong Kong has around 2,000 apparel and embroidery group accounts. Some of these are dormant accounts. The group accounts can comprise of a number of individual related companies formed for different purposes (e.g. HK customer who orders & pays in HK but delivers in China; or HK customer who orders in HK but delivers & pays in China etc…). The unit of the analysis in this survey questionnaire is largely on a group account basis.

Specifiers under the Coats partnership programs, are specifically excluded from this survey, because they are not direct thread users and do not understand the technical jargons and information about sewing and embroidery threads.   The Footwear manufacturers are also excluded because its market is immature in Hong Kong, and they are too few (less than 10 footwear manufacturers in Hong Kong) in numbers for a meaningful and effective market segmentation.

About 1,500 sets of Customer Survey Questionnaire were delivered by hand to the apparel and embroidery customers, during the period from January 1998 to June 1998. In order to increase the response rate, the Marketing Department of Coats China sent "The Technology of Thread & Seams Book" with an attached "Thank You Letter" to the respondents as an incentive.

Since the questionnaire is on named basis and its return is entirely voluntary by the respondents, the company only received 238 responses. The response rate of 16% is satisfactory for survey of this nature in Hong Kong. The number of 238 is also adequate for meaningful statistical analyses.

For the process of collecting questionnaires from respondents, Marketing Department anticipated difficulties to cover all the existing customers of Coats China, who were located in various geographic regions. In order to have effective collection of questionnaires, the researcher put more focus on large customers, who generated 85% of Coats' total sales turnover in the whole year of 1997. This was the Phase I of the data collection stage. Sales representatives were asked to follow up closely with the respondents during the stage of Phase I. The remaining of 15% in terms of sales turnover of Coats customers were covered in Phase II after completion of Phase I, which lasted for about three months.

The total number of the questionnaires sent to the Phase I customers (including both apparel and embroidery thread users) was 327 with 153 responses. The response rate of Phase I customers was 47%. The response rate for Phase II was about 7%. The lower response rate for Phase II was due to the fact that most of the respondents were much smaller in size and some of the respondents were not major customers for Coats China.

3.3   Chapter Conclusion

The approach of the research is described. The action research covers both qualitative data analyses and quantitative analyses. The differences between qualitative and quantitative researches are discussed. The approach of structured face-to-face interview is outlined. A computer software (NUD.IST) for qualitative data analysis is mentioned. The S.W.O.T. situational analysis is used as the starting point of the action research. The S.W.O.T. is a systematic strategic planning approach to scan external environment and review internal capabilities.

In addition to the customer survey data, in-house secondary data are used. The combination of tailor-designed survey data with existing in-house data is unique in action learning.

The Customer Survey Questionnaire is the key research instrument used in this action learning project. The rationale of each questionnaire item is explained.

The sampling approach and the duration of the customer survey is then discussed.

Chapter Four   Data Analyses

4.1   Descriptive statistical analyses of Customer Survey Questionnaire

1,500 questionnaires were distributed. 238 sets of completed questionnaires were returned. This represents about 16% of response rate. The distribution are as follows:

- Team A (Apparel in Kwun Tong region) has 39 responses.
- Team B (Apparel in San Po Kong; Hung Hom; To Kwa Wan; Tai Ko Tsui; Tsim Sha Tsui; Mong Kok; Kowloon Bay regions) has 103 responses.
- Team C (Apparel in Cheung Sha Wan; Kwai Chung; Tsuen Wan regions) 35 responses.
- Team 4C+9B (4C represents Hong Kong Island region, 9B responsible for Nylon and Domestic threads) has 9 responses.
- Team AST (Responsible for small turnover business account and it also represents New Territories Account, such as Yuen Long, Tuen Mun, Sha Tin, and Fo Tan) has 9 responses.
- Team 9E (Represents Embroidery Thread) has 43 responses.

This response rate is acceptable given the response is on voluntary basis. The size of 238 sets of returned questionnaires is good enough for most statistical analyses. Although there are fields not completed by the respondents (i.e. missing values), the majority of the questionnaire items are acceptable for survey and the results should be representative of the population.

For this section on descriptive statistical analyses, the table numbers from 1 to 34 correspond to the question item numbers used in the Customer Survey Questionnaire.

Table 1: Frequency Distribution by BUSINESS NATURE

```
                                          Valid      Cum
Value Label              Value Frequency Percent Percent Percent

Others                       1         9     3.8     3.9     3.9
Licensee                    10         2      .8      .9     4.7
Buying Office              100         4     1.7     1.7     6.5
Trading                   1000        22     9.2     9.5    15.9
Trading/BuyOff/Others     1101         1      .4      .4    16.4
Mfr                      10000       182    76.5    78.4    94.8
Mfr/BuyOff               10100         3     1.3     1.3    96.1
Mfr/Trading              11000         8     3.4     3.4    99.6
Mfr/Trading/BuyOff/Others 11101        1      .4      .4   100.0
                             .         6     2.5 Missing
                                   ------- ------- -------
                         Total       238   100.0   100.0

Valid cases    232    Missing cases     6
```

Most of the respondents are manufacturers. They represent about 78.4% (or 83.5% when their business nature also extends to include other areas) of all the respondents.

This is followed by trading firms which represent 9.5% (or 13.7% co-existing with other types of business nature).

There were six respondents who did not disclose their business nature. These are the missing values.

Table 2: Frequency Distribution by THREAD TYPE

```
                                                      Valid      Cum
Value Label                    Value  Frequency  Percent  Percent  Percent

Others                             1        3      1.3      1.4      1.4
Rayon                            100       11      4.6      5.0      6.4
Trilobal                        1000        3      1.3      1.4      7.7
Trilobal/Rayon                  1100        6      2.5      2.7     10.5
PolyCore                       10000       17      7.1      7.7     18.2
PolyCore/Bulked                10010        1       .4       .5     18.6
PolyCore/Rayon                 10100        3      1.3      1.4     20.0
CottonCore                    100000        6      2.5      2.7     22.7
CottonCore/Rayon              100100        3      1.3      1.4     24.1
CottonCore/Polycore           110000        1       .4       .5     24.5
CottonCore/Polycore/Rayon     110100        1       .4       .5     25.0
CottonC/Polycore/Tri/Rayon    111100        1       .4       .5     25.5
Spun Polyester               1000000       93     39.1     42.3     67.7
Spun/Others                  1000001        2       .8       .9     68.6
Spun/Rayon                   1000100       13      5.5      5.9     74.5
Spun/Rayon/Bulked            1000110        1       .4       .5     75.0
Spun/Trilobal                1001000        8      3.4      3.6     78.6
Spun/Trilobal/Rayon          1001100       22      9.2     10.0     88.6
Spun/PolyCore                1010000        5      2.1      2.3     90.9
Spun/PolyCore/Rayon          1010100        3      1.3      1.4     92.3
Spun/Cotton-Corespun         1100000        9      3.8      4.1     96.4
Spun/Cotton-Core/Rayon       1100100        2       .8       .9     97.3
Spun/CottonC/Rayon/Others    1100101        1       .4       .5     97.7
Spun/CottonC/Tri/Rayon       1101100        1       .4       .5     98.2
Spun/CottonC/Polycore        1110000        1       .4       .5     98.6
Spun/CottonC/Polycore/Tri    1111000        1       .4       .5     99.1
Spun/CoC/PoC/Tri/Ray/Bulk    1111110        2       .8       .9    100.0
                                   .       18      7.6   Missing
                                       -------  -------  -------
                            Total      238     100.0    100.0

Valid cases    220    Missing cases    18
```

The most popular type of thread purchased by the respondents is Spun Polyester which accounts for 42.3% or 74.8% co-existing with other thread types. Coats is selling this type of thread under the brand name "Astra". Spun Polyester is suitable for all purpose sewing (e.g. outerwear, underwear, seam covering, knitwear). The benefits of Spun Polyester include:

- Wide range application
- Cost effective
- International availability
- Extensive color range
- Exquisite seam appearance

Table 3: Frequency Distribution by NUMBER OF STAFF

```
                                          Valid     Cum
Value Label             Value  Frequency  Percent  Percent  Percent

1-50 STAFF                1       201      84.5     85.9     85.9
51-100 STAFF              2        18       7.6      7.7     93.6
101-200 STAFF             3         8       3.4      3.4     97.0
201-500 STAFF             4         7       2.9      3.0    100.0
                          .         4       1.7    Missing
                                -------  -------  -------
                        Total     238     100.0    100.0

Valid cases    234    Missing cases     4
```

Most respondents (85.9%) have less than 51 office employees. Only seven (i.e. 3%) of the respondents have over 200 employees. The distribution of sizes of organizations is quite typical of that in Hong Kong. The employee size of workers for manufacturers has reduced because the bulk of production have switched to China. The number of staff is representative of the employee size of Hong Kong's trading and management functions.

Table 4: Frequency Distribution by NUMBER OF WORKERS

```
                                        Valid     Cum
Value Label              Value Frequency Percent Percent Percent

1-100 WORKERS              1       72     30.3    33.5    33.5
101-200 WORKERS           2       42     17.6    19.5    53.0
201-300 WORKERS           3       19      8.0     8.8    61.9
301-500 WORKERS           4       23      9.7    10.7    72.6
501-1000 WORKERS          5       23      9.7    10.7    83.3
1001-1500 WORKERS         6       13      5.5     6.0    89.3
1501-2000 WORKERS         7        9      3.8     4.2    93.5
2001-3000 WORKERS         8        6      2.5     2.8    96.3
OVER 3000 WORKERS         9        8      3.4     3.7   100.0
                          .       23      9.7   Missing
                                -------  -------  -------
                        Total     238    100.0   100.0

Valid cases      215    Missing cases     23
```

About one third has a workforce of less than 100 workers.

Roughly one third has a workforce between 100 to 500 workers.

About 17% has over 1000 workers.

The employer size can be used as an indicator of the size of the company.

Table 5: Frequency Distribution by NUMBER OF SEWING MACHINES

```
                                         Valid     Cum
Value Label              Value Frequency Percent Percent Percent

1-50 MACHINES              1        78    32.8    37.5    37.5
51-100 MACHINES           2        29    12.2    13.9    51.4
101-200 MACHINES          3        26    10.9    12.5    63.9
201-300 MACHINES          4        24    10.1    11.5    75.5
301-500 MACHINES          5        18     7.6     8.7    84.1
501-1000 MACHINES         6        17     7.1     8.2    92.3
1001-2000 MACHINES        7         6     2.5     2.9    95.2
OVER 2000 MACHINES        8        10     4.2     4.8   100.0
                          .        30    12.6   Missing
                                -------  ------- -------
                       Total      238   100.0   100.0

Valid cases    208    Missing cases    30
```

The number of machines used by the respondent is a good indicator of the purchase potential.

Over 50% have less than 101 sewing machines.

Only 7.7% of the respondents have more than 1,000 sewing machines for their garment production. Number of sewing machines can serve as an alternative measure of the size of the respondents.

Table 6: Frequency Distribution by ANNUAL GARMENT PRODUCTION

```
                                          Valid     Cum
Value Label                Value Frequency Percent Percent Percent

LESS THAN 100,000PCS          1      21      8.8    10.7    10.7
100,001-500,000PCS            2      68     28.6    34.5    45.2
500,001-1,000,000PCS          3      34     14.3    17.3    62.4
1,000,001-2,000,000PCS        4      22      9.2    11.2    73.6
2,000,001-5,000,000PCS        5      23      9.7    11.7    85.3
5,000,001-10,000,000PCS       6      13      5.5     6.6    91.9
OVER 10,000,000PCS            7      16      6.7     8.1   100.0
                              .      41     17.2  Missing
                                  -------  ------- -------
                           Total    238    100.0   100.0

Valid cases     197    Missing cases     41
```

The annual garment production is yet another measure of the size of the respondents as well as their thread purchase potential. Due to the wide variety of garment types, this measure of respondent size is probably crude.

Table 7: Frequency Distribution by ANNUAL TURNOVER HK$M

```
                                        Valid      Cum
Value Label              Value Frequency Percent Percent Percent

LESS THAN HK$1M            1       8      3.4      5.2     5.2
HK$1-5M                    2      27     11.3     17.4    22.6
HK$5-10M                   3      28     11.8     18.1    40.6
HK$10-30M                  4      24     10.1     15.5    56.1
HK$30-50M                  5       8      3.4      5.2    61.3
HK$50-75M                  6      12      5.0      7.7    69.0
HK$75-100M                 7       6      2.5      3.9    72.9
HK$100-150M                8       8      3.4      5.2    78.1
HK$150-200M                9       7      2.9      4.5    82.6
OVER HK$200M              10      27     11.3     17.4   100.0
                          .      83     34.9    Missing
                               ------- ------- -------
                        Total    238    100.0    100.0

Valid cases    155    Missing cases     83
```

The annual turnover figure can at best be a rough indicator of the size of customer. It is possible as well as likely that the respondents are engaged in other kinds of businesses, such as investment in property market. The annual turnover figures may cover incomes from other businesses.

Table 8.1: Frequency Distribution by FACTORY LOCATION 1

```
                                           Valid      Cum
Value Label              Frequency  Percent Percent  Percent
MISSING                       123     51.7    51.7     51.7
CHINA                          26     10.9    10.9     62.6
SHENZHEN                       24     10.1    10.1     72.7
DONGGUAN                       23      9.7     9.7     82.4
GUANGDONG                      12      5.0     5.0     87.4
HK                             10      4.2     4.2     91.6
PANYU                           4      1.7     1.7     93.3
SHANTOU                         4      1.7     1.7     95.0
ZHONGSHAN                       3      1.3     1.3     96.2
PHILIPPINE                      2       .8      .8     97.1
COLUMBO                         1       .4      .4     97.5
MACAU                           1       .4      .4     97.9
MALAYSIA                        1       .4      .4     98.3
SRI LANKA                       1       .4      .4     98.7
TAIWAN                          1       .4      .4     99.2
THAILAND                        1       .4      .4     99.6
ZHUHAI                          1       .4      .4    100.0
                          -------  ------- -------
                              238    100.0   100.0

Valid cases    238    Missing cases      0
```

More than half of the respondents did not indicate their factory location.
It is obvious that most of the factories are located in China, such as Shenzhen;
Dongguan; Shantou; PanYu; Zhuhai; Zhongshan; and Guangdong.

Table 8.1.1: Frequency Distribution by `FTY PRODUCTION % 1`
`By levels of FACTORY LOCATION 1`

```
Variable        Value  Label                    Mean    Cases

For Entire Population                         82.0722      97

M8__1             1    MISSING                98.0000       1
M8__1             2    CHINA                  89.4286      21
M8__1             5    COLUMBO                20.0000       1
M8__1             6    DONGGUAN               92.1429      21
M8__1             8    GUANGDONG              85.9091      11
M8__1            11    HK                     37.7778       9
M8__1            13    MACAU                  90.0000       1
M8__1            14    MALAYSIA               90.0000       1
M8__1            16    PANYU                  95.0000       4
M8__1            17    PHILIPPINE             45.0000       1
M8__1            20    SHANTOU                86.6667       3
M8__1            24    SHENZHEN               80.2941      17
M8__1            27    SRI LANKA             100.0000       1
M8__1            29    TAIWAN                 25.0000       1
M8__1            30    THAILAND              100.0000       1
M8__1            34    ZHONGSHAN              95.0000       2
M8__1            35    ZHUHAI                100.0000       1

Total Cases = 238
Missing Cases = 141 or  59.2 Pct
```

These are the percentages of total production in those particular countries. For example, there are 21 respondents having production in China, and their average production percentage in China amount to 89.4%. This table suggests that most of the production is outside Hong Kong. This has been the trend of economic infrastructural change for Hong Kong since the last ten or fifteen years.

Table 8.2: Frequency Distribution by FACTORY LOCATION 2

```
                                      Valid     Cum
Value Label            Frequency  Percent  Percent  Percent
MISSING                      212     89.1     89.1     89.1
DONGGUAN                       5      2.1      2.1     91.2
HK                             5      2.1      2.1     93.3
CHINA                          3      1.3      1.3     94.5
SHENZHEN                       3      1.3      1.3     95.8
MALAYSIA                       2       .8       .8     96.6
FUKIEN                         1       .4       .4     97.1
GUANGDONG                      1       .4       .4     97.5
KARACHI                        1       .4       .4     97.9
PANYU                          1       .4       .4     98.3
SRI LANKA                      1       .4       .4     98.7
THAILAND                       1       .4       .4     99.2
ZHONGSHAN                      1       .4       .4     99.6
ZHUHAI                         1       .4       .4    100.0
                         -------  -------  -------
                             238    100.0    100.0

Valid cases    238    Missing cases      0
```

There are many missing values for factory Location 2. It implies that most respondents have only one factory location.

Table 8.2.1: Frequency Distribution by FTY PRODUCTION % 2
By levels of FACTORY LOCATION 2

```
Variable       Value  Label                  Mean    Cases

For Entire Population                       43.7500      24

M8__2             2  CHINA                  56.6667       3
M8__2             3  DONGGUAN               40.0000       5
M8__2             4  FUKIEN                 20.0000       1
M8__2             5  GUANGDONG              60.0000       1
M8__2             6  HK                     26.0000       5
M8__2             9  KARACHI                40.0000       1
M8__2            11  MALAYSIA               10.0000       1
M8__2            12  PANYU                  60.0000       1
M8__2            16  SHENZHEN               70.0000       2
M8__2            18  SRI LANKA              30.0000       1
M8__2            20  THAILAND               25.0000       1
M8__2            22  ZHONGSHAN              70.0000       1
M8__2            23  ZHUHAI                 95.0000       1

Total Cases = 238
Missing Cases = 214 or  89.9 Pct
```

There are only 24 valid cases here. Most of these are still based in China.

Table 8.3: Frequency Distribution by FACTORY LOCATION 3

```
                                           Valid      Cum
Value Label                Frequency  Percent  Percent  Percent
MISSING                         231    97.1     97.1     97.1
SHENZHEN                          2      .8       .8     97.9
SRI LANKA                         2      .8       .8     98.7
MADAGASCAR                        1      .4       .4     99.2
THAILAND                          1      .4       .4     99.6
VANCOUVER                         1      .4       .4    100.0
                            -------  -------  -------
                                238   100.0    100.0

Valid cases    238    Missing cases     0
```

There are even more missing values for factory Location 3. It implies that most respondents have only one factory location.

**Table 8.3.1: Frequency Distribution by FTY PRODUCTION % 3
By levels of FACTORY LOCATION 3**

```
Variable        Value  Label                    Mean     Cases

For Entire Population                          25.7143       7

M8__3             2    MADAGASCAR               20.0000       1
M8__3             3    SHENZHEN                 37.5000       2
M8__3             5    SRI LANKA                17.5000       2
M8__3             6    THAILAND                 25.0000       1
M8__3             7    VANCOUVER                25.0000       1

Total Cases = 238
Missing Cases = 231 or  97.1 Pct
```

There are only seven valid cases here. Most of the third locations are outside China.

Table 8.4: Frequency Distribution by FACTORY LOCATION 4

```
                                            Valid     Cum
Value Label            Value  Frequency  Percent  Percent  Percent

MISSING                   1        233     97.9     97.9     97.9
GUANGDONG                 2          1      .4       .4      98.3
MALAYSIA                  3          1      .4       .4      98.7
MAURITIUS                 4          1      .4       .4      99.2
MEXICO                    5          1      .4       .4      99.6
TUNISIA                   6          1      .4       .4     100.0
                                 -------  -------  -------
                       Total        238    100.0    100.0

Valid cases    238     Missing cases      0
```

Obviously there are even more missing values for factory Location 4. It implies that most respondents have only one factory location.

Table 8.4.1: Frequency Distribution by FTY PRODUCTION % 4
By levels of FACTORY LOCATION 4

```
Variable      Value  Label                      Mean    Cases

For Entire Population                          28.0000      5

M8__4            2   GUANGDONG                 40.0000      1
M8__4            3   MALAYSIA                  25.0000      1
M8__4            4   MAURITIUS                 50.0000      1
M8__4            5   MEXICO                     5.0000      1
M8__4            6   TUNISIA                   20.0000      1

Total Cases = 238
Missing Cases = 233 or  97.9 Pct
```

There are only five valid cases here. Most of the fourth locations are outside China.

Table 9: Frequency Distribution by Major Export Country in term of percentage point

```
                              Valid
Variable      Mean       Sum    N   Label

P9_1        62.05    9307.00   150  NORTH AMERICA %
P9_2        38.91    4942.00   127  EUROPE %
P9_3        25.23    2119.00    84  JAPAN %
P9_4        29.79    2443.00    82  CHINA & HK %
P9_5        22.02     969.00    44  OTHERS %
```

"Sum" represents the product of "Valid N" and the "respective means". For example, the sum (9307) of North America is generated from 150 valid counts being multiplied with 62.05 (The average percentage of 150 counts export to North America).

The sum indicates the relative importance of the export countries. In descending order of importance of export market, the ranking are:

➢ North America   47%
➢ Europe   25%
➢ China & Hong Kong   12%
➢ Japan   11%
➢ Others   5%

The above ranking of order of importance is roughly similar to the pattern of Hong Kong's garment export figures. This provides supporting evidence that the respondent samples are representative of Hong Kong's actual situation and the findings of this action research can be generalized.

Table 10: Frequency Distribution by HAVE GARMENT QUOTA

```
                                             Valid     Cum
Value Label             Value  Frequency  Percent  Percent  Percent

YES                        1       96      40.3     54.5     54.5
NO                         2       80      33.6     45.5    100.0
                           .       62      26.0   Missing
                                 -------  -------  -------
                        Total     238     100.0    100.0

Valid cases    176    Missing cases    62
```

26% of respondents did not disclose whether they hold garment quotas.

Of those who responded, slightly more than half had export garment quotas.

Table 11: Analysis of brands by machine number

ACCOUNT	BRAND	QUALITY	PERCENT	TOTAL_M	COMS_M	GZMS_M	GLMS_M	AEMS_M	TYMS_M
T1772	A/X	1.00	20.00	5.00	1.00	.00	.00	2.00	1.50
5423	A/X	2.00	50.00	200.00	120.00	20.00	20.00	20.00	20.00
6559	ALFRED ANG	1.00	20.00	30.00	3.00	.00	.00	9.00	.00
4978	ANNE KLEIN	1.00	90.00	22.50	15.75	1.80	.00	3.83	1.13
2273	ANNTAYLOR	1.00	34.00	85.00	59.50	.00	17.00	4.25	4.25
5302	ANNTAYLOR	1.00	95.00	237.50	190.00	.00	47.50	.00	.00
6828	ANNTAYLOR	1.00	30.00	45.00	13.50	.00	4.50	4.50	22.50
5658	ANTEPRIMA	1.00	14.00	21.00	17.85	3.15	.00	.00	.00
1411	APPLE	1.00	15.00	37.50	15.00	20.63	1.88	.00	.00
2519	ARA	3.00	40.00	60.00	18.00	.00	.00	36.00	6.00
7691	ARMAGO	.	50.00	125.00	.	.	.	.	.
6220	ARMANI	.	.	.	.	.	.	.	.
5658	AVI	1.00	13.00	19.50	16.58	2.93	.00	.00	.00
3317	BABYWEAR	3.00	20.00	30.00	.30	.00	.00	.00	.00
3597	BADBOYS	3.00	20.00	600.00	600.00	.00	.00	.00	.00
2613	BAIRD	.	20.00	50.00	25.00	25.00	.	.	.
1342	BALENO	3.00	100.00	1500.00	300.00	750.00	.00	.00	.00
1328	BELDOCH	1.00	20.00	5.00	2.50	.00	.00	.00	2.50
2803	BENETTON	1.00	30.00	.	.00	.00	.00	.00	.00
3447	BENETTON	3.00	25.00	62.50	56.25	.00	.00	.00	.00
6220	BENNARDCHA	.	.	.	.	.	.	.	.
1630	BENYBARDO	1.00	50.00	12.50	6.25	.00	.00	.00	6.25
1497	BHS	1.00	30.00	450.00	180.00	270.00	.00	.00	.00
2873	BLACKTIE	.	50.00	.	.	.00	.	.00	.00
4170	BLUE RIDGE	1.00	20.00	.	.	.	.	.	.
4448	BOSS	.	33.00	24.75	21.04	1.24	.00	2.48	.00
5922	BOSS	.	.	.	.	.	.	.	.
3415	BOSSINI	1.00	85.00	212.50	42.50	106.25	10.63	.00	21.25
5755	BOSSINI	2.00	25.00	100.00	15.00	.00	65.00	10.00	.00
1530	BURBERRY	2.00	10.00	2.50	.75	.13	.00	.00	.
2422	BURBERRY	.	.	.	.	.	.	.	.
2519	CACHAREL	2.00	30.00	45.00	13.50	.00	.00	27.00	4.50
3597	CAKEWALK	3.00	20.00	600.00	600.00	.00	.00	.00	.00
6223	CAMBRIDGE	3.00	20.00	5.00	.50	1.00	1.00	.00	2.50
2454	CARMEN MAR	1.00	50.00	12.50	2.50	.00	.00	.00	.00
5296	CARRY BACK	.	.	.	.	.	.	.	.
1400	CAT	2.00	60.00	450.00	.00	.00	.00	.00	.00
6593	CAT	1.00	25.00	100.00	85.00	1.00	7.00	7.00	.00
T1937	CDG	2.00	50.00	12.50	1.88	.00	.00	.00	.00
4479	CELIO	2.00	10.00	300.00	120.00	120.00	60.00	.00	.00
3447	CHAMPION	2.00	25.00	62.50	56.25	.00	.00	.00	.00
5643	CHAPS	1.00	10.00	7.50	2.25	.00	.00	.00	.75
4427	CHARLES JO	1.00	25.00	.	.	.00	.00	.	.
7188	CHARTER CL	3.00	20.00	30.00	6.00	6.00	.00	6.00	6.00
3317	CHE	3.00	20.00	30.00	.30	.00	.00	.00	.00
1637	CHEVON	2.00	34.00	51.00	15.30	5.10	.00	5.10	5.10
1497	CK	1.00	5.00	75.00	30.00	45.00	.00	.00	.00
2623	CK	1.00	8.00	32.00	16.00	1.60	6.40	6.40	1.60
4954	CK	2.00	5.00	150.00	82.50	60.00	.00	.00	.00
5134	CK	.	20.00	5.00	.	.	.	.	.
5643	CK	1.00	10.00	7.50	2.25	.00	.00	.00	.75
5922	CK	.	.	.	.	.	.	.	.
6593	CK	1.00	25.00	100.00	85.00	1.00	7.00	7.00	.00
7118	CK	1.00	5.00	37.50	11.25	11.25	.00	7.50	.00
1537	CLASSIQUES	1.00	15.00	3.75	2.14	.26	.00	.00	1.35
4795	CLOUDS	.	5.00	7.50	.	.	.	.	.
6223	CLUB CLASS	2.00	15.00	3.75	.38	.75	.75	.00	1.88
1878	CO-OP	2.00	15.00	22.50	22.50	.00	.00	.00	.00
3483	COLOUR 18	2.00	20.00	15.00	7.50	.00	.00	1.50	6.00
2765	COLUMBIA	3.00	100.00	.	.	.00	.	.	.00
1320	COPPER KEY	2.00	5.00	37.50	.	.	.	.	.
5887	COULOUR	1.00	30.00	7.50	4.50	2.63	.15	.22	.00
1329	COUNTRY RO	1.00	10.00	2.50	.75	.25	.25	.50	.75
6426	COUNTRY RO	1.00	4.00	10.00	.	.	.	.	.
7127	COUNTRY RO	1.00	25.00	100.00	10.00	30.00	10.00	10.00	20.00
3567	COZZI	.	20.00	5.00	2.25	.05	.40	2.25	
2690	CROCODILE	2.00	25.00	62.50	6.25	12.50	.00	.00	43.75
5887	DESCENTE	1.00	10.00	2.50	1.50	.88	.05	.08	.00
1288	DFS	2.00	100.00	150.00	90.00	60.00	.00	.00	.00
30179	DIADORA	2.00	90.00	135.00	13.50	.00	.00	.00	13.50
1458	DISNEY	2.00	5.00	1.25	.75	.25	.00	.00	.00
1552	DISNEY	1.00	100.00	25.00	12.50	12.50	.	.	.
1828	DISNEY	1.00	60.00	15.00	12.00	.75	.00	.30	.00
2529	DISNEY	3.00	30.00	22.50	1.13	.00	.00	.00	.00

ACCOUNT	BRAND	QUALITY	PERCENT	TOTAL_M	COMS_M	GZMS_M	GLMS_M	AEMS_M	TYMS_M
2623	DISNEY	1.00	2.00	8.00	4.00	.40	1.60	1.60	.40
2669	DISNEY	1.00	10.00	2.50	1.25	.00	.00	.00	.00
2867	DISNEY	2.00	.	.	.	.	.00	.00	.00
4748	DISNEY	1.00	45.00	675.00	540.00	.00	.00	.00	.00
4780	DISNEY	1.00	10.00	2.50	1.13	.25	.00	.00	.00
1329	DKNY	1.00	30.00	7.50	2.25	.75	.75	1.50	2.25
1591	DKNY	1.00	20.00	50.00	15.00	30.00	.00	.00	.00
2422	DKNY	.	.	.	.	.	.	.	.
2803	DKNY	1.00	10.00	.	.00	.00	.00	.00	.00
3447	DKNY	2.00	25.00	62.50	56.25	.00	.00	.00	.00
5922	DKNY	.	.	.	.	.	.	.	.
6220	DKNY	.	.	.	.	.	.	.	.
6426	DKNY	1.00	30.00	75.00	.	.	.	.	.
6593	DKNY	1.00	25.00	100.00	85.00	1.00	7.00	7.00	.00
6682	DKNY	1.00	20.00	150.00	30.00	52.50	15.00	22.50	22.50
6828	DKNY	1.00	10.00	15.00	4.50	.00	1.50	1.50	7.50
6645	DME PER TW	2.00	85.00	340.00	68.00	.00	85.00	51.00	85.00
1591	E P PRO	2.00	20.00	50.00	15.00	30.00	.00	.00	.00
7795	EASEY	1.00	100.00	750.00	480.00	45.00	.00	75.00	.00
T1772	EBI	1.00	20.00	5.00	1.00	.00	.00	2.00	1.50
1502	EDDIEBAUER	1.00	30.00	225.00	33.75	191.25	.00	.00	.00
2422	EDDIEBAUER	.	.	.	.	.	.	.	.
4479	EDDIEBAUER	2.00	25.00	750.00	300.00	300.00	150.00	.00	.00
5755	EDDIEBAUER	1.00	25.00	100.00	15.00	.00	65.00	10.00	.00
6220	EDDIEBAUER	.	.	.	.	.	.	.	.
4448	EINHORN	.	33.00	24.75	21.04	1.24	.00	2.48	.00
2273	ELLEN TRAC	1.00	33.00	82.50	57.75	.00	16.50	4.13	4.13
3567	ELLEN TRAC	.	20.00	5.00	2.25	.05	.05	.40	2.25
1503	ELLESSE	2.00	33.00	49.50	19.80	4.95	4.95	.00	.00
4633	ELLESSE	1.00	40.00	10.00	.50	4.00	.00	.00	.00
1329	EMANUEL	1.00	30.00	7.50	2.25	.75	.75	1.50	2.25
3567	EMANUEL	.	20.00	5.00	2.25	.05	.05	.40	2.25
6426	EMANUEL	1.00	30.00	75.00	.	.	.	.	.
1329	EPISODE	1.00	30.00	7.50	2.25	.75	.75	1.50	2.25
2479	EPISODE	1.00	70.00	280.00	210.00	.00	5.60	64.40	.00
3483	EPISODE	2.00	20.00	15.00	7.50	.00	.00	1.50	6.00
3483	EPISODE	2.00	30.00	22.50	11.25	.00	.00	2.25	9.00
6426	EPISODE	2.00	30.00	75.00	.	.	.	.	.
5302	ESCADA	3.00	5.00	12.50	10.00	.00	2.50	.00	.00
5570	ESCADA	.	.	.	.	.	.00	.00	.
1998	ESONIEE	.	.	.	.	.00	.00	.00	.00
5064	ESPRIT	2.00	20.00	50.00	35.00	5.00	.00	.00	5.00
5291	ESPRIT	.	.	.	.	.	.	.	.
4448	ETERNA	.	34.00	25.50	21.68	1.28	.00	2.55	.00
1511	EXPRESS	.	.	.	.	.00	.00	.	.
2550	EXPRESS	2.00	1.00	30.00	21.00	3.00	3.00	3.00	.00
2623	EXPRESS	1.00	20.00	80.00	40.00	4.00	16.00	16.00	4.00
3975	EXPRESS	3.00	50.00	12.50	.63	7.50	.00	.63	.00
4413	FACONNABLE	1.00	10.00	2.50	1.25	.00	1.25	.00	.00
T1772	FEDGRAT	1.00	20.00	5.00	1.00	.00	.00	2.00	1.50
2777	FERRARI	1.00	5.00	1.25	1.00	.13	.00	.00	.00
2357	FILA	1.00	20.00	600.00	.00	.00	.00	.00	.00
2550	FILA	3.00	1.00	30.00	21.00	3.00	3.00	3.00	.00
5134	FILA	2.00	30.00	7.50	.	.	.	.	.
1637	FORNARI	2.00	33.00	49.50	14.85	4.95	.00	4.95	4.95
2690	FORTEI	2.00	10.00	25.00	2.50	5.00	.00	.00	17.50
2613	FOURSEASON	.	20.00	50.00	25.00	25.00	.	.	.
6559	FRANCESS A	3.00	10.00	15.00	1.50	.00	.00	4.50	.00
2690	FRENCHTRAD	1.00	25.00	62.50	6.25	12.50	.00	.00	43.75
1601	G2000	3.00	20.00	150.00	105.00	7.50	7.50	.00	15.00
2265	G2000	.	.	.	.	.	.	.	.
2690	G2000	2.00	20.00	50.00	5.00	10.00	.00	.00	35.00
3567	G2000	.	20.00	5.00	2.25	.05	.05	.40	2.25
7188	G2000	3.00	20.00	30.00	6.00	6.00	.00	6.00	6.00
7198	G2000	3.00	50.00	75.00	60.00	15.00	.00	.00	.00
2990	GANT	1.00	25.00	187.50	.	.	.	.	.
T1772	GAP	1.00	20.00	5.00	1.00	.00	.00	2.00	1.50
1458	GAP	2.00	10.00	2.50	1.50	.50	.00	.00	.00
1828	GAP	2.00	5.00	1.25	1.00	.06	.00	.03	.00
2550	GAP	3.00	1.00	30.00	21.00	3.00	3.00	3.00	.00
2803	GAP	1.00	30.00	.	.00	.00	.00	.00	.00
2990	GAP	1.00	25.00	187.50	.	.	.	.	.
3447	GAP	2.00	25.00	62.50	56.25	.00	.00	.00	.00
4479	GAP	2.00	40.00	1200.00	480.00	480.00	240.00	.00	.00
4780	GAP	2.00	5.00	1.25	.56	.13	.00	.00	.00
4969	GAP	1.00	40.00	30.00	3.00	6.00	.00	.00	.00

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ACCOUNT	BRAND	QUALITY	PERCENT	TOTAL_M	COMS_M	GZMS_M	GLMS_M	AEMS_M	TYMS_M
5183	GAP	.	.	.	.	.	.	.	.
2990	GEAR	2.00	25.00	187.50	.	.	.	.	.
2990	GEAR WINNI	1.00	25.00	187.50	.	.	.	.	.
2519	GERRY WEBE	2.00	20.00	30.00	9.00	.00	.00	18.00	3.00
6426	GERRY WEBE	3.00	6.00	15.00	.	.	.	.	.
2705	GIORDANO	1.00	30.00	7.50	.38	.00	.00	.00	.00
2690	GOLDLION	1.00	20.00	50.00	5.00	10.00	.00	.00	35.00
1591	GUESS	2.00	5.00	12.50	3.75	7.50	.00	.00	.00
5064	GUESS	2.00	70.00	175.00	122.50	17.50	.00	.00	17.50
5423	GUESS	2.00	50.00	200.00	120.00	20.00	20.00	20.00	20.00
7188	GUESS	3.00	20.00	30.00	6.00	6.00	.00	6.00	6.00
1828	GYMBOREE	2.00	10.00	2.50	2.00	.13	.00	.05	.00
5887	HARD CORPS	1.00	10.00	2.50	1.50	.88	.05	.08	.00
1400	HEAD	2.00	10.00	75.00	.00	.00	.00	.00	.00
3317	HELLOKITTY	3.00	20.00	30.00	.30	.00	.00	.00	.00
4427	HI-PO	3.00	25.00	.	.	.00	.00	.	.
2777	HK BANK	2.00	10.00	2.50	2.00	.25	.00	.00	.00
4748	HOT FINGER	1.00	10.00	150.00	120.00	.00	.00	.00	.00
4413	HUHUCHEUNG	1.00	30.00	7.50	3.75	.00	3.75	.00	.00
2357	IAII	1.00	20.00	600.00	.00	.00	.00	.00	.00
5724	IHC	.	.	.	.	.00	.	.00	.
2426	IN WEAR	2.00	60.00	45.00	22.50	13.50	.00	2.25	4.50
6465	IN WEAR	3.00	33.00	132.00	13.20	.00	.00	.00	92.40
4170	ITEMS	1.00	20.00	.	.	.	.	.	.
T1188	J CREW	1.00	50.00	75.00	52.50	22.50	.00	.00	.00
1411	J CREW	1.00	5.00	12.50	5.00	6.88	.63	.00	.00
5570	J CREW	.	.	.	.	.	.00	.00	.
5724	J CREW	.	.	.	.	.00	.	.00	.
6682	J CREW	2.00	20.00	150.00	30.00	52.50	15.00	22.50	22.50
1516	J JILL	3.00	50.00	375.00	225.00	75.00	75.00	.00	.00
4981	JACOB	3.00	50.00	12.50	6.25	.00	.00	.00	.00
4479	JC PENNY	2.00	25.00	750.00	300.00	300.00	150.00	.00	.00
4954	JC PENNY	1.00	20.00	600.00	330.00	240.00	.00	.00	.00
6559	JENNA	1.00	70.00	105.00	10.50	.00	.00	31.50	.00
2479	JESSICA	1.00	30.00	120.00	90.00	.00	2.40	27.60	.00
3483	JESSICA	2.00	30.00	22.50	11.25	.00	.00	2.25	9.00
7118	JONES N Y	2.00	25.00	187.50	56.25	56.25	.00	37.50	.00
7118	JOSEPH ABO	.00	5.00	37.50	11.25	11.25	.00	7.50	.00
5296	JUMPER	.	.	.	.	.	.	.	.
5887	KAELIN	1.00	30.00	7.50	4.50	2.63	.15	.22	.00
1530	KAPPA	3.00	5.00	1.25	.38	.06	.00	.00	.00
5134	KAPPA	3.00	10.00	2.50	.	.	.	.	.
4785	KASPER	2.00	30.00	7.50	.75	.75	.75	.38	1.50
31001	KASPER	1.00	90.00	225.00	11.25	56.25	45.00	.00	112.50
5570	L L BEAN	.	.	.	.	.	.00	.00	.
1320	LADY ANTHO	3.00	15.00	112.50	.	.	.	.	.
6828	LANDS' END	1.00	60.00	90.00	27.00	.00	9.00	9.00	45.00
3415	LANE BRANT	1.00	15.00	37.50	7.50	18.75	1.88	.00	3.75
1591	LAUREN	2.00	30.00	75.00	22.50	45.00	.00	.00	.00
2613	LEE	.	20.00	50.00	25.00	25.00	.	.	.
3494	LEE	2.00	25.00	187.50	112.50	56.25	.00	.00	.00
5317	LEE	.	50.00	375.00	112.50	112.50	.00	75.00	37.50
5339	LEVI'S	.	.	.	.	.	.	.	.00
5755	LI FUNG	1.00	25.00	100.00	15.00	.00	65.00	10.00	.00
2273	LIZCLAIBOR	1.00	33.00	82.50	57.75	.00	16.50	4.13	4.13
4153	LIZCLAIBOR	3.00	33.00	990.00	.	.	.	.	.
5183	LIZCLAIBOR	.	.	.	.	.	.	.	.
6220	LIZCLAIBOR	.	.	.	.	.	.	.	.
7118	LIZCLAIBOR	2.00	60.00	450.00	135.00	135.00	.00	90.00	.00
3825	LIZWEAR	1.00	100.00	400.00	120.00	240.00	.00	.00	40.00
1411	LLOYD'S	2.00	45.00	112.50	45.00	61.88	5.63	.00	.00
2357	LOWE ALINE	1.00	20.00	600.00	.00	.00	.00	.00	.00
2357	M&S	1.00	20.00	600.00	.00	.00	.00	.00	.00
2550	M&S	1.00	2.00	60.00	42.00	6.00	6.00	6.00	.00
2803	M&S	1.00	30.00	.	.00	.00	.00	.00	.00
6682	MAG	1.00	20.00	150.00	30.00	52.50	15.00	22.50	22.50
1328	MAPA	3.00	30.00	7.50	3.75	.00	.00	.00	3.75
2454	MARIE ST C	1.00	50.00	12.50	2.50	.00	.00	.00	.00
2777	MARLBORO	1.00	5.00	1.25	1.00	.13	.00	.00	.00
4690	MARLBORO	.	10.00	15.00	3.00	.00	.00	.00	.00
2357	MARMOT	1.00	20.00	600.00	.00	.00	.00	.00	.00
1630	MASABARDO	1.00	50.00	12.50	6.25	.00	.00	.00	6.25
1637	MAST	1.00	33.00	49.50	14.85	4.95	.00	4.95	4.95
2426	MATINIQUE	3.00	20.00	15.00	7.50	4.50	.00	.75	1.50
6465	MATINIQUE	3.00	33.00	132.00	13.20	.00	.00	.00	92.40
7691	MAY STORE	.	50.00	125.00	.	.	.	.	.

ACCOUNT	BRAND	QUALITY	PERCENT	TOTAL_M	COMS_M	GZMS_M	GLMS_M	AEMS_M	TYMS_M
3317	MEN'S CLUE	3.00	20.00	30.00	.30	.00	.00	.00	.00
7900	MERVYNS	2.00	.	.	.	.	.	.	.
4491	MEXX	2.00	30.00	120.00	42.00	.00	18.00	36.00	18.00
4795	MEXX	.	10.00	15.00	.	.	.	.	.
1878	MIGROS	2.00	15.00	22.50	22.50	.00	.00	.00	.00
1497	MM	1.00	20.00	300.00	120.00	180.00	.00	.00	.00
7118	MONDI	2.00	5.00	37.50	11.25	11.25	.00	7.50	.00
6682	MOTHER WOR	2.00	20.00	150.00	30.00	52.50	15.00	22.50	22.50
1530	MOTHERCARE	1.00	40.00	10.00	3.00	.50	.00	.00	.00
7198	MOY	3.00	50.00	75.00	60.00	15.00	.00	.00	.00
T1937	MTRC	2.00	10.00	2.50	.38	.00	.00	.00	.00
3317	MULTIPALS	3.00	20.00	30.00	.30	.00	.00	.00	.00
3494	MUSTANG	2.00	25.00	187.50	112.50	56.25	.00	.00	.00
1337	NAUTICA	.	.	.	.	.	.	.	.
1411	NAUTICA	1.00	30.00	75.00	30.00	41.25	3.75	.00	.00
1529	NAUTICA	1.00	.	.	.	.	.	.	.00
1601	NAUTICA	1.00	50.00	375.00	262.50	18.75	18.75	.00	37.50
3494	NAUTICA	2.00	25.00	187.50	112.50	56.25	.00	.00	.00
3864	NAUTICA	1.00	40.00	10.00	4.00	1.50	.50	.00	.00
4633	NAUTICA	1.00	30.00	7.50	.38	3.00	.00	.00	.00
4795	NAUTICA	.	30.00	45.00	.	.	.	.	.
5570	NAUTICA	.	.	.	.	.	.00	.00	.
6104	NAUTICA	1.00	100.00	25.00	7.50	.00	7.50	.00	.00
30179	NAUTICA	2.00	10.00	15.00	1.50	.00	.00	.00	1.50
4690	NBA	.	20.00	30.00	6.00	.00	.00	.00	.00
7189	NEIMAR MAR	1.00	30.00	7.50	6.75	.00	.00	.00	.75
1300	NEXT	3.00	50.00	200.00	100.00	20.00	.00	.00	80.00
4491	NEXT	1.00	50.00	200.00	70.00	.00	30.00	60.00	30.00
4748	NEXT	1.00	30.00	450.00	360.00	.00	.00	.00	.00
5413	NEXT	2.00	.00	.00	.00	.00	.00	.00	.00
1523	NIKE	2.00	50.00	37.50	26.25	3.75	.00	.00	.00
2613	NIKE	.	20.00	50.00	25.00	25.00	.	.	.
2873	NITELINE	.	50.00	.	.	.00	.	.00	.00
3597	NOMAD	3.00	20.00	600.00	600.00	.00	.00	.00	.00
7189	NORDSTROM	1.00	40.00	10.00	9.00	.00	.00	.00	1.00
2623	OLD NAVY	1.00	50.00	200.00	100.00	10.00	40.00	40.00	10.00
2705	OTHER	2.00	70.00	17.50	.88	.00	.00	.00	.00
2777	OTHER	2.00	10.00	2.50	2.00	.25	.00	.00	.00
3864	OTHER	.	20.00	5.00	2.00	.75	.25	.00	.00
4084	OTHER	2.00	60.00	15.00	4.50	.00	.00	.00	.00
5643	OTHER	2.00	60.00	45.00	13.50	.00	.00	.00	4.50
30632	OTTOKERN	1.00	50.00	.	.	.00	.00	.00	.00
5413	OVAL	2.00	.00	.00	.00	.00	.00	.00	.00
2426	PART TWO	3.00	20.00	15.00	7.50	4.50	.00	.75	1.50
6465	PART TWO	3.00	34.00	136.00	13.60	.00	.00	.00	95.20
4795	PEPE	.	25.00	37.50	.	.	.	.	.
4427	PERRY ELLI	1.00	25.00	.	.	.00	.00	.	.
1400	PIERRECARD	2.00	20.00	150.00	.00	.00	.00	.00	.00
2422	PIERRECARD	.	.	.	.	.	.	.	.
5252	PIERRECARD	1.00	40.00	60.00	54.00	.00	.00	.00	6.00
1300	POLO	2.00	50.00	200.00	100.00	20.00	.00	.00	80.00
1458	POLO	2.00	65.00	16.25	9.75	3.25	.00	.00	.00
1530	POLO	3.00	40.00	10.00	3.00	.50	.00	.00	.00
2529	POLO	1.00	30.00	22.50	1.13	.00	.00	.00	.00
3864	POLO	1.00	40.00	10.00	4.00	1.50	.50	.00	.00
4153	POLO	1.00	33.00	990.00	.	.	.	.	.
4633	POLO	1.00	30.00	7.50	.38	3.00	.00	.00	.00
5134	POLO	.	20.00	5.00	.	.	.	.	.
5570	POLO	.	.	.	.	.	.00	.00	.
5643	POLO	1.00	10.00	7.50	2.25	.00	.00	.00	.75
5771	POLO	1.00	80.00	20.00	4.00	2.00	14.00	.00	.00
5922	POLO	.	.	.	.	.	.	.	.
7910	POLO	.	60.00	1800.00	720.00	1080.00	.	.	.
5041	PRO-CAM FI	1.00	90.00	225.00	112.50	22.50	22.50	.00	.00
4413	PURE SILK	1.00	10.00	2.50	1.25	.00	1.25	.00	.00
30163	R	.00	10.00	15.00	3.00	6.00	.00	1.50	.00
6682	RALPH LAUR	1.00	20.00	150.00	30.00	52.50	15.00	22.50	22.50
5134	REEBOK	2.00	20.00	5.00	.	.	.	.	.
5643	REEBOK	1.00	10.00	7.50	2.25	.00	.00	.00	.75
1602	RENOWN	1.00	95.00	23.75	23.75	.00	.00	.00	.00
4690	RHENOS	.	10.00	15.00	3.00	.00	.00	.00	.00
3494	RIDERS	3.00	25.00	187.50	112.50	56.25	.00	.00	.00
3975	RIGGS	.00	10.00	2.50	.13	1.50	.00	.13	.00
1400	RIVER ISLA	2.00	10.00	75.00	.00	.00	.00	.00	.00
4084	RONDOR	1.00	30.00	7.50	2.25	.00	.00	.00	.00
6223	ROYAL ROBB	2.00	20.00	5.00	.50	1.00	1.00	.00	2.50

ACCOUNT	BRAND	QUALITY	PERCENT	TOTAL_M	COMS_M	GZMS_M	GLMS_M	AEMS_M	TYMS_M
5658	ROYALPATOU	1.00	60.00	90.00	76.50	13.50	.00	.00	.00
7189	SAKS	1.00	30.00	7.50	6.75	.00	.00	.00	.75
3597	SALTY DOG	3.00	20.00	600.00	600.00	.00	.00	.00	.00
2265	SAN DINO	.	.	.	.	.	.	.	.
1502	SAND END	1.00	30.00	225.00	33.75	191.25	.00	.00	.00
1878	SEAR	2.00	40.00	60.00	60.00	.00	.00	.00	.00
3985	SEAR	1.00	100.00	25.00	25.00	.00	.00	.00	.00
4954	SHOE TAG	2.00	35.00	1050.00	577.50	420.00	.00	.00	.00
6223	SIGNATURE	2.00	15.00	3.75	.38	.75	.75	.00	1.88
T1188	SISLEY	2.00	8.00	12.00	8.40	3.60	.00	.00	.00
6223	SLAZENGAR	3.00	10.00	2.50	.25	.50	.50	.00	1.25
1503	SPEEDO	3.00	33.00	49.50	19.80	4.95	4.95	.00	.00
5887	SPYDER	1.00	20.00	5.00	3.00	1.75	.10	.15	.00
6593	ST CLAIBOR	1.00	25.00	100.00	85.00	1.00	7.00	7.00	.00
4427	ST DUPONT	1.00	25.00	.	.	.00	.00	.	.
5922	STEFANEL	.	.	.	.	.	.	.	.
5755	STJOHNBAY	2.00	25.00	100.00	15.00	.00	65.00	10.00	.00
2623	STRUCTURE	1.00	20.00	80.00	40.00	4.00	16.00	16.00	4.00
2990	STRUCTURE	1.00	25.00	187.50	.	.	.	.	.
7188	STRUCTURE	3.00	20.00	30.00	6.00	6.00	.00	6.00	6.00
7188	STYLE & CO	3.00	20.00	30.00	6.00	6.00	.00	6.00	6.00
1328	SUNIKIN	2.00	50.00	12.50	6.25	.00	.00	.00	6.25
1537	SUSAN BRIS	1.00	15.00	3.75	2.14	.26	.00	.00	1.35
1591	SUSAN BRIS	2.00	15.00	37.50	11.25	22.50	.00	.00	.00
1537	TALBOTS	1.00	25.00	6.25	3.56	.44	.00	.00	2.25
5372	TALBOTS	3.00	70.00	17.50	5.25	.00	3.50	3.50	.00
T1937	TCC	2.00	40.00	10.00	1.50	.00	.00	.00	.00
3597	TCP	2.00	20.00	600.00	600.00	.00	.00	.00	.00
4413	TERRA PORA	1.00	50.00	12.50	6.25	.00	6.25	.00	.00
3938	TESS	4.00	50.00	125.00	12.50	12.50	.00	12.50	18.75
4170	TESTED	1.00	20.00	.	.	.	.	.	.
1503	TEXWOOD	2.00	34.00	51.00	20.40	5.10	5.10	.00	.00
5658	THALIA	1.00	13.00	19.50	16.58	2.93	.00	.00	.00
5892	TI	3.00	100.00	150.00	105.00	.00	.00	.00	.00
1601	TIMBERLAND	1.00	30.00	225.00	157.50	11.25	11.25	.00	22.50
3938	TOGETHER	3.00	50.00	125.00	12.50	12.50	.00	12.50	18.75
4690	TOGETHER	.	65.00	97.50	19.50	.00	.00	.00	.00
1458	TOMMYHILFI	2.00	20.00	5.00	3.00	1.00	.00	.00	.00
2550	TOMMYHILFI	1.00	2.00	60.00	42.00	6.00	6.00	6.00	.00
2777	TOMMYHILFI	1.00	70.00	17.50	14.00	1.75	.00	.00	.00
4153	TOMMYHILFI	3.00	34.00	1020.00	.	.	.	.	.
4591	TOMMYHILFI	1.00	.	.	.	.	.00	.00	.00
4780	TOMMYHILFI	1.00	50.00	12.50	5.63	1.25	.00	.00	.00
4795	TOMMYHILFI	.	30.00	45.00	.	.	.	.	.
4954	TOMMYHILFI	2.00	30.00	900.00	495.00	360.00	.00	.00	.00
4491	TOPPY	1.00	20.00	80.00	28.00	.00	12.00	24.00	12.00
4748	TOTES	1.00	15.00	225.00	180.00	.00	.00	.00	.00
1537	TOWNSOURCE	1.00	15.00	3.75	2.14	.26	.00	.00	1.35
4170	TRADER	1.00	20.00	.	.	.	.	.	.
T1188	TREND CLUB	1.00	25.00	37.50	26.25	11.25	.00	.00	.00
T1772	U2	1.00	20.00	5.00	1.00	.00	.00	2.00	1.50
1516	U2	3.00	50.00	375.00	225.00	75.00	75.00	.00	.00
3567	U2	.	20.00	5.00	2.25	.05	.05	.40	2.25
4084	UMBRO	1.00	10.00	2.50	.75	.00	.00	.00	.00
3975	UNIONBAY	3.00	40.00	10.00	.50	6.00	.00	.50	.00
30163	UTILITY	.00	80.00	120.00	24.00	48.00	.00	12.00	.00
4954	VAN HEUSEN	2.00	10.00	300.00	165.00	120.00	.00	.00	.00
1320	VENEZIA	3.00	80.00	600.00	.	.	.	.	.
1497	VENL	1.00	5.00	75.00	30.00	45.00	.00	.00	.00
30632	VERSE	1.00	50.00	.	.	.00	.00	.00	.00
1497	VSS	1.00	40.00	600.00	240.00	360.00	.00	.00	.00
5413	WARNACO	2.00	.00	.00	.00	.00	.00	.00	.00
1537	WARNER BRO	1.00	30.00	7.50	4.27	.53	.00	.00	2.70
2669	WARNER BRO	1.00	50.00	12.50	6.25	.00	.00	.00	.00
4170	WARNER BRO	1.00	20.00	.	.	.	.	.	.
4780	WARNER BRO	1.00	10.00	2.50	1.13	.25	.00	.00	.00
30163	WEEKEND ED	.00	10.00	15.00	3.00	6.00	.00	1.50	.00
4981	WET SEAL	3.00	50.00	12.50	6.25	.00	.00	.00	.00
5551	WILSON	2.00	100.00	75.00	75.00	.00	.00	.00	.00
2519	WINDSOR	3.00	10.00	15.00	4.50	.00	.00	9.00	1.50
2613	WRANGLER	.	20.00	50.00	25.00	25.00	.	.	.
5317	WRANGLER	.	50.00	375.00	112.50	112.50	.00	75.00	37.50
1411	YGM	1.00	5.00	12.50	5.00	6.88	.63	.00	.00
2867	YICK BO	3.00	.	.	.	.	.00	.00	.00
1878	YOUNG CANA	2.00	30.00	45.00	45.00	.00	.00	.00	.00
1530	YSL	3.00	5.00	1.25	.38	.06	.00	.00	.00

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The above lists the major brand names. The quality ranges from 1 (High Quality) to 5 (Low Quality). Most are described as 1 and 2. The "Percent" is the percentage of respondent's products being produced for that brand name.

Total_M is the product of "Percent/100" and "Machine Number". Machine Numbers are the mid-range values of Customer Survey Questionnaire – item 5. That is (a) 25 machines; (b) 75 machines; (c) 150 machines; (d) 250 machines; (e) 400 machines; (f) 750 machines; (g) 1,500 machines; and (h) 3,000 machines (150% of the lower bound of the largest range in item 5).

COMS_M = Coats Market Share in terms of Sewing
Machine Number for that particular brand.

GZMS_M = Gunzetal Market Share in terms of Sewing
Machine Number for that particular brand.

GLMS_M = GoldLink Market Share in terms of Sewing
Machine Number for that particular brand.

AEMS_M = A&E Market Share in terms of Sewing
Machine Number for that particular brand.

TYMS_M = TseYu Market Share in terms of Sewing
Machine Number for that particular brand.

These are calculated by multiplying the "Total_M" with the percentage share in Customer Survey Questionnaire – item 28.

Table 12: Listings of Garment Type Percentage

(Sum represents relative importance of that particular garment type)

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                          Valid
Variable     Mean      Sum     N   Label

P12_1        21.70   2474.00  114  PANTS, SLACKS, TROUSERS %
P12_2        38.51   4236.00  110  SHIRTS, BLOUSES %
P12_3        35.55   2275.00   64  KNITWEAR, T-SHIRT %
P12_4        20.73   1845.00   89  DRESS, SKIRT %
P12_5        47.24    803.00   17  UNDERWEAR, BRA %
P12_6        25.68   2080.00   81  COATS, OVERCOATS, JACKETS %
P12_7        34.00    408.00   12  GLOVES, HATS, TOWELS %
P12_8        24.61    812.00   33  MEN & WOMEN SUITS %
P12_9        21.33    704.00   33  SPORTWEAR %
P12_10       37.27    410.00   11  LEATHERWEAR %
P12_11       26.40    132.00    5  SWIMWEAR %
P12_12       16.71    585.00   35  CHILDREN WEARS %
P12_13       27.62    718.00   26  DENIM JEANS %
P12_14       44.54   1158.00   26  WOOL SWEATER %
P12_15       43.30    996.00   23  OTHERS %
```

The Sum is the Product of Mean and Valid N that represents the relative importance. In descending order of the percentage that respondent produced in different garment types:

Garment Type	Sum	% of garment types produced by respondents
Shirts, Blouses %	4236	21.57%
Pants, Slacks, Trousers %	2474	12.60%
Knitwear, T-shirt %	2275	11.59%
Coats, Overcoats, Jackets %	2080	10.59%
Dress, Skirt %	1845	9.40%
Wool Sweater %	1158	5.90%
Others %	996	5.07%
Men & Women Suits %	812	4.14%
Underwear, Bra %	803	4.09%
Denim Jeans %	718	3.66%
Sportwear %	704	3.59%
Children Wears %	585	2.98%
Leatherwear %	410	2.09%
Gloves, Hats, Towels %	408	2.08%
Swimwear %	132	0.67%

Table 13: Frequency Distribution by THREAD SUPPLIER NEED ISO

```
                                        Valid     Cum
Value Label            Value  Frequency  Percent  Percent  Percent

YES                      1       143      60.1     64.7     64.7
NO                       2        78      32.8     35.3    100.0
                         .        17       7.1    Missing
                               -------  -------  -------
                       Total     238     100.0    100.0

Valid cases    221    Missing cases     17
```

About 65% of the respondents request their thread suppliers to have ISO Certificate. This percentage suggests some value of ISO 9000 being recognized by the thread customers. The acquisition of ISO helps build up a better image of thread suppliers among the thread customers. Both Coats and Gunzetal (the largest thread manufacturers) have obtained ISO certification.

Table 14: Frequency Distribution by THREAD SUPPLIER NEED OKO-TEX

```
                                            Valid      Cum
Value Label              Value  Frequency  Percent  Percent  Percent

YES                         1        141     59.2     65.3     65.3
NO                          2         75     31.5     34.7    100.0
                            .         22      9.2  Missing
                                   -------  -------  -------
                         Total       238    100.0    100.0

Valid cases     216    Missing cases     22
```

About 65% of the respondents require their thread supplier to have Oko-Tex Standard 100 Certificate. The percentage is similar to that for the ISO certification. It is likely that thread customers treat ISO and Oko-Tex as equally important. Again both Coats and Gunzetal have Oko-Tex Standard 100 Certificate. Strictly speaking, Oko-Tex Standard is not a quality label.

The certificate provides confidence in textile tested for harmful substances (e.g. pH value, formaldehyde, extractable heavy-metals, pesticides, clorinated phenols, biocide finish, cancerogeneous dyestuffs, allergenous dyestuffs, cleavable arvlamines dyestuffs, flame retardant finish, color fastness, emission of volatiles, determination of odors).

Table 15: Frequency Distribution by THREAD SUPPLIER NEED OTHER QUALITY STD

```
                                             Valid     Cum
Value Label                 Value  Frequency  Percent  Percent  Percent

YES                           1        51      21.4     28.0     28.0
NO                            2       131      55.0     72.0    100.0
                              .        56      23.5   Missing
                                    -------   -------   -------
                            Total     238     100.0    100.0

Valid cases    182    Missing cases    56
```

Obviously the demand for other quality standards are significantly less than that for ISO and Oko-Tex. No specific quality standard is mentioned.

Table 16: Frequency Distribution by RESPONSIBLE FOR COLOR MATCHING

```
                                          Valid    Cum
Value Label              Value Frequency Percent Percent Percent

YES                        1      163      68.5    73.1    73.1
NO                         2       60      25.2    26.9   100.0
                           .       15       6.3  Missing
                                -------  ------- -------
                        Total     238     100.0   100.0

Valid cases    223   Missing cases    15
```

Most respondents (73.1%) claim that they are responsible for color matching.

Table 17: Frequency Distribution by COLOR MATCHING STANDARD

```
                                          Valid     Cum
Value Label                Value Frequency Percent Percent Percent

Others                         1       6     2.5     2.7    2.7
Visual no Light Box           10     115    48.3    52.0   54.8
Visual no LB/Others           11       1      .4      .5   55.2
Visual with LB               100      93    39.1    42.1   97.3
Visual with LB/Others        101       1      .4      .5   97.7
Visual with LB/Visual no LB  110       3     1.3     1.4   99.1
Computer Matching           1000       2      .8      .9  100.0
                               .      17     7.1  Missing
                                    ------- ------- -------
                            Total    238   100.0   100.0

Valid cases     221    Missing cases     17
```

Most respondents (96.4%) use visual with or without light box for color matching.

Only two respondents allege that they are using computer matching.

Table 18: Frequency Distribution by COLOR MATCHING LIGHT SOURCE

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Others	1	23	9.7	16.3	16.3
Horizon	10	7	2.9	5.0	21.3
Horizon/Others	11	1	.4	.7	22.0
CWF	100	20	8.4	14.2	36.2
CWF/Others	101	1	.4	.7	36.9
TL84	1000	5	2.1	3.5	40.4
TL84/Horizon	1010	2	.8	1.4	41.8
TL84/CWF	1100	2	.8	1.4	43.3
D65	10000	59	24.8	41.8	85.1
D65/Others	10001	3	1.3	2.1	87.2
D65/CWF	10100	4	1.7	2.8	90.1
D65/CWF/Others	10101	1	.4	.7	90.8
D65/CWF/Horizon/Others	10111	1	.4	.7	91.5
D65/TL84	11000	9	3.8	6.4	97.9
D65/TL84/Horizon/Others	11011	1	.4	.7	98.6
D65/TL84/CWF	11100	2	.8	1.4	100.0
	.	97	40.8	Missing	
	Total	238	100.0	100.0	

Valid cases   141   Missing cases   97

The most popular light source is by D65 (41.8%). Some of the respondents use more than one method.

Table 19.1: Frequency Distribution by YARN COMPLAINT

```
                                           Valid     Cum
Value Label               Value Frequency Percent  Percent  Percent

Shrinkage                     1       24    10.1     25.3     25.3
Poor Strength                10       24    10.1     25.3     50.5
Poor Strength/Shrinkage      11        9     3.8      9.5     60.0
Poor sewability             100       19     8.0     20.0     80.0
Poor sewability/Shrinkage   101        1      .4      1.1     81.1
Poor sew/Poor Strength      110        8     3.4      8.4     89.5
Poor sew/P_Strength/Shrink  111       10     4.2     10.5    100.0
                              .      143    60.1   Missing
                                 -------  -------  -------
                          Total     238   100.0    100.0

Valid cases      95    Missing cases    143
```

These complaints were not addressed against any particular brand of thread. This only gives some indication of the common problems encountered by the garment manufacturers. The 143 missing values may indicate fewer problems regarding yarn.

Table 19.2: Frequency Distribution by FINISHING COMPLAINT

```
                                              Valid     Cum
Value Label                  Value Frequency Percent  Percent  Percent

Thread breakage                  1       19     8.0     11.0     11.0
Poor color fastness             10        6     2.5      3.5     14.5
Poor fastness/Thread Breakage   11        3     1.3      1.7     16.2
Shade variation                100       61    25.6     35.3     51.4
Shade variation/Thread break   101       52    21.8     30.1     81.5
Shade variation/Poor fastness  110       15     6.3      8.7     90.2
Shade var/P_fastness/Break     111       17     7.1      9.8    100.0
                                 .       65    27.3   Missing
                                    -------  -------  -------
                             Total      238   100.0    100.0

Valid cases    173    Missing cases     65
```

There are somewhat more complaints on the finishing aspects, especially in shade variation. Only 65 cases were with missing values.

Table 19.3: Frequency Distribution by AESTHETIC COMPLAINT

```
                                                 Valid     Cum
Value Label                Value  Frequency  Percent  Percent  Percent

Short Length                  1         9      3.8      8.0      8.0
Insufficient Ticket range    10        12      5.0     10.6     18.6
Ticket range/Length          11         1       .4       .9     19.5
Insufficient Color range    100        53     22.3     46.9     66.4
Color range/Length          101         8      3.4      7.1     73.5
Color range/Ticket range    110         7      2.9      6.2     79.6
Color/Ticket range/Length   111         6      2.5      5.3     85.0
Cleanliness                1000        12      5.0     10.6     95.6
Cleanliness/Length         1001         2       .8      1.8     97.3
Cleanliness/Ticket range   1010         1       .4       .9     98.2
Cleanliness/Color range    1100         1       .4       .9     99.1
Clean/Color/Tkt range/Length 1111       1       .4       .9    100.0
                              .        125     52.5   Missing
                                    -------  -------  -------
                           Total      238    100.0    100.0

Valid cases      113    Missing cases     125
```

Most of the complaints on aesthetic aspects are related with color range.

Table 20: Frequency Distribution by SHADE CARD COLOR LEAD TIME

```
                                          Valid     Cum
Value Label             Value  Frequency  Percent  Percent  Percent

1 DAY                       1       116     48.7    50.0     50.0
2 DAYS                      2        71     29.8    30.6     80.6
3 DAYS                      3        28     11.8    12.1     92.7
4 DAYS                      4         6      2.5     2.6     95.3
5 DAYS                      5         3      1.3     1.3     96.6
6 DAYS                      6         1      .4      .4      97.0
7 DAYS                      7         7      2.9     3.0     100.0
                            .         6      2.5    Missing
                                  -------  -------  -------
                        Total       238    100.0    100.0

Valid cases     232    Missing cases     6
```

This table provides more indication on the requirement of thread customers regarding delivery lead time for shade card colour.

Half of the respondents request delivery lead time to be within one day.

Table 21: Frequency Distribution by COLOR LAP-DIP LEAD TIME

```
                                         Valid     Cum
Value Label            Value  Frequency  Percent  Percent  Percent

1 DAY                    1        62      26.1     27.7     27.7
2 DAYS                   2        80      33.6     35.7     63.4
3 DAYS                   3        49      20.6     21.9     85.3
4 DAYS                   4        19       8.0      8.5     93.8
5 DAYS                   5         9       3.8      4.0     97.8
6 DAYS                   6         1        .4       .4     98.2
7 DAYS                   7         2        .8       .9     99.1
OVER 7 DAYS             8         2        .8       .9    100.0
                        .        14       5.9    Missing
                              -------   -------  -------
                      Total     238     100.0    100.0

Valid cases    224    Missing cases    14
```

The table shows the expectation of customer on the lead time for producing a color lap-dip.

Over half of the respondents (63.4%) request lap-dip lead time to be within two days.

Table 22: Frequency Distribution by SPECIAL COLOR LEAD TIME

```
                                              Valid      Cum
Value Label             Value  Frequency  Percent  Percent  Percent

1 DAY                       1        7       2.9      3.1      3.1
2 DAYS                      2       22       9.2      9.7     12.8
3 DAYS                      3       63      26.5     27.8     40.5
4 DAYS                      4       66      27.7     29.1     69.6
5 DAYS                      5       34      14.3     15.0     84.6
6 DAYS                      6        5       2.1      2.2     86.8
7 DAYS                      7       27      11.3     11.9     98.7
OVER 7 DAYS                 8        3       1.3      1.3    100.0
                            .       11       4.6   Missing
                                 -------  -------  -------
                        Total      238     100.0    100.0

Valid cases    227    Missing cases     11
```

It seems that the customers can wait for longer time for the special colour thread.

About 60% respondents can accept the lead time exceeding three days.

Table 23: Frequency Distribution by GARMENT ACCESSORY DELIVERED IN CHINA

```
                                               Valid     Cum
         Value Label          Value  Frequency  Percent  Percent  Percent

         YES                     1       156      65.5     67.0     67.0
         NO                      2        77      32.4     33.0    100.0
                                 .         5       2.1   Missing
                                        -------  -------  -------
                               Total     238     100.0    100.0

         Valid cases    233    Missing cases      5
```

Most respondents (67%) already have garment accessory being delivered in China by their suppliers.

Table 24: Frequency Distribution by PLAN TO HAVE THREAD DELIVERED IN CHINA

```
                                             Valid     Cum
      Value Label            Value  Frequency  Percent  Percent  Percent

      YES                      1      158      66.4     69.0     69.0
      NO                       2       71      29.8     31.0    100.0
                               .        9       3.8   Missing
                                     -------  -------  -------
                             Total    238     100.0    100.0

      Valid cases    229   Missing cases     9
```

69% of respondents plan to have sewing thread to be delivered in China by their suppliers.

Table 25: Frequency Distribution by INTEREST IN TECHNICAL ADVISORY SERVICE

```
                                             Valid     Cum
Value Label              Value  Frequency  Percent  Percent  Percent

YES                        1         91      38.2     44.4     44.4
NO                         2        114      47.9     55.6    100.0
                           .         33      13.9   Missing
                                 -------   -------  -------
                        Total      238     100.0    100.0

Valid cases    205    Missing cases    33
```

Over half of the respondents (55.6%) are not interested in Technical Advisory Services.

Table 26: Frequency Distribution by PLAN SET UP EDI WITH THREAD SUPPLIER

```
                                          Valid    Cum
Value Label              Value Frequency Percent Percent Percent

YES                        1       32      13.4   15.8    15.8
NO                         2      171      71.8   84.2   100.0
                           .       35      14.7 Missing
                                -------  ------- -------
                         Total    238     100.0   100.0

Valid cases    203    Missing cases    35
```

Most have no interest to use EDI with thread suppliers. It would be useful to identify who are the 32 respondents indicating interest in EDI. This may help enhance partnership with customers. The 32 respondents are as follows:

A/C	COMPANY
4495	GOLDEN TRUE INT'L CO LTD
4834	LYCEUM FASHION GMT CO LTD
7106	CHATHAM INDUSTRIES LTD
4591	WING TAK COMPUTER EMB DEV
1288	KELEX LTD
1497	WARNACO (HK) LTD
1552	FAIRYARD GARMENT CO LTD
6593	DO DO FASHION LTD
5570	REINDEER LTD
6263	HEADLINE FASHIONS LTD
2623	HANBO ENTERPRISES LTD
1300	KAIHON GARMENTS LTD
31001	INVINCIBLE INTERNATIONAL
1834	H K WING TAI KNITTING TRG
2867	SHUN FAT COMPUTER EMB CO
4954	TAL APPAREL LTD
5803	ALL GOOD FAAHION LTD
7118	PO LUNG GMT FTY LTD
3415	FOURSEAS COMPONENT CO LTD
5529	MING KEE
6645	WING HONG GMT
6682	UPTREND GARMENT MFG
5951	LUNG KAE GARMENT CO
1400	MAY TRADING (HK) LTD
2357	AUSTINS MARMON LTD
4690	SAM SAM (MEI WAH) COMPUTE
2669	PLANET K COMPUTER EMB FTY
5517	UNIVERSAL LEATHER CO
6784	TAI HING TRADING CO
6104	CASUAL TIME LTD
7910	SMART SHIRTS MFG LTD
7691	KWONG LUEN TAI GMT FTY LTD

Table 27: Frequency Distribution by EXPECTED FREQUENCY OF VISIT

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
EVERYDAY	1	11	4.6	5.6	5.6
4 TIMES A WEEK	2	6	2.5	3.0	8.6
3 TIMES A WEEK	3	22	9.2	11.2	19.8
2 TIMES A WEEK	4	30	12.6	15.2	35.0
ONCE A WEEK	5	57	23.9	28.9	64.0
ONCE A MONTH	6	71	29.8	36.0	100.0
	.	41	17.2	Missing	
	Total	238	100.0	100.0	

Valid cases   197   Missing cases   41

This table would help the Sales Team to plan their visits to their customers.

There are 11 respondents who expect daily visits and 71 respondents who expect monthly visits.

Table 28: Frequency Distribution by Thread Manufacturer Market share of Customer Purchase

```
                              Valid
Variable      Mean       Sum     N  Label

P28_1        46.86   9044.00   193  COATS PURCHASE %
P28_2        24.65   2687.00   109  GUNZETAL PURCHASE %
P28_3        15.59    842.00    54  GOLDLINK PURCHASE %
P28_4        16.37   1031.00    63  A&E PURCHASE %
P28_5        21.91   1402.00    64  TSE YU PURCHASE %
P28_6        40.39   4524.00   112  OTHERS PURCHASE %
```

From the survey, the market share of various thread manufacturers in descending order are listed as follows:

- ➢ Coats   46.3%
- ➢ Gunzetal   13.8%
- ➢ Tse Yu   7.2%
- ➢ A&E   5.3%
- ➢ GoldLink   4.3%
- ➢ Others   23.2% (including Embroidery Thread Manufacturers)

Table 29.1: Listing of Importance Level of Thread Attribute in natural order (1 is very important;…; 5 is very unimportant)

```
                   Valid
Variable     Mean     N   Label

S29_1        2.51    162  IMP: PRODUCT BRAND IMAGE
S29_2        1.64    174  IMP: PRODUCT PERFORMANCE
S29_3        1.89    170  IMP: PRODUCT RANGE
S29_4        1.46    185  IMP: PRODUCT COLOR RANGE
S29_5        2.74    165  IMP: PRODUCT PACKAGING
S29_6        1.27    198  IMP: PRODUCT PRICE
S29_7        1.71    185  IMP: SPECIAL COLOR SERVICE
S29_8        1.68    184  IMP: THREAD SAMPLE SERVICE
S29_9        2.51    161  IMP: TECHNICAL ADVISORY SERVICE
S29_10       1.36    185  IMP: DELIVERY QUALITY SERVICE
S29_11       1.29    188  IMP: ACCURATE QUANTITY DELIVERY
S29_12       1.31    188  IMP: DELIVERY LEAD TIME
S29_13       1.35    190  IMP: STOCK AVAILABILITY
S29_14       1.73    179  IMP: FLEXIBLE DYED QUANTITY POLICY
S29_15       2.19    158  IMP: CHINA DELIVERY
S29_16       1.65    180  IMP: SUPPLIER REPUTATION
S29_17       1.48    190  IMP: RESPONSIVENESS OF SALES
S29_18       1.66    183  IMP: PROFESSIONALISM OF SALES
S29_19       1.74    176  IMP: EFFECTIVE COMMUNICATION
S29_20       1.90    172  IMP: PARTNERSHIP ORIENTATION
S29_21       2.67    149  IMP: INTERNATIONAL COVERAGE
S29_22       1.33      6  IMP: OTHERS
```

The range of the perceived importance levels of thread attributes is from 1.27 to 2.54. On a 5-point Likert scale with 1 denoting Very Important and 5 denoting Very Unimportant, all thread attributes are perceived to be important (i.e. being less than the neutral value of 3). Means is used to represent the extent of importance for easy comparison among the various attributes. The valid N represents the number of valid responses for that particular attribute. In the case for "others" there are only six valid responses. The majority of respondents are happy with the 21 thread attributes listed in the survey questionnaire.

Table 29.2: Listing of Importance Level of Thread Attribute in ascending order
(1 is very important;…; 5 is very unimportant)

```
                        Valid
Variable     Mean      N   Label

S29_6        1.27     198  IMP: PRODUCT PRICE
S29_11       1.29     188  IMP: ACCURATE QUANTITY DELIVERY
S29_12       1.31     188  IMP: DELIVERY LEAD TIME
S29_22       1.33       6  IMP: OTHERS
S29_13       1.35     190  IMP: STOCK AVAILABILITY
S29_10       1.36     185  IMP: DELIVERY QUALITY SERVICE
S29_4        1.46     185  IMP: PRODUCT COLOR RANGE
S29_17       1.48     190  IMP: RESPONSIVENESS OF SALES
S29_2        1.64     174  IMP: PRODUCT PERFORMANCE
S29_16       1.65     180  IMP: SUPPLIER REPUTATION
S29_18       1.66     183  IMP: PROFESSIONALISM OF SALES
S29_8        1.68     184  IMP: THREAD SAMPLE SERVICE
S29_7        1.71     185  IMP: SPECIAL COLOR SERVICE
S29_14       1.73     179  IMP: FLEXIBLE DYED QUANTITY POLICY
S29_19       1.74     176  IMP: EFFECTIVE COMMUNICATION
S29_3        1.89     170  IMP: PRODUCT RANGE
S29_20       1.90     172  IMP: PARTNERSHIP ORIENTATION
S29_15       2.19     158  IMP: CHINA DELIVERY
S29_9        2.51     161  IMP: TECHNICAL ADVISORY SERVICE
S29_1        2.51     162  IMP: PRODUCT BRAND IMAGE
S29_21       2.67     149  IMP: INTERNATIONAL COVERAGE
S29_5        2.74     165  IMP: PRODUCT PACKAGING
```

The top ten items considered to be important by the respondents are: (Cross Reference: Section 4.3 Qualitative data analysis)

1. Product Price

2. Accurate Quantity Delivery

3. Delivery Lead Time

4. Stock Availability

5. Delivery Quality Service

6. Product Colour Range

7. Responsiveness of Sales Representatives

8. Product Performance

9. Supplier Reputation

10. Professionalism of Sales Representatives

Table 30.1.1: Listing of Satisfaction Level with Coats in natural order (1 is excellent,…, 5 is poor)

```
                  Valid
Variable   Mean     N   Label

CO_1       2.17    184   SAT: PRODUCT BRAND IMAGE
CO_2       2.25    177   SAT: PRODUCT PERFORMANCE
CO_3       2.25    171   SAT: PRODUCT RANGE
CO_4       2.34    180   SAT: PRODUCT COLOR RANGE
CO_5       2.40    172   SAT: PRODUCT PACKAGING
CO_6       3.57    175   SAT: PRODUCT PRICE
CO_7       2.63    164   SAT: SPECIAL COLOR SERVICE
CO_8       2.45    176   SAT: THREAD SAMPLE SERVICE
CO_9       2.73    115   SAT: TECHNICAL ADVISORY SERVICE
CO_10      2.61    180   SAT: DELIVERY QUALITY SERVICE
CO_11      2.43    180   SAT: ACCURATE QUANTITY DELIVERY
CO_12      2.78    178   SAT: DELIVERY LEAD TIME
CO_13      3.08    177   SAT: STOCK AVAILABILITY
CO_14      3.03    147   SAT: FLEXIBLE DYED QUANTITY POLICY
CO_15      3.31     74   SAT: CHINA DELIVERY
CO_16      2.24    171   SAT: SUPPLIER REPUTATION
CO_17      2.22    176   SAT: RESPONSIVENESS OF SALES
CO_18      2.39    163   SAT: PROFESSIONALISM OF SALES
CO_19      2.37    160   SAT: EFFECTIVE COMMUNICATION
CO_20      2.35    150   SAT: PARTNERSHIP ORIENTATION
CO_21      2.46     78   SAT: INTERNATIONAL COVERAGE
CO_22      2.53    163   SAT: OVERALL PERFORMANCE
```

The range of the perceived satisfaction levels of thread attributes is from 2.17 to 3.57. On a 5-point Likert scale with 1 denoting Excellent and 5 denoting Poor, most thread attributes are perceived to be satisfactory (i.e. being less than the neutral value of 3). Means is used to represent the extent of satisfaction for easy comparison among the various attributes. The valid N represents the number of valid responses for that particular attribute.

Table 30.1.2: Listing of Satisfaction Level with Coats in ascending order
(1 is excellent,…, 5 is poor)

```
                 Valid
Variable    Mean    N   Label

CO_1        2.17   184   SAT: PRODUCT BRAND IMAGE
CO_17       2.22   176   SAT: RESPONSIVENESS OF SALES
CO_16       2.24   171   SAT: SUPPLIER REPUTATION
CO_2        2.25   177   SAT: PRODUCT PERFORMANCE
CO_3        2.25   171   SAT: PRODUCT RANGE
CO_4        2.34   180   SAT: PRODUCT COLOR RANGE
CO_20       2.35   150   SAT: PARTNERSHIP ORIENTATION
CO_19       2.37   160   SAT: EFFECTIVE COMMUNICATION
CO_18       2.39   163   SAT: PROFESSIONALISM OF SALES
CO_5        2.40   172   SAT: PRODUCT PACKAGING
CO_11       2.43   180   SAT: ACCURATE QUANTITY DELIVERY
CO_8        2.45   176   SAT: THREAD SAMPLE SERVICE
CO_21       2.46    78   SAT: INTERNATIONAL COVERAGE
CO_22       2.53   163   SAT: OVERALL PERFORMANCE
CO_10       2.61   180   SAT: DELIVERY QUALITY SERVICE
CO_7        2.63   164   SAT: SPECIAL COLOR SERVICE
CO_9        2.73   115   SAT: TECHNICAL ADVISORY SERVICE
CO_12       2.78   178   SAT: DELIVERY LEAD TIME
CO_14       3.03   147   SAT: FLEXIBLE DYED QUANTITY POLICY
CO_13       3.08   177   SAT: STOCK AVAILABILITY
CO_15       3.31    74   SAT: CHINA DELIVERY
CO_6        3.57   175   SAT: PRODUCT PRICE
```

The above list outlines the satisfaction levels of the respondents on Coats' threads along the 21 product attributes. On the whole, they were least satisfied with product price, China delivery, stock availability, and Flexible dyed quantity policy. These are the areas for improvement for Coats.

They were happy with product brand image, responsiveness of sales representatives, reputation of Coats, and the product performance. These are the strengths for Coats.

Multiple linear regression analysis was conducted with the overall satisfaction with Coats as the dependent variable and the satisfaction for other attributes as independent variables. Pairwise exclusion was applied for the missing values. The following are results of stepwise regression method.

The following multiple linear regression formula suggests that (1) Delivery Quality Service; (2) Accurate Quantity Services; (3) Responsiveness of Sales Representatives; (4) Product Performance; and (5) Special Colour Services are important determinants for overall satisfaction with Coats:

Overall Satisfaction = -0.24 + 0.21CO_10 + 0.22CO_11 + 0.26CO_17 + 0.21CO_2 + 0.24CO_7

The coefficient of determination (i.e. R Square) is 0.75. In other words, 75% of the data variability can be explained by the five independent variables, viz CO_10, CO_11, CO_17, CO_2, and CO_7.

The beta weights, which indicate the relative importance of the respective attributes are (Cross Reference: Section 2.7.9):

CO_10   0.23   (Delivery Quality and Reliability)
CO_11   0.23   (Accurate Quantity Delivery)
CO_17   0.27   (Responsiveness of Sales Representatives)
CO_2   0.19   (Product Performance)
CO_7   0.26   (Special Color Services)

Table 30.1.3: Gap Analysis for Coats

```
                   Valid
Variable    Mean      N   Label

GAPCO6      2.22    160   Gap:Product Price for Coats
GAPCO13     1.71    160   Gap:Stock Availability for Coats
GAPCO12     1.49    160   Gap:Delivery Lead Time for Coats
GAPCO14     1.35    132   Gap:Flexible Dyed Quantity Policy for Co
GAPCO15     1.28     68   Gap:China Delivery Service for Coats
GAPCO10     1.26    161   Gap:Delivery Quality & Reliability for C
GAPCO11     1.15    162   Gap:Accurate Quantity Delivery for Coats
GAPCO7       .97    145   Gap:Special Color Service for Coats
GAPCO8       .85    155   Gap:Technical Sample Service for Coats
GAPCO4       .82    159   Gap:Product Colour Range for Coats
GAPCO18      .76    147   Gap:Professionalism of salesman of Coats
GAPCO17      .74    163   Gap:Responsiveness of salesman of Coats
GAPCO19      .67    144   Gap:Effective Communication with Coats
GAPCO16      .65    152   Gap:Supplier Relationship with Coats
GAPCO2       .61    152   Gap:Product Performance for Coats
GAPCO20      .51    136   Gap:Partnership Orientation with Coats
GAPCO9       .48    100   Gap:Technical Advisory Service for Coats
GAPCO3       .39    150   Gap:Product Range for Coats
GAPCO21     -.17     71   Gap:International Coverage of Coats
GAPCO5      -.27    143   Gap:Product Packaging for Coats
GAPCO1      -.34    144   Gap:Brand Image for Coats
```

The "Gap" is the difference between the satisfaction level and the importance level. The larger the gap, the more is the need for Coats to improve in that particular aspects.

The top seven items (with gap larger than 1) for improvements (either actual or a perception issue) are:

1. Price
2. Stock Availability
3. Delivery Lead Time
4. Flexible Dyed Quantity Policy
5. China Delivery Services
6. Delivery Quality & Reliability
7. Accurate Quantity Delivery

The gap analysis is useful in highlighting which areas need improvement. Gap exists when an item is considered to be important and yet the customer is not satisfied with it.

Gap would not exist for unimportant items which the customers are not happy with; or for important items which the customers are satisfied with.

Negative gaps denote over provision of the quality / services of that particular aspect.

**Table 30.2.1: Listing of Satisfaction Level with Gunzetal in natural order
(1 is excellent,…, 5 is poor)**

```
                  Valid
Variable    Mean      N  Label

GZ_1        2.44    128  SAT: PRODUCT BRAND IMAGE
GZ_2        2.34    125  SAT: PRODUCT PERFORMANCE
GZ_3        2.43    115  SAT: PRODUCT RANGE
GZ_4        2.46    125  SAT: PRODUCT COLOR RANGE
GZ_5        2.50    118  SAT: PRODUCT PACKAGING
GZ_6        3.38    120  SAT: PRODUCT PRICE
GZ_7        2.77    109  SAT: SPECIAL COLOR SERVICE
GZ_8        2.78    120  SAT: THREAD SAMPLE SERVICE
GZ_9        3.00     84  SAT: TECHNICAL ADVISORY SERVICE
GZ_10       2.56    119  SAT: DELIVERY QUALITY SERVICE
GZ_11       2.38    121  SAT: ACCURATE QUANTITY DELIVERY
GZ_12       2.57    120  SAT: DELIVERY LEAD TIME
GZ_13       2.55    121  SAT: STOCK AVAILABILITY
GZ_14       2.87    101  SAT: FLEXIBLE DYED QUANTITY POLICY
GZ_15       3.31     45  SAT: CHINA DELIVERY
GZ_16       2.26    116  SAT: SUPPLIER REPUTATION
GZ_17       2.62    118  SAT: RESPONSIVENESS OF SALES
GZ_18       2.61    108  SAT: PROFESSIONALISM OF SALES
GZ_19       2.66    107  SAT: EFFECTIVE COMMUNICATION
GZ_20       2.61    103  SAT: PARTNERSHIP ORIENTATION
GZ_21       2.94     54  SAT: INTERNATIONAL COVERAGE
GZ_22       2.73    110  SAT: OVERALL PERFORMANCE
```

The range of the perceived satisfaction levels of thread attributes is from 2.26 to 3.38.
On a 5-point Likert scale with 1 denoting Excellent and 5 denoting Poor, most thread
attributes are perceived to be satisfactory (i.e. being less than the neutral value of 3).
Means is used to represent the extent of satisfaction for easy comparison among the
various attributes. The valid N represents the number of valid responses for that
particular attribute.

Table 30.2.2: Listing of Satisfaction Level with Gunzetal in ascending order
(1 is excellent,…, 5 is poor)

```
                  Valid
Variable    Mean     N   Label

GZ_16       2.26    116   SAT: SUPPLIER REPUTATION
GZ_2        2.34    125   SAT: PRODUCT PERFORMANCE
GZ_11       2.38    121   SAT: ACCURATE QUANTITY DELIVERY
GZ_3        2.43    115   SAT: PRODUCT RANGE
GZ_1        2.44    128   SAT: PRODUCT BRAND IMAGE
GZ_4        2.46    125   SAT: PRODUCT COLOR RANGE
GZ_5        2.50    118   SAT: PRODUCT PACKAGING
GZ_13       2.55    121   SAT: STOCK AVAILABILITY
GZ_10       2.56    119   SAT: DELIVERY QUALITY SERVICE
GZ_12       2.57    120   SAT: DELIVERY LEAD TIME
GZ_18       2.61    108   SAT: PROFESSIONALISM OF SALES
GZ_20       2.61    103   SAT: PARTNERSHIP ORIENTATION
GZ_17       2.62    118   SAT: RESPONSIVENESS OF SALES
GZ_19       2.66    107   SAT: EFFECTIVE COMMUNICATION
GZ_22       2.73    110   SAT: OVERALL PERFORMANCE
GZ_7        2.77    109   SAT: SPECIAL COLOR SERVICE
GZ_8        2.78    120   SAT: THREAD SAMPLE SERVICE
GZ_14       2.87    101   SAT: FLEXIBLE DYED QUANTITY POLICY
GZ_21       2.94     54   SAT: INTERNATIONAL COVERAGE
GZ_9        3.00     84   SAT: TECHNICAL ADVISORY SERVICE
GZ_15       3.31     45   SAT: CHINA DELIVERY
GZ_6        3.38    120   SAT: PRODUCT PRICE
```

Multiple Linear Regression Formula suggests that the important attributes for Gunzetal are: (1) Stock availability; (2) Responsiveness of Sales Representatives; (3) International Coverage.

Overall Satisfaction = 0.16 + 0.24GZ_13 + 0.37GZ_17 + 0.34GZ_21

The coefficient of determination (i.e. R Square) is 0.62. In other words, 62% of the data variability can be explained by the five independent variables, viz GZ_13, GZ_17, and GZ_21.

The beta weights, which indicate the relative importance of the respective attributes are (Cross Reference: Section 2.7.9):

GZ_13   0.26   (Stock Availability)

GZ_17   0.45   (Responsiveness of Sales Representatives)

GZ_21   0.31   (International Coverage)

Table 30.2.3: Gap Analysis for Gunzetal

```
Valid
Variable      Mean     N  Label

GAPGZ6        2.04    109  Gap:Product Price for Gunzetal
GAPGZ10       1.29    107  Gap:Delivery Quality & Reliability for G
GAPGZ12       1.27    108  Gap:Delivery Lead Time for Gunzetal
GAPGZ13       1.21    109  Gap:Stock Availability for Gunzetal
GAPGZ8        1.21    105  Gap:Technical Sample Service for Gunzeta
GAPGZ7        1.14     98  Gap:Special Color Service for Gunzetal
GAPGZ11       1.12    108  Gap:Accurate Quantity Delivery for Gunze
GAPGZ17       1.10    109  Gap:Responsiveness of salesman of Gunzet
GAPGZ14       1.06     90  Gap:Flexible Dyed Quantity Policy for Gu
GAPGZ15        .98     41  Gap:China Delivery Service for Gunzetal
GAPGZ19        .95     98  Gap:Effective Communication with Gunzeta
GAPGZ18        .94     97  Gap:Professionalism of salesman of Gunze
GAPGZ4         .92    112  Gap:Product Colour Range for Gunzetal
GAPGZ9         .72     72  Gap:Technical Advisory Service for Gunze
GAPGZ20        .69     93  Gap:Partnership Orientation with Gunzeta
GAPGZ2         .66    106  Gap:Product Performance for Gunzetal
GAPGZ16        .57    102  Gap:Supplier Relationship with Gunzetal
GAPGZ3         .53    102  Gap:Product Range for Gunzetal
GAPGZ21        .20     49  Gap:International Coverage of Gunzetal
GAPGZ1        -.15    100  Gap:Brand Image for Gunzetal
GAPGZ5        -.27    100  Gap:Product Packaging for Gunzetal
```

Except for a smaller size of the respondents, the patterns of satisfaction level and gaps are very similar to those of Coats. They have nine items with gaps larger than 1.

Thus, Gunzetal is the closest competitor for Coats.

Coats should try to do better than Gunzetal in selected key areas in order to widen and maintain the competitive edges.

Table 30.3.1: Listing of Satisfaction Level with GoldLink in natural order
(1 is excellent,…, 5 is poor)

```
                    Valid
Variable     Mean      N   Label

GL_1         2.74     61   SAT: PRODUCT BRAND IMAGE
GL_2         2.68     59   SAT: PRODUCT PERFORMANCE
GL_3         2.68     53   SAT: PRODUCT RANGE
GL_4         2.72     57   SAT: PRODUCT COLOR RANGE
GL_5         2.53     55   SAT: PRODUCT PACKAGING
GL_6         3.31     55   SAT: PRODUCT PRICE
GL_7         3.14     50   SAT: SPECIAL COLOR SERVICE
GL_8         2.75     56   SAT: THREAD SAMPLE SERVICE
GL_9         3.19     36   SAT: TECHNICAL ADVISORY SERVICE
GL_10        2.38     53   SAT: DELIVERY QUALITY SERVICE
GL_11        2.35     54   SAT: ACCURATE QUANTITY DELIVERY
GL_12        2.81     54   SAT: DELIVERY LEAD TIME
GL_13        2.78     55   SAT: STOCK AVAILABILITY
GL_14        3.13     45   SAT: FLEXIBLE DYED QUANTITY POLICY
GL_15        3.00     16   SAT: CHINA DELIVERY
GL_16        2.47     53   SAT: SUPPLIER REPUTATION
GL_17        2.57     54   SAT: RESPONSIVENESS OF SALES
GL_18        2.68     47   SAT: PROFESSIONALISM OF SALES
GL_19        2.59     49   SAT: EFFECTIVE COMMUNICATION
GL_20        2.68     47   SAT: PARTNERSHIP ORIENTATION
GL_21        2.94     16   SAT: INTERNATIONAL COVERAGE
GL_22        2.96     52   SAT: OVERALL PERFORMANCE
```

The range of the perceived satisfaction levels of thread attributes is from 2.35 to 3.31.
On a 5-point Likert scale with 1 denoting Excellent and 5 denoting Poor, most thread
attributes are perceived to be satisfactory (i.e. being less than the neutral value of 3).
Means is used to represent the extent of satisfaction for easy comparison among the
various attributes. The valid N represents the number of valid responses for that
particular attribute.

Table 30.3.2: Listing of Satisfaction Level with GoldLink in ascending order
1 is excellent,…, 5 is poor)

```
Valid
Variable      Mean      N  Label

GL_11         2.35     54  SAT: ACCURATE QUANTITY DELIVERY
GL_10         2.38     53  SAT: DELIVERY QUALITY SERVICE
GL_16         2.47     53  SAT: SUPPLIER REPUTATION
GL_5          2.53     55  SAT: PRODUCT PACKAGING
GL_17         2.57     54  SAT: RESPONSIVENESS OF SALES
GL_19         2.59     49  SAT: EFFECTIVE COMMUNICATION
GL_2          2.68     59  SAT: PRODUCT PERFORMANCE
GL_3          2.68     53  SAT: PRODUCT RANGE
GL_18         2.68     47  SAT: PROFESSIONALISM OF SALES
GL_20         2.68     47  SAT: PARTNERSHIP ORIENTATION
GL_4          2.72     57  SAT: PRODUCT COLOR RANGE
GL_1          2.74     61  SAT: PRODUCT BRAND IMAGE
GL_8          2.75     56  SAT: THREAD SAMPLE SERVICE
GL_13         2.78     55  SAT: STOCK AVAILABILITY
GL_12         2.81     54  SAT: DELIVERY LEAD TIME
GL_21         2.94     16  SAT: INTERNATIONAL COVERAGE
GL_22         2.96     52  SAT: OVERALL PERFORMANCE
GL_15         3.00     16  SAT: CHINA DELIVERY
GL_14         3.13     45  SAT: FLEXIBLE DYED QUANTITY POLICY
GL_7          3.14     50  SAT: SPECIAL COLOR SERVICE
GL_9          3.19     36  SAT: TECHNICAL ADVISORY SERVICE
GL_6          3.31     55  SAT: PRODUCT PRICE
```

From the multiple linear regression formula, there is only one major determinant for overall satisfaction for Goldlink. The determinant is Partnership Orientation with Goldlink.

Overall satisfaction = 0.91 + 0.76GL_20

The coefficient of determination (i.e. R Square) is 0.62. In other words, 62% of the data variability can be explained by the five independent variables, viz GL_20.

The beta weight for partnership orientation (GL_20) is 0.79. (Cross Reference: Section 2.7.9)

Table 30.3.3: Gap Analysis for GoldLink

```
                    Valid
Variable    Mean      N   Label

GAPGL6      1.98     45   Gap:Product Price for GoldLink
GAPGL12     1.62     45   Gap:Delivery Lead Time for GoldLink
GAPGL7      1.62     42   Gap:Special Color Service for GoldLink
GAPGL13     1.49     45   Gap:Stock Availability for GoldLink
GAPGL4      1.31     48   Gap:Product Colour Range for GoldLink
GAPGL8      1.29     45   Gap:Technical Sample Service for GoldLin
GAPGL14     1.24     37   Gap:Flexible Dyed Quantity Policy for Go
GAPGL10     1.14     44   Gap:Delivery Quality & Reliability for G
GAPGL11     1.13     46   Gap:Accurate Quantity Delivery for GoldL
GAPGL18     1.13     39   Gap:Professionalism of salesman of GoldL
GAPGL17     1.09     45   Gap:Responsiveness of salesman of GoldLi
GAPGL2      1.04     50   Gap:Product Performance for GoldLink
GAPGL9       .96     28   Gap:Technical Advisory Service for GoldL
GAPGL19      .93     40   Gap:Effective Communication with GoldLin
GAPGL16      .91     45   Gap:Supplier Relationship with GoldLink
GAPGL3       .77     44   Gap:Product Range for GoldLink
GAPGL20      .75     40   Gap:Partnership Orientation with GoldLin
GAPGL15      .53     15   Gap:China Delivery Service for GoldLink
GAPGL21      .43     14   Gap:International Coverage of GoldLink
GAPGL1       .07     46   Gap:Brand Image for GoldLink
GAPGL5      -.27     41   Gap:Product Packaging for GoldLink
```

Judging from the smaller number of respondents, the market share for Goldlink is much smaller.

Goldlink has 12 items with gaps larger than 1.

Table 30.4.1: Listing of Satisfaction Level with A&E in natural order
(1 is excellent,…, 5 is poor)

```
                  Valid
Variable    Mean     N  Label

AE_1        2.57    69  SAT: PRODUCT BRAND IMAGE
AE_2        2.62    66  SAT: PRODUCT PERFORMANCE
AE_3        2.49    59  SAT: PRODUCT RANGE
AE_4        2.67    63  SAT: PRODUCT COLOR RANGE
AE_5        2.66    59  SAT: PRODUCT PACKAGING
AE_6        3.62    60  SAT: PRODUCT PRICE
AE_7        3.09    58  SAT: SPECIAL COLOR SERVICE
AE_8        2.82    62  SAT: THREAD SAMPLE SERVICE
AE_9        3.17    41  SAT: TECHNICAL ADVISORY SERVICE
AE_10       2.61    61  SAT: DELIVERY QUALITY SERVICE
AE_11       2.41    63  SAT: ACCURATE QUANTITY DELIVERY
AE_12       2.82    61  SAT: DELIVERY LEAD TIME
AE_13       2.92    62  SAT: STOCK AVAILABILITY
AE_14       3.24    49  SAT: FLEXIBLE DYED QUANTITY POLICY
AE_15       3.69    13  SAT: CHINA DELIVERY
AE_16       2.47    59  SAT: SUPPLIER REPUTATION
AE_17       2.83    63  SAT: RESPONSIVENESS OF SALES
AE_18       2.73    55  SAT: PROFESSIONALISM OF SALES
AE_19       2.74    54  SAT: EFFECTIVE COMMUNICATION
AE_20       2.75    52  SAT: PARTNERSHIP ORIENTATION
AE_21       2.89    19  SAT: INTERNATIONAL COVERAGE
AE_22       2.90    52  SAT: OVERALL PERFORMANCE
```

The range of the perceived satisfaction levels of thread attributes is from 2.41 to 3.69. On a 5-point Likert scale with 1 denoting Excellent and 5 denoting Poor, most thread attributes are perceived to be satisfactory (i.e. being less than the neutral value of 3). Means is used to represent the extent of satisfaction for easy comparison among the various attributes. The valid N represents the number of valid responses for that particular attribute.

Table 30.4.2: Listing of Satisfaction Level with A&E in ascending order (1 is excellent,…, 5 is poor)

```
                 Valid
Variable    Mean     N  Label

AE_11       2.41     63  SAT: ACCURATE QUANTITY DELIVERY
AE_16       2.47     59  SAT: SUPPLIER REPUTATION
AE_3        2.49     59  SAT: PRODUCT RANGE
AE_1        2.57     69  SAT: PRODUCT BRAND IMAGE
AE_10       2.61     61  SAT: DELIVERY QUALITY SERVICE
AE_2        2.62     66  SAT: PRODUCT PERFORMANCE
AE_5        2.66     59  SAT: PRODUCT PACKAGING
AE_4        2.67     63  SAT: PRODUCT COLOR RANGE
AE_18       2.73     55  SAT: PROFESSIONALISM OF SALES
AE_19       2.74     54  SAT: EFFECTIVE COMMUNICATION
AE_20       2.75     52  SAT: PARTNERSHIP ORIENTATION
AE_12       2.82     61  SAT: DELIVERY LEAD TIME
AE_8        2.82     62  SAT: THREAD SAMPLE SERVICE
AE_17       2.83     63  SAT: RESPONSIVENESS OF SALES
AE_21       2.89     19  SAT: INTERNATIONAL COVERAGE
AE_22       2.90     52  SAT: OVERALL PERFORMANCE
AE_13       2.92     62  SAT: STOCK AVAILABILITY
AE_7        3.09     58  SAT: SPECIAL COLOR SERVICE
AE_9        3.17     41  SAT: TECHNICAL ADVISORY SERVICE
AE_14       3.24     49  SAT: FLEXIBLE DYED QUANTITY POLICY
AE_6        3.62     60  SAT: PRODUCT PRICE
AE_15       3.69     13  SAT: CHINA DELIVERY
```

Multiple Linear Regression Analysis suggests that the most important determinant for overall satisfaction is Partnership Orientation.

Overall Satisfaction = 0.86 + 0.74AE_20

The coefficient of determination (i.e. R Square) is 0.63. In other words, 63% of the data variability can be explained by the five independent variables, viz AE_20.

The beta weight for partnership orientation (AE_20) is 0.79. (Cross Reference: Section 2.7.9)

Table 30.4.3: Gap Analysis for A&E

```
                  Valid
Variable    Mean     N   Label

GAPAE6      2.14    50   Gap:Product Price for A&E
GAPAE12     1.65    51   Gap:Delivery Lead Time for A&E
GAPAE7      1.64    50   Gap:Special Color Service for A&E
GAPAE13     1.54    50   Gap:Stock Availability for A&E
GAPAE14     1.51    41   Gap:Flexible Dyed Quantity Policy for A&
GAPAE17     1.35    54   Gap:Responsiveness of salesman of A&E
GAPAE8      1.30    50   Gap:Technical Sample Service for A&E
GAPAE10     1.27    51   Gap:Delivery Quality & Reliability for A
GAPAE18     1.26    47   Gap:Professionalism of salesman of A&E
GAPAE11     1.23    53   Gap:Accurate Quantity Delivery for A&E
GAPAE4      1.20    54   Gap:Product Colour Range for A&E
GAPAE19     1.11    46   Gap:Effective Communication with A&E
GAPAE9      1.03    32   Gap:Technical Advisory Service for A&E
GAPAE20      .93    43   Gap:Partnership Orientation with A&E
GAPAE15      .92    12   Gap:China Delivery Service for A&E
GAPAE2       .91    55   Gap:Product Performance for A&E
GAPAE16      .84    49   Gap:Supplier Relationship with A&E
GAPAE3       .60    47   Gap:Product Range for A&E
GAPAE21      .53    15   Gap:International Coverage of A&E
GAPAE5       .00    45   Gap:Product Packaging for A&E
GAPAE1      -.02    53   Gap:Brand Image for A&E
```

The gap pattern of A&E is rather similar to GoldLink.

GoldLink has 13 items with gaps larger than 1.

Table 30.5.1: Listing of Satisfaction Level with Tse Yu in natural order (1 is excellent,…, 5 is poor)

```
                  Valid
Variable     Mean     N  Label

TY_1         2.78    69  SAT: PRODUCT BRAND IMAGE
TY_2         2.90    67  SAT: PRODUCT PERFORMANCE
TY_3         2.80    60  SAT: PRODUCT RANGE
TY_4         2.77    64  SAT: PRODUCT COLOR RANGE
TY_5         2.75    60  SAT: PRODUCT PACKAGING
TY_6         2.72    65  SAT: PRODUCT PRICE
TY_7         3.29    55  SAT: SPECIAL COLOR SERVICE
TY_8         2.52    65  SAT: THREAD SAMPLE SERVICE
TY_9         3.43    37  SAT: TECHNICAL ADVISORY SERVICE
TY_10        2.36    66  SAT: DELIVERY QUALITY SERVICE
TY_11        2.33    66  SAT: ACCURATE QUANTITY DELIVERY
TY_12        2.48    67  SAT: DELIVERY LEAD TIME
TY_13        2.66    65  SAT: STOCK AVAILABILITY
TY_14        3.43    44  SAT: FLEXIBLE DYED QUANTITY POLICY
TY_15        3.37    16  SAT: CHINA DELIVERY
TY_16        2.50    60  SAT: SUPPLIER REPUTATION
TY_17        2.44    64  SAT: RESPONSIVENESS OF SALES
TY_18        2.74    53  SAT: PROFESSIONALISM OF SALES
TY_19        2.47    53  SAT: EFFECTIVE COMMUNICATION
TY_20        2.47    51  SAT: PARTNERSHIP ORIENTATION
TY_21        3.06    16  SAT: INTERNATIONAL COVERAGE
TY_22        2.72    58  SAT: OVERALL PERFORMANCE
```

The range of the perceived satisfaction levels of thread attributes is from 2.33 to 3.43. On a 5-point Likert scale with 1 denoting Excellent and 5 denoting Poor, most thread attributes are perceived to be satisfactory (i.e. being less than the neutral value of 3). Means is used to represent the extent of satisfaction for easy comparison among the various attributes. The valid N represents the number of valid responses for that particular attribute.

Table 30.5.2: Listing of Satisfaction Level with Tse Yu in ascending order
(1 is excellent,…, 5 is poor)

```
                     Valid
Variable     Mean      N   Label

TY_11        2.33     66   SAT: ACCURATE QUANTITY DELIVERY
TY_10        2.36     66   SAT: DELIVERY QUALITY SERVICE
TY_17        2.44     64   SAT: RESPONSIVENESS OF SALES
TY_20        2.47     51   SAT: PARTNERSHIP ORIENTATION
TY_19        2.47     53   SAT: EFFECTIVE COMMUNICATION
TY_12        2.48     67   SAT: DELIVERY LEAD TIME
TY_16        2.50     60   SAT: SUPPLIER REPUTATION
TY_8         2.52     65   SAT: THREAD SAMPLE SERVICE
TY_13        2.66     65   SAT: STOCK AVAILABILITY
TY_6         2.72     65   SAT: PRODUCT PRICE
TY_22        2.72     58   SAT: OVERALL PERFORMANCE
TY_18        2.74     53   SAT: PROFESSIONALISM OF SALES
TY_5         2.75     60   SAT: PRODUCT PACKAGING
TY_4         2.77     64   SAT: PRODUCT COLOR RANGE
TY_1         2.78     69   SAT: PRODUCT BRAND IMAGE
TY_3         2.80     60   SAT: PRODUCT RANGE
TY_2         2.90     67   SAT: PRODUCT PERFORMANCE
TY_21        3.06     16   SAT: INTERNATIONAL COVERAGE
TY_7         3.29     55   SAT: SPECIAL COLOR SERVICE
TY_15        3.37     16   SAT: CHINA DELIVERY
TY_14        3.43     44   SAT: FLEXIBLE DYED QUANTITY POLICY
TY_9         3.43     37   SAT: TECHNICAL ADVISORY SERVICE
```

No independent variables (thread attributes) are entered / removed from the stepwise regression analysis. Therefore no regression analysis can be performed.

Table 30.5.3: Listing of Gap Analysis for Tse Yu

```
                    Valid
Variable    Mean       N   Label

GAPTY7      1.79      47   Gap:Special Color Service for Tse Yu
GAPTY14     1.71      35   Gap:Flexible Dyed Quantity Policy for Ts
GAPTY13     1.46      54   Gap:Stock Availability for Tse Yu
GAPTY6      1.36      55   Gap:Product Price for Tse Yu
GAPTY12     1.31      54   Gap:Delivery Lead Time for Tse Yu
GAPTY4      1.28      54   Gap:Product Colour Range for Tse Yu
GAPTY9      1.23      26   Gap:Technical Advisory Service for Tse Y
GAPTY18     1.18      45   Gap:Professionalism of salesman of Tse Y
GAPTY11     1.16      56   Gap:Accurate Quantity Delivery for Tse Y
GAPTY2      1.13      53   Gap:Product Performance for Tse Yu
GAPTY10     1.13      55   Gap:Delivery Quality & Reliability for T
GAPTY17     1.04      55   Gap:Responsiveness of salesman of Tse Yu
GAPTY8       .98      52   Gap:Technical Sample Service for Tse Yu
GAPTY16      .98      50   Gap:Supplier Relationship with Tse Yu
GAPTY3       .94      49   Gap:Product Range for Tse Yu
GAPTY15      .93      14   Gap:China Delivery Service for Tse Yu
GAPTY19      .77      44   Gap:Effective Communication with Tse Yu
GAPTY21      .67      12   Gap:International Coverage of Tse Yu
GAPTY20      .62      42   Gap:Partnership Orientation with Tse Yu
GAPTY1       .29      49   Gap:Brand Image for Tse Yu
GAPTY5      -.05      44   Gap:Product Packaging for Tse Yu
```

Tse Yu has 12 items with gaps larger than 1.

Table 30.6: Summary of perceived gaps of thread manufacturers

```
ATTRIBUTE                       COATS    GUNZETAL   GOLDLINK      A_E     TSEYU

Brand Image                      -.34       -.15        .07      -.02       .29
Product Performance               .61        .66       1.04       .91      1.13
Product Range                     .39        .53        .77       .60       .94
Color Range                       .82        .92       1.31      1.20      1.28
Product Package                  -.27       -.27       -.27       .00      -.05
Price                            2.22       2.04       1.98      2.14      1.36
Special Color Service             .97       1.14       1.62      1.64      1.79
Thread Sample Service             .85       1.21       1.29      1.30       .98
Technical Advisory Service        .48        .72        .96      1.03      1.23
Delivery Quality & Reliability   1.26       1.29       1.14      1.27      1.13
Accurate Quantity Delivery       1.15       1.12       1.13      1.23      1.16
Delivery Lead Time               1.49       1.27       1.62      1.65      1.31
Stock Availability               1.71       1.21       1.49      1.54      1.46
Flex Dyed Quantity Policy        1.35       1.06       1.24      1.51      1.71
China Delivery                   1.28        .98        .53       .92       .93
Reputation                        .65        .57        .91       .84       .98
Responsiveness of sale            .74       1.10       1.09      1.35      1.04
Professionalism of Sale           .76        .94       1.13      1.26      1.18
Effective Communication           .67        .95        .93      1.11       .77
Partnership Orientation           .51        .69        .75       .93       .62
International Coverage            -.17        .20        .43       .53       .67
```

This table summarizes the gaps of the five major thread suppliers in Hong Kong and China. The larger the gap the more important it is for the respective thread manufacturers to improve in that particular areas. The gaps are the improvement area. This table can also serve some benchmarking purposes. Coats China and Gunzetal are more similar with two negative gaps on both brand image and product packaging. In short, Coats is relatively good in most aspects, but perceived to be expensive from customer point of view.

Table 31: Frequency Distribution of PDI - CARE WHICH TYPE/BRAND I BUY

```
                                               Valid     Cum
Value Label                Value  Frequency  Percent  Percent  Percent

DEFINITELY NOT CARE          1        17        7.1      8.7      8.7
NOT CARE                     2        17        7.1      8.7     17.4
SLIGHTLY NOT CARE            3        28       11.8     14.4     31.8
NEUTRAL                      4        40       16.8     20.5     52.3
SLIGHTLY CARE                5        29       12.2     14.9     67.2
CARE                         6        34       14.3     17.4     84.6
DEFINTELY CARE               7        30       12.6     15.4    100.0
                             .        43       18.1   Missing
                                   -------  -------  -------
                           Total    238      100.0    100.0

Mean           4.379


Valid cases     195    Missing cases     43
```

The neutral value is "4". The means of 4.38 denote the customer are relatively concerned with the type or brand of threads they buy.

Table 32: Frequency Distribution of PDI - SIMILARITY OF TYPE OF THREAD

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
DEFINITELY ALIKE	1	11	4.6	5.6	5.6
ALIKE	2	24	10.1	12.2	17.9
SLIGHTLY ALIKE	3	43	18.1	21.9	39.8
NEUTRAL	4	69	29.0	35.2	75.0
SLIGHTLY DIFFERENT	5	26	10.9	13.3	88.3
DIFFERENT	6	13	5.5	6.6	94.9
DEFINITELY DIFFERENT	7	10	4.2	5.1	100.0
	.	42	17.6	Missing	
	Total	238	100.0	100.0	

Mean   3.786

Valid cases   196   Missing cases   42

The neutral value is "4". The means of 3.78 denote the customer treat threads somewhat alike from each others. This is not unusual as thread is a very simple and basic components in garment industry.

**Table 33: Frequency Distribution of PDI - IMPORTANCE TO MAKE A
           RIGHT CHOICE**

```
                                            Valid     Cum
Value Label             Value  Frequency  Percent  Percent  Percent

DEFINITELY NOT IMPOR      1        19       8.0      9.6      9.6
NOT IMPORTANT             2         3       1.3      1.5     11.2
SLIGHTLY NOT IMPORTA      3         5       2.1      2.5     13.7
NEUTRAL                   4        20       8.4     10.2     23.9
SLIGHTLY IMPORTANT        5        26      10.9     13.2     37.1
IMPORTANT                 6        36      15.1     18.3     55.3
DEFINITELY IMPORTANT      7        88      37.0     44.7    100.0
                          .        41      17.2   Missing
                                -------  -------  -------
                        Total     238     100.0    100.0

Mean          5.492


Valid cases    197    Missing cases    41
```

The means of 5.49 denote the customer opine that it is important for them to make the
right choice of thread purchase. The quality of thread can have a direct impact on the
quality of the customers' garments.

Table 34: Frequency Distribution of PDI - CONCERN ABOUT OUTCOME OF CHOICE

```
                                               Valid     Cum
Value Label               Value  Frequency  Percent  Percent  Percent

DEFINITELY NOT CONCE        1        17       7.1      8.6      8.6
NOT CONCERN                 2         5       2.1      2.5     11.2
SLIGHTLY NOT CONCERN        3         1        .4       .5     11.7
NEUTRAL                     4        16       6.7      8.1     19.8
SLIGHTLY CONCERN            5        23       9.7     11.7     31.5
CONCERN                     6        44      18.5     22.3     53.8
DEFINITELY CONCERN          7        91      38.2     46.2    100.0
                            .        41      17.2   Missing
                                   -------   -------  -------
                          Total     238     100.0    100.0

Mean          5.635


Valid cases     197     Missing cases     41
```

The means of 5.64 denote the customer are relatively concerned about the outcome of their choice.

Table 35: Overall Purchase Decision Involvement

```
                 Valid
Variable    Mean     N  Label

  31        4.38   195  CARE WHICH TYPE/BRAND I BUY
  32        3.79   196  SIMILARITY OF TYPE OF THREAD
  33        5.49   197  IMPORTANCE TO MAKE A RIGHT CHOICE
  34        5.63   197  CONCERN ABOUT OUTCOME OF CHOICE
PDI         4.83   197  PURCHASE DECISION INVOLVEMENT
```

PDI is the means of S31, S32, S33, and S34. The higher the PDI, the more the purchaser would involve in the decision.

In a Likert scale of 1 to 7, the larger the scale, the more important is the proper decision for the purchase.

The overall score (4.83) is slightly over the neutral score of 4, suggesting that thread purchase is of average importance to the thread users.

As thread is a rather basic and perhaps simple raw materials in production of garment, "similarity of type of thread" scored only 3.79 point.

4.2   Inferential statistical analyses of Customer Survey Questionnaire

Inferential statistical analyses are used from sub-sections 4.2.1 to 4.2.8 to depict more in-depth inter-relationships among the various variables than the previous sub-section 4.1 on the descriptive statistical analyses.

The eight sub-sections on inferential statistical analyses are:

1.   Cluster Analysis

2.   Chi-square Automatic Interaction Detection (CHAID)

3.   Discriminant Analysis

4.   Artificial Neural Network (ANN)

5.   Utility Analysis

6.   Multi-Dimensional Scaling (MDS) Analysis

7.   Independent Samples T-Test

8.   One-way Analysis of Variance (ANOVA)

The ordering of these sub-sections is roughly in the sequence of the types of inferential statistical analyses performed for this action learning research. However there may be occasions when certain research issues need to be tackled from different perspectives (i.e. triangulation approach) in order to derive a holistic view. Where several statistical techniques are used in addressing a particular issue, they are cross-referenced appropriately.

4.2.1. Market Segmentation by K-Means Cluster Analysis

Cluster analysis is a statistical tool to group similar objects together. Both cluster analysis and discriminant analysis classify objects into categories. In discriminant analysis, group membership for objects used to derive the classification rule has to be known in advance. For cluster analysis, group membership for all cases is not known. In fact, even the number of categories is also unknown. The objective of cluster analysis is to identify homogenous groups or clusters.

It is useful to cluster the respondents into various clusters (segments). The size of 238 respondents is too large for Icicle and Dendrogram display (with cases and variables transposed). In order to address this size problem, K-Means Cluster Analysis is used instead of Hierarchical Cluster Analysis.

The respondents can be classified into any number of segments. The following K-Means Cluster Analysis groups the respondents into four segments. Four segments are selected so that the size of number of customers within each segment are neither too large nor too small.

It is useful to cluster (segment) the customers according to some selected attributes. The three basis of segmenting the respondents are:
- Importance scores (items from Question 29)
- Satisfaction scores with Coats (items from Question 30) &
- Gap scores with Coats (i.e. difference between importance and satisfaction)

First, the respondents are segmented according to their importance, satisfaction, and gap scores assigned to 21 attributes under questions 29 and 30. The following tables summarize the counts of respondents under each segment (cluster) and the comparison of means of various segments by One-way Analysis of Variance (ANOVA). (Cross Reference: Section 4.2.8)

The modified least significant difference (LSD) post hoc multiple comparison test (i.e. Bonferroni) at 0.05 significant levels is used to discern the difference amount of various thread customer segments according to their perception on importance, satisfaction with Coats, and gaps with Coats of the various thread attributes under Q29 and Q30. Bonferroni test is used to avoid multiple comparison errors.

It can be observed from the following tables that most of the segments (clusters) are significant different (i.e. they are homogenous within, and heterogeneous across with each others).

The following tables (i.e. Table 36, 38, 40) summarize the means of importance, satisfaction, and gap scores of each segments. The last column in the table shows where two means are significant under the Bonferroni test at 0.05 level (e.g. 1-3 signifies the importance means of segments one and three are significant, and 2-4 signifies the importance means of segments two and four are significant, etc…).

4.2.1.1.   Cluster Analysis by Importance scores

From the K-Mean Cluster Analysis of 238 Respondents, four segments emerge out by their Importance scores.

Segment 1 has the following characteristics: There are eight responses and whose views are somewhat neutral in all attributes. They treat price and product color range to be more important than the other attributes. 84% of them are small manufacturers. Over half of their export are for the European Market. The major garment type for segment 1 are Sportwear; Shirt / Blouses; and Pants / Slacks / Trousers. Coats occupies about 37% of the market share of this segment 1.

Segment 2 has the following characteristics: There are 113 responses in this segment. This segment is most concerned about Accurate Quantity Delivery and Delivery Lead Time. 74% of this segment are small manufacturers with less than 50 sewing machines in their factory. Their major export market is for the North America (46%). Their garment types are: Shirts / Blouses; Pants / Slacks / Trousers; and Knitwear / T-shirt. Again, Coats is the major thread supplier, taking up 47% of the market share.

Segment 3 is extremely small, having only 3 cases. It has the following characteristics: The customers are distinctly clear with what their requirements are and their rating are on the extreme ends of the scale. Invariably, they are all small manufacturers. Export market are for North America (45%). The major garment types are: Shirts / Blouses; and Knitwear / T-shirt. Coats takes up 62.5% of the market share of this segment 3.

Segment 4 has the following characteristics: It has 79 cases. They treat some attributes to be more important, and the rest somewhat neutral. They treat Accurate Quantity Delivery and Stock Availability most importantly. 56% of this segment 4 are small garment manufacturers. 51% of export are for the North American market. The major garment type are: Shirts / Blouses; Pants / Slacks / Trousers; and Knitwear / T-shirt. Coats occupies 45% of market share of segment 4.

The Bonferroni test of ANOVA suggests that the four segments are distinctly discernable from one another. This suggests that the segmentation criteria are met. Table 37 shows the major demographic details of the four Importance clusters.

Table 36: Comparison of means of Importance clusters by ANOVA

Importance attributes under Q29 1=Important;.......5=Unimportant	Segment 1 (8)	Segment 2 (113)	Segment 3 (3)	Segment 4 (79)	Result of Bonferroni test at 0.05 significant level
1. Brand Image	3.00	1.99	5.00	3.03	2-3 2-4
2. Product Performance	2.88	1.33	1.00	1.88	1-2 1-3 1-4 2-4
3. Product Range	2.75	1.50	5.00	2.21	1-2 2-3 2-4 3-4
4. Product Color Range	2.63	1.31	5.00	1.48	1-2 1-4 2-3 3-1 3-4
5. Product Packaging	3.29	2.14	5.00	3.32	1-2 2-3 2-4
6. Product Price	2.38	1.18	1.00	1.30	1-2 1-3 1-4
7. Special Color Services	2.75	1.26	5.00	2.03	1-2 1-3 2-3 2-4 3-4
8. Thread Sample Services	2.88	1.38	5.00	1.90	1-2 1-3 2-3 2-4 3-4
9. Technical Advisory Svc	3.38	1.67	5.00	3.34	1-2 2-3 2-4
10.Delivery Qual & Rel	3.00	1.14	1.00	1.48	1-2 1-3 1-4 2-4
11.Accurate Quant Delivery	2.88	1.09	1.00	1.29	1-2 1-3 1-4 2-4
12.Deliery Lead-time	3.25	1.11	1.00	1.38	1-2 1-3 1-4 2-4
13.Stock Availability	3.50	1.18	1.00	1.35	1-2 1-3 1-4
14.Flexible Dyed Quantity	2.88	1.37	1.00	2.07	1-2 1-4 2-4
15.China Delivery Services	3.14	1.79	1.00	2.59	1-4 2-4
16.Supplier Reputation	2.88	1.26	5.00	1.96	1-2 1-4 2-3 2-4 3-1 3-4
17.Sales Responsiveness	3.00	1.19	5.00	1.67	1-2 1-4 2-3 2-4 3-1 3-4
18.Sales Professionalism	3.25	1.27	1.00	1.96	1-2 1-3 1-4 2-4
19.Effective Communication	3.50	1.33	1.00	2.03	1-2 1-3 1-4 2-4
20.Partnership orientation	2.88	1.43	1.00	2.34	1-2 2-4
21.International coverage	3.29	2.18	5.00	3.14	1-2 2-3 2-4

Table 37: Characteristics of Four Importance Clusters (QIMP)

Characteristic of Four Importance Clusters		Segment 1 (8)	Segment 2 (113)	Segment 3 (3)	Segment 4 (79)
Size of Garment Manufacturers	1-50 sewing machines	84.21%	73.87%	100.00%	56.37%
	51-100 sewing machines	5.26%	5.86%	0.00%	12.88%
	101-200 sewing machines	5.26%	4.83%	0.00%	10.70%
	201-300 sewing machines	0.00%	8.21%	0.00%	6.80%
	301-500 sewing machines	5.26%	1.75%	0.00%	5.25%
	501-1,000 sewing machines	0.00%	3.95%	0.00%	5.25%
	1,001-2,000 sewing machines	0.00%	0.77%	0.00%	0.11%
	Over 2,000 sewing machines	0.00%	0.77%	0.00%	2.65%
Major Export Country	North America (USA & Canada)	15.38%	46.13%	45.00%	50.69%
	Europe	50.38%	26.64%	26.00%	19.80%
	Japan	11.88%	10.84%	16.50%	9.97%
	China and Hong Kong	16.75%	13.22%	12.50%	10.97%
	Others	5.63%	3.18%	0.00%	8.57%
Major Garment Type that company produces	Pants / Slacks / Trousers	11.95%	13.28%	5.00%	12.96%
	Shirts / Blouses	13.61%	16.39%	55.00%	24.04%
	Knitwear / T-shirt	6.04%	12.95%	17.50%	12.28%
	Dress / Skirt	9.59%	8.50%	0.00%	8.72%
	Underwear /Brassieres	0.00%	5.25%	0.00%	3.18%
	Coats / Overcoats /Jackets	10.77%	10.27%	10.00%	11.51%
	Gloves / Hats / Towels	0.00%	3.27%	0.00%	0.37%
	Men's & Women's Suit	7.22%	4.57%	0.00%	3.66%
	Sportwear	16.69%	2.77%	0.00%	4.24%
	Leatherwear	1.18%	0.55%	0.00%	3.52%
	Swimwear	0.00%	1.45%	0.00%	0.00%
	Children Wears	3.08%	3.36%	2.50%	2.69%
	Denim Jeans	7.81%	4.11%	0.00%	2.96%
	Wool Sweater	9.70%	6.55%	0.00%	5.37%
	Others	2.37%	6.73%	10.00%	4.51%
Market Share	Coats	37.25%	47.10%	62.50%	45.07%
	Gunzetal	26.00%	12.19%	2.50%	14.51%
	Goldlink	2.75%	3.85%	0.00%	4.33%
	A&E	2.25%	5.50%	0.00%	5.72%
	Tse Yu	2.50%	9.05%	0.00%	5.73%
	Others	29.25%	22.31%	35.00%	24.65%

4.2.1.2.   Cluster Analysis by Satisfaction scores with Coats

From the means scores in the tables below, customers in segment 1 are obviously more satisfied with Coats' products under a Likert scale with 1 = Excellent, …., 5 = Poor. Customers in segment 2 is distinctly unhappy with China delivery services. Segment 3 is a marginally dissatisfied group and segment 4 is a marginally satisfied group. The last column suggests that the four customer segments are heterogeneous in their satisfaction level with Coats. Bonferroni (modified Least Significant Difference) post hoc test is adopted to avoid multiple comparison error under the One-way ANOVA.

The characteristics of Segment 1: They are the most satisfied with Coats on Product Color Range and Partnership Orientation with 29 cases. 52% of this segment 1 are small garment manufacturers. Major export countries are for North America (50%). Their major garment types are: Shirts / Blouses; Knitwear / T-shirt; and Coats / Overcoats / Jackets. Coats has 52% of the market share for this segment 1.

Segment 2 has 61 cases. They are more satisfied with Coats on Supplier Reputation and Sales Responsiveness. About 59% of this segment 2 are small manufacturers. Their major export market is North America(47%). Their major garment types are: Knitwear / T-shirt; Pants / Slacks / Trousers; and Shirts / Blouses. Coats is the major thread supplier to this segment 2 with 43% market share.

Segment 3 has 50 cases. They are more satisfied with Coats on Brand Image. 57% of this segment are small manufacturers. 45% of the export are for North America. Their major products are: Shirts / Blouses; Wool Sweater; and Pants / Slacks / Trousers. Compare to the other segments, Coats has a smaller market share of 35% in this segment 3.

Most of the manufacturers (88%) from Segment 4 are small companies with 51 cases. 46% of the export market are for North America. The major garment types are: Shirts / Blouses; Pants / Slacks / Trousers; and Dress / Skirt. Coats' market share in segment 4 is around 51%.

Table 39 describes the key characteristics of the four satisfaction clusters in terms of their sizes, export markets, garment types and thread suppliers.

Table 38: Comparison of means of Satisfaction clusters by ANOVA

Satisfaction attributes under Q30 1=Excellent;……………5=Poor	Segment 1 (29)	Segment 2 (61)	Segment 3 (50)	Segment 4 (51)	Result of Bonferroni test at 0.05 significant level
1. Brand Image	1.32	2.23	2.83	1.96	1-2 1-3 1-4 2-3 3-4
2. Product Performance	1.44	2.32	2.95	1.96	1-2 1-3 1-4 2-3 2-4 3-4
3. Product Range	1.27	2.32	2.95	2.04	1-2 1-3 1-4 2-3 3-4
4. Product Color Range	1.18	2.55	3.13	1.96	1-2 1-3 1-4 2-3 2-4 3-4
5. Product Packaging	1.58	2.26	3.20	2.22	1-2 1-3 1-4 2-3 3-4
6. Product Price	2.85	3.91	3.98	3.17	1-2 1-3 2-4 3-4
7. Special Color Services	1.59	2.78	3.38	2.21	1-2 1-3 1-4 2-3 2-4 3-4
8. Thread Sample Services	1.59	2.45	3.19	2.21	1-2 1-3 1-4 2-3 3-4
9. Technical Advisory Svc	1.57	2.73	3.41	2.56	1-2 1-3 1-4 2-3 2-4
10.Delivery Qual & Rel	1.80	2.73	3.42	2.04	1-2 1-3 2-3 2-4 3-4
11.Accurate Quant Delivery	1.73	2.50	3.18	1.96	1-2 1-3 2-3 2-4 3-4
12.Deliery Lead-time	2.16	2.98	3.47	2.15	1-2 1-3 2-3 2-4 3-4
13.Stock Availability	2.38	3.43	3.80	2.36	1-2 1-3 2-4 3-4
14.Flexible Dyed Quantity	2.47	3.13	3.68	2.51	1-2 1-3 2-3 2-4 3-4
15.China Delivery Services	2.36	4.19	3.21	3.04	1-2 2-3 2-4
16.Supplier Reputation	1.26	2.17	3.14	2.04	1-2 1-3 1-4 2-3 2-4
17.Sales Responsiveness	1.26	2.16	2.91	2.16	1-2 1-3 1-4 2-3 3-4
18.Sales Professionalism	1.36	2.38	3.22	2.23	1-2 1-3 1-4 2-3 3-4
19.Effective Communication	1.30	2.40	3.12	2.19	1-2 1-3 1-4 2-3 3-4
20.Partnership orientation	1.24	2.41	2.97	2.27	1-2 1-3 1-4 2-3 3-4
21.International coverage	1.36	2.48	3.05	2.43	1-2 1-3 1-4 2-3 3-4

Table 39: Characteristics of Four Satisfaction Clusters (QSAT)

Characteristic of Four Satisfaction Clusters		Segment 1 (29)	Segment 2 (61)	Segment 3 (50)	Segment 4 (51)
Size of Garment Manufacturers	1-50 sewing machines	51.67%	59.19%	56.81%	87.57%
	51-100 sewing machines	0.80%	18.28%	10.43%	4.68%
	101-200 sewing machines	20.13%	2.94%	10.43%	3.24%
	201-300 sewing machines	12.92%	4.57%	14.20%	2.06%
	301-500 sewing machines	7.23%	8.97%	2.61%	0.13%
	501-1,000 sewing machines	3.23%	4.57%	2.61%	2.06%
	1,001-2,000 sewing machines	3.23%	0.74%	0.29%	0.13%
	Over 2,000 sewing machines	0.80%	0.74%	2.61%	0.13%
Major Export Country	North America (USA & Canada)	50.13%	46.89%	45.02%	46.37%
	Europe	15.48%	22.05%	29.82%	27.41%
	Japan	19.57%	11.66%	9.18%	7.98%
	China and Hong Kong	11.31%	15.60%	11.93%	13.94%
	Others	3.52%	3.80%	4.04%	4.30%
Major Garment Type that company produces	Pants / Slacks / Trousers	10.42%	15.98%	12.56%	12.09%
	Shirts / Blouses	25.75%	11.86%	19.27%	28.02%
	Knitwear / T-shirt	13.83%	16.08%	12.00%	6.64%
	Dress / Skirt	9.92%	3.53%	8.10%	11.20%
	Underwear /Brassieres	0.29%	2.16%	2.46%	6.29%
	Coats / Overcoats /Jackets	14.46%	11.37%	8.54%	9.70%
	Gloves / Hats / Towels	0.29%	4.51%	1.00%	0.66%
	Men's & Women's Suit	2.37%	1.67%	6.95%	6.66%
	Sportwear	7.58%	4.22%	5.78%	1.10%
	Leatherwear	0.50%	3.14%	3.12%	0.22%
	Swimwear	0.29%	1.96%	0.12%	0.44%
	Children Wears	3.42%	4.22%	1.83%	2.54%
	Denim Jeans	0.79%	5.49%	1.85%	5.84%
	Wool Sweater	9.67%	4.61%	12.71%	3.09%
	Others	0.42%	9.22%	3.71%	5.51%
Market Share	Coats	51.67%	42.82%	35.33%	51.47%
	Gunzetal	11.96%	16.88%	17.43%	10.92%
	Goldlink	5.63%	3.87%	3.86%	4.00%
	A&E	4.78%	3.73%	7.06%	4.96%
	Tse Yu	3.52%	6.24%	12.49%	7.00%
	Others	22.44%	26.46%	23.83%	21.65%

4.2.1.3.   Cluster Analysis by Gap scores with Coats

Segment 2 has only one customer who is an extremist in scoring the gap for Coats. Customers in segment 1 perceive small level of performance gaps with Coats. Customers in segment 3 perceive much larger performance gaps with Coats. Customers in segment 4 perceive extremely small gaps with Coats. Since Segment 2 has only one case, this segment can be ignored. The four segments are clear distinct groups.

Segment 1 has 53 cases. There are two negative gaps, viz Brand Image and Product Packaging. The largest performance gap is Product Price. The segment has the following characteristics: 73% are small garment manufacturers. 49% exports go to North America. The major garment types are: Shirts / Blouses; Pants / Slacks / Trousers; and Coats / Overcoats / Jackets. Coats occupies 45% of the market share in Segment 1.

Segment 3 has 60 respondents. Many gaps exceed the value of 2. The gaps are the improvement area for Coats. The gaps are in descending order: Product Price; Stock Availability; China Delivery Service; Flexible Dyed Quantity; Delivery Lead Time; Delivery Quality and Reliability; and Special Color Services. If Coats China wants to attract this segment 3, they are much improvement need to be done. The characteristics of segment 3 are: 60% are small garment manufacturers. 46% of export go to North America. The major garment types are: Knitwear / T-shirt; Shirts / Blouses; and Pants / Slacks / Trousers. Possibly of the large number of performance gaps, Coats has only 39% of the market share of segment 3.

Segment 4 (64 cases) are the more happier group of customer for Coats. In eight areas, they have negative gaps. These over-provided performance areas are: Product Packaging; Brand Image; International Coverage; Technical Advisory Service; Partnership Orientation; Effective Communication; Sales Responsiveness; and Sales

Professionalism. The characteristics of Segment 4 are74% small garment companies.
45% are to North America. Their major garment types are: Shirts / Blouses; Pants /
Slacks / Trousers; and Coats / Overcoats / Jackets. As the segment is delighted with
Coats' services, 51% of the market share is occupied by Coats China.

Table 41 shows the key demographic characteristics of the four Gap clusters. The
Gaps are de facto improvement areas for Coats. The larger the Gaps the more
important it is for Coats to improve or rectify in those specific areas.

Table 40: Comparison of means of Gap clusters by ANOVA

Gap attributes under Q29 & Q30	Segment 1 (53)	Segment 2 (1)	Segment 3 (60)	Segment 4 (64)	Result of Bonferroni test at 0.05 significant level
1. Brand Image	-0.38	-4.00	0.40	-0.78	1-2 1-3 2-3 2-4 3-4
2. Product Performance	0.55	0.00	1.27	0.17	1-3 3-4
3. Product Range	0.37	-4.00	0.91	0.05	1-2 1-3 2-3 2-4 3-4
4. Product Color Range	0.90	-4.00	1.50	0.25	1-2 1-3 1-4 2-3 2-4 3-4
5. Product Packaging	-0.20	-4.00	0.60	-0.96	1-2 1-3 1-4 2-3 3-4
6. Product Price	2.16	4.00	2.82	1.71	1-3 3-4
7. Special Color Services	1.00	-4.00	2.07	0.11	1-2 1-3 1-4 2-3 2-4 3-4
8. Thread Sample Services	0.57	-4.00	1.94	0.16	1-2 1-3 2-3 2-4 3-4
9. Technical Advisory Svc	0.74	-4.00	1.58	-0.39	1-2 1-3 1-4 2-3 2-4 3-4
10.Delivery Qual & Rel	1.08	0.00	2.14	0.68	1-3 3-4
11.Accurate Quant Delivery	1.13	0.00	1.94	0.52	1-3 1-4 3-4
12.Deliery Lead-time	1.44	2.00	2.22	0.82	1-3 1-4 3-4
13.Stock Availability	1.45	4.00	2.71	1.10	1-3 3-4
14.Flexible Dyed Quantity	1.43	4.00	2.28	0.50	1-3 1-4 2-4 3-4
15.China Delivery Services	0.83	4.00	2.44	0.76	1-3 3-4
16.Supplier Reputation	0.44	-4.00	1.66	0.09	1-2 1-3 2-3 2-4 3-4
17.Sales Responsiveness	0.78	-4.00	1.70	-0.05	1-2 1-3 1-4 2-3 2-4 3-4
18.Sales Professionalism	0.78	0.00	1.77	-0.05	1-3 1-4 3-4
19.Effective Communication	0.72	0.00	1.80	-0.16	1-3 1-4 3-4
20.Partnership orientation	0.75	0.00	1.38	-0.37	1-3 1-4 3-4
21.International coverage	0.27	-4.00	0.46	-0.68	1-2 1-4 2-3 2-4 3-4

Table 41: Characteristics of Four Gap Clusters (QGAP)

Characteristic of Four Gap Clusters		Segment 1 (53)	Segment 2 (1)	Segment 3 (60)	Segment 4 (64)
Size of Garment Manufacturers	1-50 sewing machines	72.53%	100.00%	59.54%	73.37%
	51-100 sewing machines	13.34%	0.00%	11.41%	3.18%
	101-200 sewing machines	5.91%	0.00%	5.78%	10.34%
	201-300 sewing machines	2.62%	0.00%	11.41%	6.22%
	301-500 sewing machines	0.66%	0.00%	3.74%	3.18%
	501-1,000 sewing machines	4.10%	0.00%	5.78%	2.05%
	1,001-2,000 sewing machines	0.66%	0.00%	0.24%	0.51%
	Over 2,000 sewing machines	0.17%	0.00%	2.09%	1.15%
Major Export Country	North America (USA & Canada)	49.17%	90.00%	45.57%	44.86%
	Europe	22.52%	2.00%	27.49%	22.75%
	Japan	12.57%	3.00%	9.89%	11.55%
	China and Hong Kong	9.57%	5.00%	15.59%	15.80%
	Others	6.18%	0.00%	1.45%	5.04%
Major Garment Type that company produces	Pants / Slacks / Trousers	13.61%	10.00%	15.69%	12.03%
	Shirts / Blouses	19.59%	30.00%	16.12%	19.01%
	Knitwear / T-shirt	9.67%	35.00%	18.18%	10.01%
	Dress / Skirt	8.87%	0.00%	6.86%	7.52%
	Underwear /Brassieres	3.04%	0.00%	4.71%	2.34%
	Coats / Overcoats /Jackets	10.44%	20.00%	10.29%	11.85%
	Gloves / Hats / Towels	0.43%	0.00%	1.55%	2.25%
	Men's & Women's Suit	0.76%	0.00%	6.10%	6.96%
	Sportwear	4.56%	0.00%	2.37%	6.35%
	Leatherwear	4.56%	0.00%	0.37%	1.46%
	Swimwear	0.22%	0.00%	2.14%	0.30%
	Children Wears	3.48%	5.00%	2.12%	3.87%
	Denim Jeans	5.98%	0.00%	2.04%	4.70%
	Wool Sweater	4.78%	0.00%	7.73%	7.61%
	Others	10.00%	0.00%	3.71%	3.73%
Market Share	Coats	45.36%	25.00%	39.31%	51.13%
	Gunzetal	12.85%	5.00%	16.34%	14.63%
	Goldlink	2.37%	0.00%	4.64%	4.04%
	A&E	4.78%	0.00%	6.24%	4.02%
	Tse Yu	8.66%	0.00%	10.29%	3.85%
	Others	25.98%	70.00%	23.17%	22.34%

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4.2.2.   Chi-squared Automatic Interaction Detection (CHAID)

CHAID is a fast, statistical multi-way tree algorithm to explore data efficiently. It can be used to perform segmentation modeling with an overall goal to divide a population into segments that differ with respect to a designated criterion. CHAID displays the final segments on an easy-to-understand tree diagram (Magidson, 1993).

The segments derived from CHAID are mutually exclusive and exhaustive. In other words, segments would not overlap (mutually exclusive), and each case belongs to exactly one segment (exhaustive).

As segments are defined by combinations of predictor variables, each case can be classified easily into appropriate segments by knowing their categories of these predictors.

In CHAID analysis, the dependent variables and predictor variables are categorical. Continuous predictor variables are discretized prior to evaluation.

Figure 1: CHAID Tree Map with Satisfaction of Overall Performance as Dependent Variable (Growing Criteria: Parent node minimum 30 cases and Child node minimum 15 cases; and Likelihood Ratio Chi Square for Nominal Target)
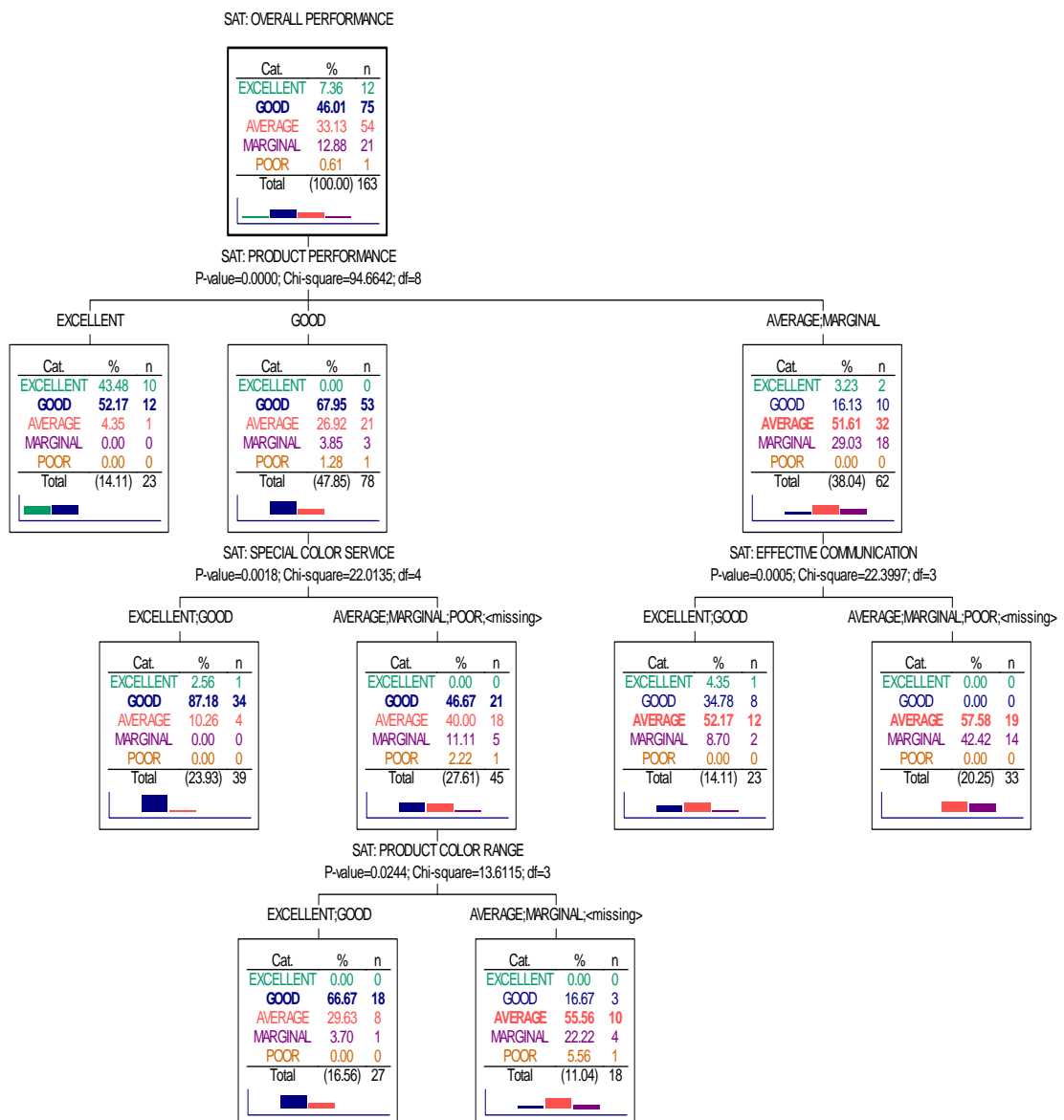
The AnswerTree structure is as below:

Root Node

      $\Rightarrow$ **Node 1**

      $\Rightarrow$ Node 2

        $\Rightarrow$**Node 4**

        $\Rightarrow$Node 5

            $\Rightarrow$ **Node 8**

            $\Rightarrow$ **Node 9**

      $\Rightarrow$ Node 3

        $\Rightarrow$**Node 6**

        $\Rightarrow$**Node 7**

The terminal nodes are bolded in the above tree diagram. The total of the counts of items in the terminal nodes is equal to the count of items in the Root node.

There are nine nodes under the root node. They are numbered as follows (from left to right and then down to the next level):

Node 1 -   **Excellent Product Performance**

Node 2 -   Good Product Performance & Missing

Node 3 -   Average & Marginal Product Performance

Node 4 -   **Excellent & Good Special Color Service**

Node 5 -   Average, Marginal & Poor Special Color Service & Missing

Node 6 -   **Excellent & Good Effective Communication**

Node 7 -   **Average, Marginal & Poor Effective Communication & Missing**

Node 8 -   **Excellent & Good Product Color Range**

Node 9 -   **Average & Marginal Product Color Range & Missing**

There are six terminal nodes (i.e. Nodes 1, 4, 6, 7, 8, 9) in the tree grown by CHAID in Figure 7 above. These terminal nodes are the segments identified by CHAID.

From Figure 7, the variables that segment the dependent variable are: product performance; special color services; effective communication; and product color range. These variables are also the key variables in the discriminant analysis (Cross reference: Section 4.2.3.4).

Table 42: Misclassification matrix for the satisfaction level of overall performance with Coats

		Actual Category					
		Excellent	Good	Average	Marginal	Poor	Total
Predicted Category	Excellent	**0**	0	0	0	0	0
	Good	11	**64**	13	1	0	89
	Average	1	11	**41**	20	1	74
	Marginal	0	0	0	**0**	0	0
	Poor	0	0	0	0	**0**	0
	Total	12	75	54	21	1	**163**

Misclassification Matrix

		Resubstitution
Risk Estimate		**0.355828**
SE of Risk Estimate		0.0374997

The predictability of the CHAID model is summarized in the above misclassification matrix. The diagonal elements represent correct classification. The risk estimate of 0.3558 means that 64.42% of cases are correctly predicted by this model.

Identifying Segment Characteristics

Having identified the nodes that define target segments, it is important to ascertain the criteria how a new case fits into one of these segments. CHAID provides the rules for each node. The followings are the "Rules" for each terminal node:

/* **Node 1** */
(CO_2 = 1);
(Product Performance = Excellent)

/* **Node 4** */

((CO_2 = 0 OR CO_2 IS NULL OR CO_2 = 2) AND (CO_7 = 2 OR CO_7 = 1));

(Product Performance = Missing OR Good)

AND (Special Color Service = Good or Excellent)

/* **Node 6** */

((CO_2 = 4 OR CO_2 = 3) AND (CO_19 = 2 OR CO_19 = 1));

(Product Performance = Marginal OR Average)

AND (Effective Communication = Good OR Excellent)

/* **Node 7** */

((CO_2 = 4 OR CO_2 = 3) AND (CO_19 = 0 OR CO_19 IS NULL OR CO_19 = 5
OR CO_19 = 4 OR CO_19 = 3));

(Product Performance = Marginal OR Average)

AND (Effective Communication = Missing OR Poor OR Marginal OR Average)

/* **Node 8** */

((CO_2 = 0 OR CO_2 IS NULL OR CO_2 = 2) AND (CO_7 = 0 OR CO_7 IS NULL
OR CO_7 = 5 OR CO_7 = 4 OR CO_7 = 3) AND (CO_4 = 2 OR CO_4 = 1));

(Product Performance = Missing OR Good)

AND (Special Color Service = Missing OR Poor Or Marginal OR Average)

AND (Product Color Range = Good OR Excellent)

/* **Node 9** */

((CO_2 = 0 OR CO_2 IS NULL OR CO_2 = 2) AND (CO_7 = 0 OR CO_7 IS NULL
OR CO_7 = 5 OR CO_7 = 4 OR CO_7 = 3) AND (CO_4 = 0 OR CO_4 IS NULL OR
CO_4 = 4 OR CO_4 = 3));

(Product Performance = Missing OR Good)

AND (Special Color Service = Missing OR Poor OR Marginal OR Average)

AND (Product Color Range = Missing OR Marginal OR Average)

Table 43: Gain summary of the satisfaction level of overall performance with Coats (Target = Excellent)

Gain Summary						
Target Variable: SAT: Overall Performance (Target Category: Excellent)						
Node	Node: n	Node: %	Resp: n	Resp: %	Gain(%)	Index(%)
1	23	14.11	10	83.33	43.48	590.58
6	23	14.11	1	8.33	4.35	59.06
4	39	23.93	1	8.33	2.56	34.83
7	33	20.25	0	0.00	0.00	0.00
8	27	16.56	0	0.00	0.00	0.00
9	18	11.04	0	0.00	0.00	0.00

The terminal node gain summary for target variable *Overall Performance* with target category *Excellent* can be interpreted as follows.

- The first row is labeled as Node 1.
- "Node: n" and "Node: %" represent the number of cases (i.e. 23) for node 1 and 14.11 % of the total number of cases (i.e. 163) respectively.
- "Resp: n" and "Resp: %" specify the 10 cases out of 23 cases for node 1 are *Excellent* and this represents 83.33% of the total cases (i.e. 12) with target category *Excellent*.
- The Gain (%) column shows the percentage of the cases in Node 1 that have the target value of *Excellent* for the target variable. (43.48% = 10/23).
- Index (%) is the ratio of the Gain (%) value and the proportion of target category (i.e. *Excellent*) responses in the entire sample (7.36% = 12/163). In other words, Index (%) = (43.48% / 7.36%) x 100% = 590.58% .

The gain summary depicts which of the terminal nodes (segments) have the highest (and lowest) response. The nodes with Gain (%) larger than 100% are performing better than the average of the entire sample in that particular target category, "Excellent" in Table 44.

If Coats wants to ensure customers to have excellent rating on "Overall Performance" they should select customer from Node 1 with the Node Characteristics: (Product Performance = Excellent)

Table 44: Gain summary of the satisfaction level of overall performance with Coats (Target = Good)

Gain Summary						
Target Variable: SAT: Overall Performance (Target Category: Good)						
Node	**Node: n**	**Node: %**	**Resp: n**	**Resp: %**	**Gain(%)**	**Index(%)**
4	39	23.93	34	45.33	87.18	189.47
8	27	16.56	18	24.00	66.67	144.89
1	23	14.11	12	16.00	52.17	113.39
6	23	14.11	8	10.67	34.78	75.59
9	18	11.04	3	4.00	16.67	36.22
7	33	20.25	0	0.00	0.00	0.00

The "Good" Overall Performance come largely from Nodes 4, 8, and 1 with Index (%) exceeding 100%. The segment characteristics of Node 4, 8, and 1 are:

/* **Node 4** */
(Product Performance = Missing OR Good)
AND (Special Color Service = Good or Excellent)

/* **Node 8** */
(Product Performance = Missing OR Good)
AND (Special Color Service = Missing OR Poor Or Marginal OR Average)
AND (Product Color Range = Good OR Excellent)

/* **Node 1** */
 (Product Performance = Excellent)

Table 45: Gain summary of the satisfaction level of overall performance with
Coats (Target = Average)

Gain Summary						
Target Variable: SAT: Overall Performance (Target Category: Average)						
Node	Node: n	Node: %	Resp: n	Resp: %	Gain(%)	Index(%)
7	33	20.25	19	35.19	57.58	173.79
9	18	11.04	10	18.52	55.56	167.70
6	23	14.11	12	22.22	52.17	157.49
8	27	16.56	8	14.81	29.63	89.44
4	39	23.93	4	7.41	10.26	30.96
1	23	14.11	1	1.85	4.35	13.12

The "Average" Overall Performance come largely from Nodes 7, 9, and 6 with Index (%) exceeding 100%. The segment characteristics of Node 7, 9, and 6 are:

/* **Node 7** */
(Product Performance = Marginal OR Average)
AND (Effective Communication = Missing OR Poor OR Marginal OR Average

/* **Node 9** */
 (Product Performance = Missing OR Good)
AND (Special Color Service = Missing OR Poor OR Marginal OR Average)
AND (Product Color Range = Missing OR Marginal OR Average)

/* **Node 6** */
(Product Performance = Marginal OR Average)
AND (Effective Communication = Good OR Excellent)

Table 46: Gain summary of the satisfaction level of overall performance with Coats (Target = Marginal)

Gain Summary						
Target Variable: SAT: Overall Performance (Target Category: Marginal)						
Node	Node: n	Node: %	Resp: n	Resp: %	Gain(%)	Index(%)
7	33	20.25	14	66.67	42.42	329.29
9	18	11.04	4	19.05	22.22	172.49
6	23	14.11	2	9.52	8.70	67.49
8	27	16.56	1	4.76	3.70	28.75
4	39	23.93	0	0.00	0.00	0.00
1	23	14.11	0	0.00	0.00	0.00

The "Marginal" Overall Performance come largely from Nodes 7and 9 with Index (%) exceeding 100%. Since this is the outcome which Coats would like to avoid. They should focus on Nodes with Index (%) less than 100%, viz. Nodes 6, 8, 4, and 1. Their segment characteristics are:

/* **Node 6** */

(Product Performance = Marginal OR Average)

AND (Effective Communication = Good OR Excellent)

/* **Node 8** */

(Product Performance = Missing OR Good)

AND (Special Color Service = Missing OR Poor Or Marginal OR Average)

AND (Product Color Range = Good OR Excellent)

/* **Node 4** */

 (Product Performance = Missing OR Good)

AND (Special Color Service = Good or Excellent)

/* **Node 1** */

 (Product Performance = Excellent)

Table 47: Gain summary of the satisfaction level of overall performance with Coats (Target = Poor)

Gain Summary						
Target Variable: SAT: Overall Performance (Target Category: Poor)						
Node	**Node: n**	**Node: %**	**Resp: n**	**Resp: %**	**Gain(%)**	**Index(%)**
9	18	11.04	1	100.00	5.56	905.56
4	39	23.93	0	0.00	0.00	0.00
7	33	20.25	0	0.00	0.00	0.00
8	27	16.56	0	0.00	0.00	0.00
6	23	14.11	0	0.00	0.00	0.00
1	23	14.11	0	0.00	0.00	0.00

There is only one case expressing "Poor" Overall Performance. This belongs to Node 9 with the following characteristics:

/* **Node 9** */

 (Product Performance = Missing OR Good)

AND (Special Color Service = Missing OR Poor OR Marginal OR Average)

AND (Product Color Range = Missing OR Marginal OR Average)

4.2.3. Discriminant Analysis

This statistical technique was first introduced by Sir Ronald Fisher. Discriminant analysis is used to identify the variables that are important for distinguishing among the groups and to develop a procedure for predicting group membership for new cases whose group membership is undetermined.

The concept for discriminant analysis is simple. Linear combination of the independent (predictor) variables are formed and serve as the basis for classifying cases into one of the groups.

4.2.3.1. Discriminant analysis with Importance Cluster grouping as dependent variable and importance scores as independent variables

Unlike cluster analysis, discriminant analysis needs to know the group membership (i.e. the four clusters groupings generated from the previous section on cluster analysis) for the dependent variable.

A discriminant analysis was performed with importance cluster grouping obtained from the previous section as dependent variable and 21 importance scores as predictor variables. There has 123 missing numbers in the 21 predictor variables of the importance scores. The accuracy for classification is extremely high at 97.39% with 115 valid responses. (See Table 48.1)

However when the missing numbers are replaced by means, the correct percentage drops to 89.16% with 203 valid responses. The 35 Ungrouped cases are due to missing value of the dependent variable from the K-Mean Cluster Analysis. (See Table 48.2)

Table 48.1: Confusion matrix for discriminant analysis with four importance cluster grouping as dependent variable and 21 importance scores as independent variables

```
Classification results -
                      No. of   Predicted Group Membership
     Actual Group     Cases       1        2        3        4
--------------------  ------   -------- -------- -------- --------

Group      1             6         6        0        0        0
                                100.0%      .0%      .0%      .0%

Group      2            57         0       55        0        2
                                   .0%    96.5%      .0%     3.5%

Group      3             1         0        0        1        0
                                   .0%      .0%   100.0%      .0%

Group      4            51         0        1        0       50
                                   .0%     2.0%      .0%    98.0%

Percent of "grouped" cases correctly classified:  97.39%
```

Table 48.2: Confusion matrix for discriminant analysis with four importance cluster grouping as dependent variable and 21 importance scores as independent variables (Replace missing values with mean)

```
Classification results -
                      No. of   Predicted Group Membership
     Actual Group     Cases       1        2        3        4
--------------------  ------   -------- -------- -------- --------

Group      1             8         8        0        0        0
                                100.0%      .0%      .0%      .0%

Group      2           113         0       98        0       15
                                   .0%    86.7%      .0%    13.3%

Group      3             3         0        2        1        0
                                   .0%    66.7%    33.3%      .0%

Group      4            79         1        4        0       74
                                  1.3%     5.1%      .0%    93.7%

Ungrouped cases        35         0        0        0       35
                                   .0%      .0%      .0%   100.0%

Percent of "grouped" cases correctly classified:  89.16%
```

For four outcome groups, there are three canonical discriminant functions. The eigenvalue is the ratio of explained variance over the unexplained variance. The first function has an eigenvalue of 5.23 explaining 68.77% of the variance.

```
                  Canonical Discriminant Functions

             Pct of   Cum  Canonical  After  Wilks'
 Fcn Eigenvalue Variance Pct    Corr      Fcn  Lambda  Chi-square  df  Sig

                                       :    0 .033959    343.334   63  .0000
  1*    5.2300   68.77   68.77   .9162 :    1 .211566    157.652   40  .0000
  2*    1.4315   18.82   87.59   .7673 :    2 .514433     67.466   19  .0000
  3*     .9439   12.41  100.00   .6968 :
   * Marks the 3 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

            Func  1    Func  2    Func  3
S29_1       -.05058     .09142     .31864
S29_2        .24476     .36434     .16798
S29_3        .07803    -.20130     .06214
S29_4        .26397    -.51251    -.24956
S29_5        .30812    -.12386     .00047
S29_6       -.22379     .20057     .05834
S29_7        .54958    -.14616    -.08774
S29_8        .07910     .02301     .09215
S29_9        .49972    -.05109     .50240
S29_10       .25595    -.31249     .13869
S29_11       .18913     .61432     .13993
S29_12       .09673     .00488    -.41766
S29_13       .32588     .06433    -.58312
S29_14       .00973     .14308     .12687
S29_15       .17206     .18554     .33020
S29_16       .33043    -.29767     .00637
S29_17       .13537    -.75256    -.28457
S29_18      -.12838     .36849    -.08443
S29_19      -.02398     .56415    -.26603
S29_20       .20478     .00579     .09946
S29_21       .16232     .11459     .09429
```

Variable S29_7 (Special Color Services) has the largest canonical discriminant coefficient in function 1. This can be interpreted as the variable having the largest influence on the dependent variable.

```
Canonical discriminant functions evaluated at group means (group centroids)

   Group      Func   1    Func   2    Func   3
       1       5.68344     1.32795    -3.09169
       2      -1.98564     -.22328     -.42732
       3       7.91780   -11.83552     -.43033
       4       1.39535      .32539      .84976
```

The above are the coordinates of the group centroids of the four groups after the discriminant analysis.

4.2.3.2. Discriminant analysis with Satisfaction Cluster grouping as dependent variable and satisfaction scores with Coats as independent variables

A discriminant analysis was performed with the satisfaction cluster grouping obtained from K-Mean Cluster Analysis in the previous section as dependent variable and 21 satisfaction scores for Coats as predictor variables. The accuracy for classification is extremely high (98.04%). The smaller number of cases (i.e. 51 responses) being analysed is due to some missing number in the predictor variables (See Table 49.1).

Lower accuracy rate (i.e. 67.54%) is generated in Table 49.2 with 191 valid responses, since its missing value is replaced by the mean.

Table 49.1: Confusion matrix for discriminant analysis with four satisfaction cluster grouping as dependent variable and 21 satisfaction scores with Coats as independent variables

```
Classification results -
                        No. of        Predicted Group Membership
    Actual Group        Cases      1         2         3         4
--------------------    ------   --------  --------  --------  --------

Group      1              7         7         0         0         0
                                  100.0%      .0%       .0%       .0%

Group      2             15         0        14         0         1
                                    .0%      93.3%      .0%       6.7%

Group      3             15         0         0        15         0
                                    .0%       .0%     100.0%      .0%

Group      4             14         0         0         0        14
                                    .0%       .0%       .0%     100.0%

Percent of "grouped" cases correctly classified:  98.04%
```

Table 49.2: Confusion matrix for discriminant analysis with four satisfaction cluster grouping as dependent variable and 21 satisfaction scores with Coats as independent variables (Replace missing values with mean)

```
Classification results -
                        No. of        Predicted Group Membership
   Actual Group         Cases      1          2          3          4
--------------------    ------   --------   --------   --------   --------

Group      1             29        17          1          0         11
                                 58.6%       3.4%        .0%       37.9%

Group      2             61         8         43          6          4
                                 13.1%      70.5%       9.8%        6.6%

Group      3             50         1         11         38          0
                                  2.0%      22.0%      76.0%        .0%

Group      4             51         4         13          3         31
                                  7.8%      25.5%       5.9%       60.8%

Ungrouped cases          47         0         47          0          0
                                   .0%     100.0%        .0%        .0%

Percent of "grouped" cases correctly classified:  67.54%
```

However when the missing numbers are replaced by means, the correct percentage drops to 67.54%. The 47 Ungrouped cases are due to missing value of the dependent variable from the K-mean Cluster Analysis (See Tables 38 and 39).

For four outcome groups, there are three canonical discriminant functions. The eigenvalue is the ratio of explained variance over the unexplained variance. The first function has an eigenvalue of 14.62 explaining 78.43% of the variance.

```
                    Canonical Discriminant Functions
                 Pct of  Cum  Canonical  After  Wilks'
  Fcn Eigenvalue Variance Pct    Corr     Fcn   Lambda  Chi-square  df  Sig

                                       :   0  .008338    179.511    63  .0000
   1*   14.6203   78.43  78.43    .9675 :   1  .130238     76.440    40  .0005
   2*    3.1858   17.09  95.52    .8724 :   2  .545153     22.751    19  .2485
   3*     .8343    4.48 100.00    .6744 :
  *        Marks the 3 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients:

             Func  1    Func  2    Func  3
CO_1        -.16594    -.11527    -.04108
CO_2         .03445    -.26271    -.23121
CO_3        1.11255    -.28861     .24586
CO_4         .48640     .07879     .19170
CO_5         .31724     .23383    -.34607
CO_6         .34162     .09790     .40791
CO_7        -.32820     .47364     .31987
CO_8        -.15371     .01529    -.11701
CO_9         .33686    -.28005    -.09587
CO_10       -.40137    1.23035    -.00784
CO_11        .17532     .39066     .30798
CO_12       -.14238    -.14175     .00203
CO_13       -.43679     .60538     .01980
CO_14        .10341     .45090    -.29778
CO_15        .15922    -.17025     .42956
CO_16        .40603    -.24908    -.40992
CO_17        .37020    -.62980     .22146
CO_18        .38629     .70656    -.40354
CO_19        .42625    -.24485    -.05131
CO_20        .44272    -.65610     .10584
CO_21       -.48797    -.54408    -.05444
```

Variable CO_3 (Product range) has the largest canonical discriminant coefficient in function 1. This can be interpreted as the variable having the largest influence on the dependent variable.

```
Canonical discriminant functions evaluated at group means (group centroids)

   Group      Func   1    Func   2     Func   3
     1       -7.79377     2.25189     -.19652
     2         .83944     -.22464     1.33864
     3        3.92420     1.43858     -.65160
     4       -1.20701    -2.42659     -.63785
```

The above are the coordinates of the group centroids of the four groups after the discriminant analysis.

4.2.3.3. Discriminant analysis with Gap Cluster grouping as dependent variable and gap scores with Coats as independent variables

A discriminant analysis was performed with the gap cluster grouping obtained from K-Mean Cluster Analysis in the previous section as dependent variable and 21 gap scores (i.e. the difference between importance and satisfaction scores) for Coats as predictor variables. The accuracy for classification is perfect, which has 100%. The smaller number of cases (i.e. 44 responses) being analysed is due to some missing number in the predictor variables (See Table 50.1).

Table 50.1: Confusion matrix for discriminant analysis with four gap cluster grouping as dependent variable and 21 gap scores with Coats as independent variables

```
Classification results -

                      No. of    Predicted Group Membership
    Actual Group      Cases        1         2         3         4
-------------------   ------    --------  --------  --------  --------

Group       1           20         20         0         0         0
                                 100.0%       .0%       .0%       .0%

Group       2            1          0         1         0         0
                                   .0%     100.0%       .0%       .0%

Group       3            7          0         0         7         0
                                   .0%       .0%     100.0%       .0%

Group       4           16          0         0         0        16
                                   .0%       .0%       .0%     100.0%

Percent of "grouped" cases correctly classified: 100.00%
```

Table 50.2: Confusion matrix for discriminant analysis with four gap cluster grouping as dependent variable and 21 gap scores with Coats as independent variables (Replace missing values with mean)

```
Classification results -

                      No. of    Predicted Group Membership
   Actual Group       Cases         1         2         3         4
-------------------- ------    --------  --------  --------  --------

Group      1           53         42         0         5         6
                                 79.2%       .0%      9.4%     11.3%

Group      2            1          0         1         0         0
                                   .0%    100.0%       .0%       .0%

Group      3           60         31         0        24         5
                                 51.7%       .0%     40.0%      8.3%

Group      4           64         18         0         1        45
                                 28.1%       .0%      1.6%     70.3%

Ungrouped cases        60         60         0         0         0
                                100.0%       .0%       .0%       .0%

Percent of "grouped" cases correctly classified:  62.92%
```

Lower accuracy rate (i.e. 62.92%) is generated in Table 50.2 with 178 valid responses, since its missing value is replaced by the mean. The 60 Ungrouped cases are due to missing value of the dependent variable from the K-mean cluster analysis.

For four outcome groups, there are three canonical discriminant functions. The eigenvalue is the ratio of explained variance over the unexplained variance. The first function has an eigenvalue of 14.07 explaining 54.74% of the variance.

```
                         Canonical Discriminant Functions
                 Pct of   Cum  Canonical  After  Wilks'
  Fcn Eigenvalue Variance  Pct    Corr     Fcn   Lambda  Chi-square  df  Sig
                                       :    0 .002696    180.438     63  .0000
   1*   14.0728   54.74   54.74   .9663 :    1 .040635     97.695     40  .0000
   2*   10.4973   40.83   95.56   .9555 :    2 .467196     23.211     19  .2282
   3*    1.1404    4.44  100.00   .7299 :
    * Marks the 3 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients
            Func  1     Func  2     Func  3
GAPCO1     -.39479     -.25577      .51762
GAPCO2     1.24420      .42602     -.58307
GAPCO3     -.36151      .11015      .15515
GAPCO4     -.88634      .33893     -.80854
GAPCO5      .38042      .58507      .32384
GAPCO6     1.32459     -.20768      .38639
GAPCO7      .03957      .22865      .28172
GAPCO8     -.58243      .25101      .53444
GAPCO9      .46706      .49324     -.43804
GAPCO10    -.95331      .20741    -1.06988
GAPCO11     .43163      .79725      .04479
GAPCO12    -.05347     -.73676     -.23644
GAPCO13     .00929      .04322      .51827
GAPCO14     .81058     -.33128      .09900
GAPCO15     .57356     -.10496     -.09418
GAPCO16    -.20973     -.16930      .51535
GAPCO17    -.34161      .55530      .14453
GAPCO18     .62004    -1.08386      .77157
GAPCO19    1.03661     1.02698     -.30537
GAPCO20     .06525     -.12210     -.07675
GAPCO21    -.18012      .13336     -.22206
```

There are a few large standardized canonical discriminant function coefficients in function 1. They are: GAPCO6 (Product Price), GAPCO2 (Product Performance), and GAPCO19 (Effective Communication). These thread attributes can be interpreted as the variables having the largest influence on the gap clustering group, dependent variable.

```
Canonical discriminant functions evaluated at group means (group centroids)

   Group     Func  1     Func  2     Func   3
     1        -.18346     1.15046    -1.04766
     2       15.34779   -15.00332    -1.01812
     3        5.13812     3.70784     1.35903
     4       -2.97784    -2.12255      .77863
```

The above are the coordinates of the group centroids of the four gap cluster groups after the discriminant analysis.

4.2.3.4 Discriminant analysis with the overall satisfaction level of overall performance with Coats as dependent variable and satisfaction scores with Coats as independent variables

The last item in question 30 (i.e. satisfaction score of the overall performance with Coats) is believed to be the outcome of the experience with the previous 21 thread attributes. In other words, a customer who is more satisfied with various 21 thread attributes would rate high on the overall performance.

A discriminant analysis is performed to establish the predictability of 21 thread attributes on the satisfaction on overall performance. There are five possible outcomes of the dependent variable viz. Excellent; Good; Average; Marginal and Poor. The confusion matrix indicates the extent of fit from the discriminant analysis with the actual result. The accuracy for classification is 93.88% with 49 responses only is due to the missing cases in the independent variables (See Table 51.1).

Table 51.1: Confusion matrix for discriminant analysis with the satisfaction level of overall performance with Coats as dependent variable and 21 satisfaction scores with Coats as predictor variables

```
Classification results -
                    No. of       Predicted Group Membership
   Actual Group      Cases      1         2         3         4
-------------------- ------   --------  --------  --------  --------

Group      1           3         3         0         0         0
EXCELLENT                     100.0%       .0%       .0%       .0%

Group      2          24         0        23         1         0
GOOD                            .0%     95.8%      4.2%       .0%

Group      3          19         0         1        17         1
AVERAGE                         .0%      5.3%     89.5%      5.3%

Group      4           3         0         0         0         3
MARGINAL                        .0%       .0%       .0%    100.0%

Group      5           0         0         0         0         0
POOR                            .0%       .0%       .0%       .0%

Ungrouped cases        2         0         2         0         0
                                .0%    100.0%       .0%       .0%


Percent of "grouped" cases correctly classified:  93.88%
```

If the missing numbers are replaced by means, the correct percentage reduces from 93.88% to 63.19% with 163 valid responses. The 75 Ungrouped cases are due to missing value of the dependent variable (i.e. satisfaction level of overall performance with Coats).

Table 51.2: Confusion matrix for discriminant analysis with the satisfaction level of overall performance with Coats as dependent variable and 21 satisfaction scores as predictor variables (Replace missing values with mean)

```
Classification results -
                     No. of       Predicted Group Membership
   Actual Group      Cases      1         2         3         4
-------------------- ------   --------  --------  --------  --------

Group      1          12        5         7         0         0
EXCELLENT                      41.7%     58.3%      .0%       .0%

Group      2          75        7        54        12         2
GOOD                           9.3%     72.0%     16.0%      2.7%

Group      3          54        2        12        37         3
AVERAGE                        3.7%     22.2%     68.5%      5.6%

Group      4          21        0         2        12         7
MARGINAL                        .0%      9.5%     57.1%     33.3%

Group      5           1        0         0         0         1
POOR                            .0%       .0%       .0%    100.0%

Ungrouped cases       75        0        67         8         0
                                .0%     89.3%     10.7%      .0%

Percent of "grouped" cases correctly classified:  63.19%
```

The first canonical discriminant function with an eigenvalue of 7.20 explains 77.82% of the variance.

```
                        Canonical Discriminant Functions
                   Pct of  Cum Canonical  After  Wilks'
    Fcn Eigenvalue Variance Pct    Corr    Fcn  Lambda  Chi-square  df  Sig

                                          :   0 .031479   122.774   63  .0000
     1*    7.1994   77.82  77.82   .9370  :   1 .258110    48.080   40  .1782
     2*    1.5065   16.28  94.10   .7753  :   2 .646960    15.459   19  .6930
     3*     .5457    5.90 100.00   .5942  :
      * Marks the 3 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients:

            Func  1   Func  2   Func  3
CO_1         .34257   -.07535    .04629
CO_2        1.11291   -.47350    .20322
CO_3        -.89612    .43468    .06517
CO_4         .27700   -.27172    .66780
CO_5        -.21199    .15846   -.18182
CO_6        -.05542    .56167   -.52422
CO_7         .94648   -.32817   -.07172
CO_8        -.16603   -.30676    .31060
CO_9        -.11987   -.53259   -.24805
CO_10        .26309    .54974    .58498
CO_11       -.48697    .64173   -.39504
CO_12        .36324   -.57979   -.30680
CO_13       -.32754   -.06841    .25342
CO_14        .06058    .68572    .41819
CO_15       -.01360    .43931    .58623
CO_16       -.21227    .64834   -.85644
CO_17        .26468   -.10037   -.11188
CO_18        .22656   -.02935    .23763
CO_19        .48208   -.07544    .48011
CO_20        .41079   -.29817   -.09248
CO_21       -.14143   -.23265   -.91535
```

There are a few large standardized canonical discriminant function coefficients in function 1. They are: CO_2 (Product Performance); CO_7 (Special Color Service); CO_3 (Product Range); CO_11 (Accurate Quantity Delivery); and CO_19 (Effective Communication). (Cross Reference: 4.2.3)

```
Canonical discriminant functions evaluated at group means (group centroids)

    Group      Func  1   Func  2   Func  3

       1      -6.90001   3.07733    .80334
       2      -1.36634   -.82959   -.36227
       3       2.21926    .12911    .64182
       4       3.77543   2.74166  -1.97006
```

The above are the centroid coordinates of the four groups.

4.2.4. Classification prediction on the overall satisfaction level with Coats by Artificial Neural Network (ANN)

Neural network has its history dated back as early as 1790s when Luigi Galvani, first made the connection between electricity and the nervous system, with his experiments on frog legs. The first mathematical endeavor to explain how a network of neurons can calculate appeared in a paper by McCulloch and Pitts in 1943. They showed that a network composed of binary-valued neurons could calculate.

During 1950s, neural computing research concentrated on a processing element called perceptron. The perceptron was capable of some learning and limited generalization to categorize classes of patterns.

However, the perceptron had many limitations. It was a linear device and could not solve nonlinear relationship between inputs and outputs. The limitation of perceptron was pointed out by Marvin Minsky and Seymour Papert, in their book published in 1969.

After the publication of the book, neural researchers entered into the dark ages, where little research continued. It was until 1982, neural computing was revitalized after John Hopfield published his paper in the *Proceedings of the National Academy of Sciences*. The paper described a novel memory model and showed how its properties could be analyzed using methods familiar to statistical physicists.

ANN is simply a new approach of analyzing data. They have the ability to learn complex patterns and trends in the data. In order to emulate human ability to solve problems related to subjective tasks, neural computing has abandoned conventional computing techniques and concentrated on how biological system works.

The human brain is made up of many neurons connected to many others in a network that adapts and changes as the brain learns.

In ANN, each processing element performs a simple task. It is the connection between the processing elements that give neural networks the ability to learn patterns and inter-relations in data.   By producing systems that learn the relationships between data and results, neural networks avoid many of the problems of conventional computing.

ANN can do prediction, classification, time series prediction, and clustering. It finds pattern in the data through an iterative process that makes no assumptions about model form. ANN is good tool for data which have complex, nonlinear interactions or are noisy. The common ANN tools include: Bayesian network, Multi-layer perceptron, Radial Basis Function, Kohonen network.

The application of ANN has mushroomed into many fields (e.g. engineering, medical, quality, business etc…). It has been reported as a better alternative to many traditional statistical approaches.

In this section, ANN is used to predict overall satisfaction on Coats from the 21 thread quality attributes (i.e. Items in Question 30). ANN is used to compare the results obtained from CHAID and discriminant analysis (Cross Reference to Section 4.2.2 and 4.2.3). The purpose of including ANN in this action research is to compare the power of different techniques in predicting classes. The use of different tools can help provide a better understanding of the situation. A better understanding of how customers think and behave can shed light on the segmentation approach.

Unlike the traditional approach, ANN does not work on any preset mathematical model. The best results are generated by testing with different criteria. The data are

divided into training data (to learn the pattern), validation (to avoid over-training) and test data (to test the result).

The following is the topology used in the ANN study on the satisfaction with Coats. The dependent (target) variable is the satisfaction on overall performance with Coats (last item in question 30) and the predictor (input) are the other 21 items in question 30. 60% of the data are randomly assigned for training purposes, 20% for validation purposes and 20% for testing purposes. The Radial Basis Function (RBF) network is used. RBF is receptive to local regions in the input feature space. It operates by measuring the distance between the input vector and the centre of each of its basis functions. The training with RBF is faster than with Muti-Layer Perceptron (MLP). Both RBF and MLP are supervised neural networks, requiring both inputs and targets. The learning algorithm works as a teacher, and modifies the network weights so that the model will learn the mapping from input target.
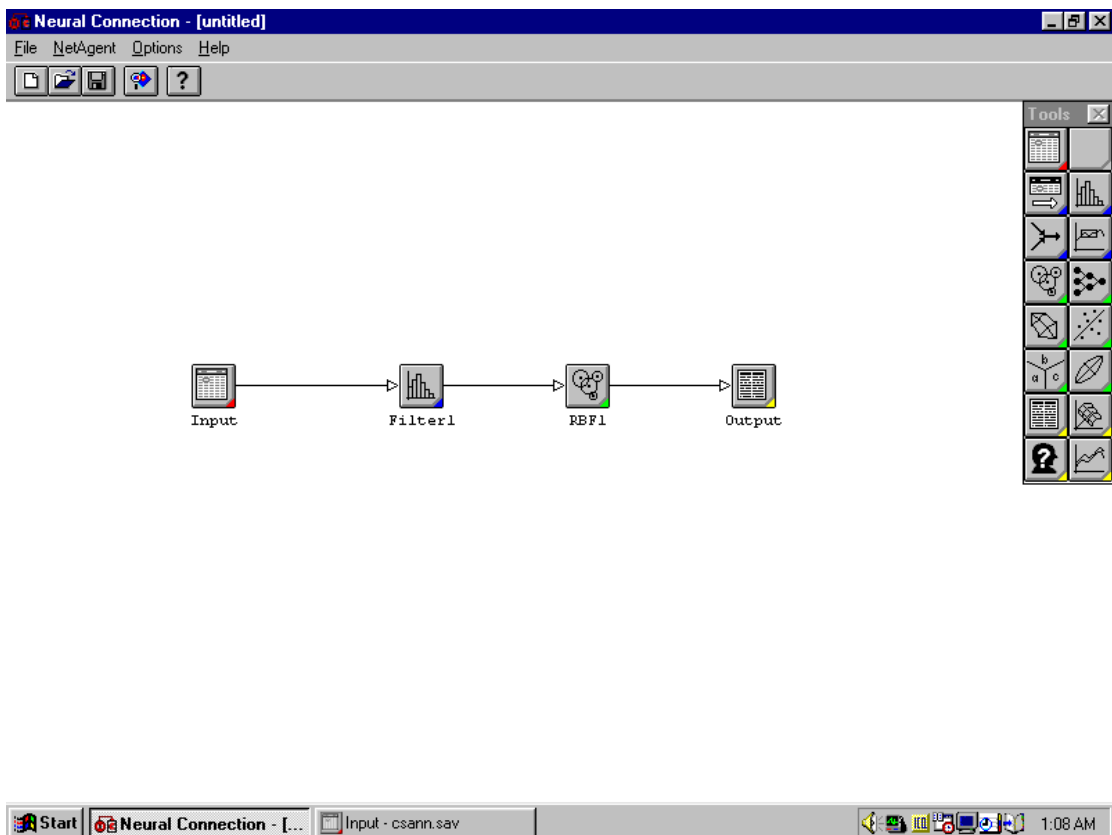
The best prediction result was 73.01 % correct.

With 5 bins division of the target data, the confusion matrix from the above ANN topology is as below:

Table 52:   Confusion matrix of ANN Analysis

		Predicted outcomes of Overall Performance				
		Excellent	Good	Average	Marginal	Poor
Actual Outcomes of Overall Performance	Excellent	10	2	0	0	0
	Good	8	59	8	0	0
	Average	0	15	38	1	0
	Marginal	0	0	8	11	1
	Poor	0	0	0	0	1

The accuracy of ANN confusion matrix can be compared with the results of other methodologies. (Cross reference: Table 42)

4.2.5   Utility Analysis

Utility Analysis is also known as Conjoint Analysis or Trade-off Analysis. It is a powerful research tool to reveal the utility (value) attached to a particular product attribute by the respondent. Unlike the traditional approach where respondents are asked to rate the importance of each product attribute individually, utility analysis uses a holistic and realistic approach. In reality, a customer makes his buying decision based on a conjoint basis of all the product attributes.

Utility Analysis models how customers make trade-off decision among multi-attribute products. It can establish the relative values of particular attributes and identifies the trade-off which customers would make in selecting a product. Utility Analysis produces two important results:

1. *Utility of attribute: a numerical expression of the value consumers place in an attribute level.*
2. *Importance of attribute: a measure of the relative importance of a particular product attribute*

As the number of possible combinations can be very large, an orthogonal array profile with reduced size is used for the utility analysis. The following factors (i.e. attributes) and factor levels (i.e. attribute levels) have been developed through a series of focus group discussions using the top Important scores (Table 29.2) and the top gaps for Coats (Tables 30.1.3) as reference.

The factors used were selected from the key question items under question 29 in the customer survey questionnaire.

Table 53: Listing of factors and factor levels for Utility Analysis

Factors	Factor Levels
Product Performance	High
	Average
	Low
Price	High
	Average
	Low
Responsiveness of Sales	High
	Average
	Low
Stock Availability	100% Available
	90% Available
	80% Available
Delivery Lead Time	1 – 3 Days
	4 – 7 Days
	Over 7 Days
Accurate Quantity Delivery	100% Accuracy
	90% Accuracy
	80% Accuracy
China Delivery Service	With China Delivery
	Without China Delivery

The possible combination of all factor levels can become too large (e.g. in the above table it amounts to: 3 x 3 x 3 x 3 x 3 x 3 x 2 = 1458 combinations) for respondents to rank or score in a meaningful way. Using the orthogonal design only 18 profiles are needed. In order to check the validity of the analysis, two hold out cases are included. The hold out cases are not used in computation of utility analysis but are used as a test of the prediction accuracy of the calculated utility scores. They are cases 10 and 13 in the Utility Profile Sheet which is annexed as Appendix 2.

4.2.4.1.   Decentring Approach

Although utility analysis has proven to be so powerful, some people still reckon it as complicated. It was unfortunate that the Managing Director of Coats viewed the utility analysis to be too complicated for the thread customers to complete, he decided that utility questionnaire should not be administered with Coats' customers. As a compromise, the Associate arranged with the sales representatives to fill in the Utility Profile Sheet on decentring basis.   Each sales representative was briefed with the utility analysis approach and they were asked to decentre into the position of one of their most familiar thread customers and complete the Utility Profile Sheet from that customers' perspective. They were asked to move away from an egocentric mode (i.e. seeing things from their own point of view) to decentre into that particular role (i.e. seeing things from the shoes of the others).   The "decentring" approach is adapted from child development psychology (Webster and Hung 1994). It is the ability to move flexibly from one point of view to another, and back again – so as to move closer to an objective view of the whole (Donaldson 1978).

There were ten completed Utility Profile Sheets. The summary of the Utility Analysis is as below.   The high Pearson's R (0.994) indicates that the utility scores produced can accurately predict the preference scores (minimum 0, …, maximum 100). Similarly the Kendall' tau is shown.   Pearson's R is a measure of association for continuous data and Kendall's tau is the measure of association for ordinal data.

Table 54: Utility Analysis Summary

```
SUBFILE SUMMARY

 Averaged
Importance    Utility        Factor

+---------+                  A
I29.34   I  7.6278               I----    High Product Perform
+---------+   .1111              I        Average Product Perf
          I -7.7389         ----I         Low Product Performa
          I
    +----+                    B
15.92I   I -3.8889            --I         High Price
    +----+   .7778              I         Average Price
          I  3.1111            I--        Low Price
          I
    +----+                    C
13.29I   I   .8611             I          High Responsiveness
    +----+  2.0611            I-           Average Responsivene
          I -2.9222          --I          Low Responsiveness o
          I
     +-+                      D
 7.03  I I   .6611             I          100% Stock Available
     +-+    .9611              I           90% Stock Available
          I -1.6222           -I          80% Stock Available
          I
    +--+                      E
 9.54  I I   .9111             I          1-3 days Delivery le
    +--+    .2944              I           4-7 days Delivery le
          I -1.2056           -I          Over 7 days Delivery
          I
    +---+                     F
13.12 I  I  2.1444            I-          100% Accurate Quanti
    +---+ -1.0556            -I           90% Accurate Quantit
          I -1.0889          -I           80% Accurate Quantit
          I
    +---+                     G
11.76 I  I  3.5542            I--         With China Delivery
    +---+ -3.5542            --I          Without China Delive
          I
            62.6208          CONSTANT

Pearson's R   =  .994                   Significance =  .0000

Kendall's tau =  .914                   Significance =  .0000
Kendall's tau = 1.000 for 2 holdouts    Significance =  .
```

The overall importance of the various attributes in descending order are:

Product Performance:	29.34
Price:	15.92
Responsiveness of Sales:	13.29
Accurate Quantity Delivery:	13.12
China Delivery:	11.76
Delivery Lead-time:	9.54
Stock Availability:	7.03

The order is somewhat similar with that in Table 29.2.

The Importance score for each factor is calculated as the percentage of the range of utility scores for that particular factor over the sum of ranges of utility scores for all factors. They would add up to 100.

The constant and the utility scores are used to estimate the preference score for each profile combination. They are similar to the calculation of multiple linear equation. Assuming that Coats has the following factor levels:

> High Product Performance
>
> High Price
>
> High Sales Responsiveness
>
> 90% Stock Availability
>
> 1-3 days delivery leadtime
>
> 90% Accurate quantity delivered
>
> With China Delivery

Estimated Preference score for Coats

$$= \text{Constant} + \Sigma \text{ (utility scores of relevant factor levels)}$$
$$= 62.62 + 7.63 - 3.89 + 0.86 + 0.96 + 0.91 - 1.06 + 3.55$$
$$= \underline{71.58}$$

The highest possible preference score

$$= 62.62 + 7.63 + 3.11 + 2.06 + 0.96 + 0.91 + 2.14 + 3.55$$
$$= \underline{82.98}$$

The lowest possible preference score

$$= 62.62 - 7.74 - 3.89 - 2.92 - 1.62 - 1.21 - 1.09 - 3.55$$
$$= \underline{40.60}$$

The following table summarizes the original preference scores for the 20 profile cases (including two hold out cases) and the predicted scores from utility analysis.

Table 55: Original Preference Score for Utility Analysis

```
SEQ1:     40.00    40.00    40.00    70.00    55.00    60.00    65.00    75.00    60.00    40.00
SEQ11:    50.00    80.00    70.00    60.00    80.00    90.00    70.00    40.00    60.00    65.00
SUBJ: 1552 - Fairyard Gmt Mfg

SEQ1:     40.00    40.00    40.00    70.00    70.00    75.00    75.00    70.00    60.00    40.00
SEQ11:    50.00    70.00    60.00    60.00    70.00    80.00    70.00    40.00    50.00    60.00
SUBJ: 2667 - Alaman Co

SEQ1:     40.00    40.00    40.00    60.00    50.00    70.00    60.00    65.00    60.00    40.00
SEQ11:    50.00    60.00    55.00    55.00    60.00    80.00    60.00    40.00    55.00    60.00
SUBJ: 4081 - Man Wah Embroidery

SEQ1:     80.00    50.00    40.00   100.00    60.00    80.00    70.00    65.00    60.00    65.00
SEQ11:    60.00    95.00    75.00    70.00    85.00    95.00    75.00    70.00    75.00    90.00
SUBJ: 4690 - Sam Sam (Mei Wah)

SEQ1:     85.00    80.00    90.00    95.00    85.00    80.00    75.00    80.00    75.00    80.00
SEQ11:    70.00    75.00    70.00    90.00    75.00    75.00    80.00    70.00    85.00    85.00
SUBJ: 1458 - Sinopair

SEQ1:     80.00    75.00    75.00    95.00    80.00    75.00    75.00    70.00    70.00    80.00
SEQ11:    75.00    70.00    70.00    80.00    85.00    85.00    85.00    80.00    85.00    75.00
SUBJ: 2867 - Shan Fat

SEQ1:     60.00    40.00    40.00    30.00    20.00    50.00    60.00    70.00    40.00    30.00
SEQ11:    30.00    40.00    50.00    30.00    80.00    60.00    40.00    30.00    40.00    50.00
SUBJ: 6392 - Hwa Fuh Mfg Co

SEQ1:     80.00    60.00    60.00    90.00    80.00    70.00    60.00    70.00    70.00    60.00
SEQ11:    60.00    70.00    70.00    60.00    60.00    80.00    70.00    70.00    60.00    60.00
SUBJ: 5517 - Universal Leather

SEQ1:     63.00    48.00    60.00    70.00    63.00    58.00    61.00    67.00    55.00    56.00
SEQ11:    45.00    64.00    68.00    30.00    83.00    78.00    58.00    23.00    28.00    72.00
SUBJ: 7314 - Regatex Mfg Ltd

SEQ1:     52.00    35.00    38.00    70.00    45.00    50.00    62.00    63.00    58.00    59.00
SEQ11:    52.00    65.00    66.00    59.00    78.00    75.00    63.00    45.00    66.00    63.00
SUBJ: 4491 - Treat Best
```

The first row starting with SEQ1 covers the first ten cases and the second row starting SEQ11 covers case11 to case 20. The name of the "decentred" subject is shown on the third line of each case.

Cases 10 and 13 are the hold-out cases. These values should be compared with the predicted scores from the Utility Analysis shown in Table 56.

Table 56: Predicted Preference Scores for Utility Analysis

```
SCORE1:     46.67    35.83    40.83    72.50    54.17    64.17    58.33    75.00    61.67    39.17
SCORE11:    50.00    78.33    68.33    61.67    76.67    88.33    67.50    37.50    63.33    67.50
SUBJ: 1552 - Fairyard Gmt Mfg

SCORE1:     45.42    38.33    45.00    73.75    65.00    76.67    69.58    70.00    57.92    34.17
SCORE11:    50.00    72.08    62.92    58.75    61.25    81.25    66.25    36.25    58.75    63.75
SUBJ: 2667 - Alaman Co

SCORE1:     40.83    41.67    38.33    63.33    51.67    68.33    59.17    65.83    55.83    37.50
SCORE11:    49.17    64.17    59.17    59.17    59.17    75.83    56.67    38.33    55.83    61.67
SUBJ: 4081 - Man Wah Embroidery

SCORE1:     74.58    50.83    40.83    93.75    59.17    79.17    75.42    63.33    63.75    35.00
SCORE11:    61.67    91.25    92.08    64.58    88.75   100.42    81.25    72.92    71.25    87.08
SUBJ: 4690 - Sam Sam (Mei Wah)

SCORE1:     77.92    81.67    90.00    87.92    85.00    78.33    82.08    78.33    78.75    80.83
SCORE11:    71.67    71.25    78.75    84.58    80.42    80.42    87.08    73.75    79.58    81.25
SUBJ: 1458 - Sinopair

SCORE1:     78.75    75.83    75.00    92.92    80.00    74.17    76.25    68.33    69.58    71.67
SCORE11:    76.67    70.42    82.08    79.58    85.42    85.42    87.08    78.75    84.58    76.25
SUBJ: 2867 - Shan Fat

SCORE1:     63.33    41.67    38.33    33.33    21.67    48.33    56.67    68.33    33.33    50.00
SCORE11:    31.67    46.67    51.67    36.67    76.67    53.33    36.67    23.33    43.33    56.67
SUBJ: 6392 - Hwa Fuh Mfg Co

SCORE1:     74.17    65.00    60.00    82.50    80.00    65.00    65.83    63.33    65.83    48.33
SCORE11:    66.67    74.17    72.50    59.17    60.83    80.83    77.50    64.17    59.17    65.83
SUBJ: 5517 - Universal Leather

SCORE1:     65.08    48.50    61.67    75.08    61.33    57.50    58.92    69.50    51.92    46.33
SCORE11:    42.50    67.08    71.75    30.92    78.75    77.08    52.92    22.92    32.25    72.08
SUBJ: 7314 - Regatex Mfg Ltd

SCORE1:     52.83    34.67    38.50    70.50    44.50    50.33    61.17    63.00    57.83    44.83
SCORE11:    52.00    65.17    62.83    59.00    77.00    75.00    62.50    44.50    67.00    63.50
SUBJ: 4491 - Treat Best
```

The predicted preference scores are amazingly close to the original preference scores in Table 55. Even the preference scores of the two hold-out cases are accurately predicted from the utility scores generated by the Utility Analysis.

Comparison of the scores from Tables 55 and 56 affirms the predictive power of Utility Analysis. If a large enough sample of respondents are available to complete the utility profile sheet, then the utility scores obtained can be a good criterion to segment the market. Unfortunately, the Managing Director of Coats did not support the use of this research technique.

The ten profiles obtained on decentring basis are at best indicative of the actual situation.

To sum up, Utility Analysis has the following benefits over other techniques:

- Different product attributes can be directly compared (i.e. apples and bananas are comparable)
- Customer's decision process can be more realistically simulated. The utilities of various product attributes are considered on a conjoint basis.
- The utilities obtained from the utility analysis can be treated as the "hidden" needs of the customers. Without the help of utility analysis, even the customers themselves would not know how strong a particular product attribute (or an aggregate of a few attributes) is influencing their purchase decision.
- The design of utility analysis can avoid much bias of the traditional approach e.g. central tendency of scores
- With the utility analysis findings, the concerned company can make informed decision to improve selectively and effectively by focusing on those key product attributes with significant utility scores.
- The accuracy can be tested by comparing the original and predicted scores. The inclusion of hold-out cases can add more weights on the predictability of the utility analysis.

On the other hand, the utility analysis may have the following possible drawbacks:

- Some people may find the Utility Profile Sheet difficult to understand.
- Garbage In Garbage Out – The respondents can simply dump figures in the profile sheet without seriously comparing one profile option with another. (This may be detected from the low Pearson's R and eliminated from the analysis)
- There is a limit on the number of product attributes used for the utility analysis. Apart from the software constraint by SPSS limiting the maximum attributes to ten, the respondents would find it difficult to rate a product with too many attributes.
- Special computer software (e.g. SPSS Categories) is needed for utility analysis.
- The respondents would need to be briefed how to score the utility profile sheet.

4.2.6 Multi-Dimensional Scaling (MDS)

Multi-Dimensional Scaling is used to analyze distance-like data called dissimilarity (or similarity) data. MDS can depict an object or event as a point in a multi-dimensional space. This is a technique used in market positioning study. In this section, the positioning of various thread suppliers are determined by means of MDS which constructs a conceptual map of locations of thread suppliers relative to each other from data that specify how different they are. The MDS is developed from a similarity distance matrix among the major thread suppliers in Hong Kong. The views of the Marketing Manager of Coats, who is very knowledgeable about the thread market, was used for this MDS analysis.

There are four kinds of MDS analyses:
- Classical MDS (one matrix, Euclidean model);
- Replicated MDS (several matrices, Euclidean model);
- Weighted MDS (several matrices, general Euclidean model); and
- Generalized MDS (several matrices, general Euclidean model)

The Euclidean distance d_{ij} between points *i* and *j* is defined as:

$$d_{ij} = [\ \Sigma\ (x_{ia} - x_{ja})^2\ ]^{\frac{1}{2}}$$

where x_{ia} specifies the position (coordinate) of point *i* on dimension *a*.

MDS can further be classified according to whether the dissimilarity data are measured on an ordinal scale (called nonmetric MDS) or an interval or ratio scale (metric MDS).

S-stress is the measure for fit for MDS ranging from 1 (worst possible fit) to 0 (perfect fit). It is the square root of the ratio of the error sums of squares to the total

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sums of squares, where the error sums of squares is calculated between the squared distances and the transformed data, and the total sums of squares is calculated on the transformed data.

The data for the current MDS analysis are ordinal and square asymmetric in nature. It is a Classical MDS approach.

4.2.6.1 Major thread suppliers positioning

Nine thread suppliers were selected for the Classical MDS analysis. They are:

Coats   (co)

Gunzetal   (gz)

Goldlink   (gl)

A & E   (ae)

Tse Yu   (ty)

Paris   (pa)

Sakura   (sa)

Kingfish   (kf)

Wire   (wi)

The similarity data matrix is as below:

(with 1 = most similar, … , 8 = most dissimilar)

Table 57:   Distance matrix for MDS Analysis

	Coats	Gunzetal	Goldlink	A&E	Tse Yu	Paris	Sakura	Kingfish	Wire
Coats	0	1	3	2	4	8	7	6	5
Gunzetal	1	0	2	3	4	5	7	6	8
Goldlink	4	1	0	2	3	5	7	6	8
A&E	1	2	3	0	4	5	7	6	8
Tse Yu	4	2	1	3	0	5	7	6	8
Paris	5	4	7	8	6	0	2	1	3
Sakura	5	4	7	6	8	3	0	2	1
Kingfish	5	4	7	6	8	1	2	0	3
Wire	4	5	7	6	8	3	1	2	0

```
Iteration history for the 2 dimensional solution (in squared distances)

                Young's S-stress formula 1 is used.

             Iteration    S-stress      Improvement

                 1          .35236
                 2          .30734        .04502
                 3          .30124        .00610
                 4          .29968        .00156
                 5          .29884        .00084


                    Iterations stopped because
            S-stress improvement is less than   .001000


             Stress and squared correlation (RSQ) in distances

RSQ values are the proportion of variance of the scaled data (disparities)
           in the partition (row, matrix, or entire data) which
            is accounted for by their corresponding distances.
              Stress values are Kruskal's stress formula 1.


              For  matrix
     Stress  =   .22602     RSQ =  .80644
```

This S-stress value is acceptable.

```
Configuration derived in 2 dimensions
Stimulus Coordinates

                     Dimension

Stimulus   Stimulus    1         2
 Number      Name

    1        AE        1.1038    .7909
    2        CO         .9184   1.1212
    3        GL        1.2715   -.6099
    4        GZ        1.1215    .6708
    5        KF         .0273  -1.2883
    6        PA       -1.3174   -.3756
    7        SA       -1.4466    .5645
    8        TY        -.2542  -1.4208
    9        WI       -1.4242    .5471
```

The coordinates of the nine thread suppliers are the locations (market positioning) on the perceptual map of the respondent. These can be depicted in the following two-dimensional map. There are three clusters of thread suppliers.

Cluster 1:   Coats, A&E, Gunzetal and Goldlink

Cluster 2:   Sakura, Wire and Paris

Cluster 3:   Tse Yu and Kingfish

Dimension 1: measures the nature of the thread (Embroidery on the left vs. General sewing thread on the right)

Dimension 2 measures the size of the thread suppliers (large size on the top and small size in the bottom)

Figure 2:   Perceptual mapping of thread manufacturers by MDS

MDS of Thread Suppliers
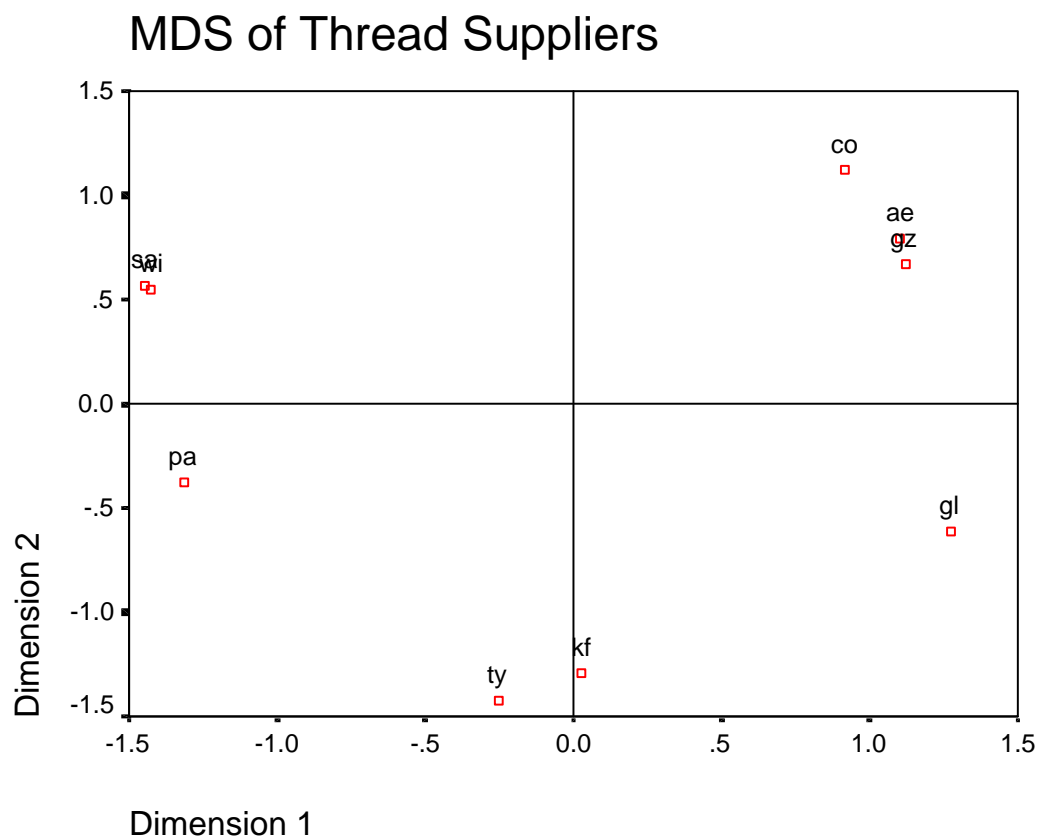
MDS is useful to describe the relative positioning of the thread suppliers in the market. Different respondents have different perceptions. The above Classical MDS analysis serves as an indication of the possible dimensions that thread customers may view the thread suppliers. This information is useful in developing the segmentation strategy so that the desired market position can be identified as target for selected customer segments.

4.2.5. Independent Samples T-Test

T-Test is used to test the hypothesis about differences in means for two samples. The variances of the two samples can be similar or they can be different.

The test statistic for unequal variance is:

$$T = (X_1 - X_2) / (S_1^2/N_1 + S_2^2/N_2)^{1/2}$$

Where X_1 is the sample mean of group 1, S_1^2 is the variance, and N_1 is the sample size and X_2 is the sample mean of group 2, S_2^2 is the variance, and N_2 is the sample size.

The test statistic for unequal variance is:

$$T = (X_1 - X_2) / (S_p^2/N_1 + S_p^2/N_2)^{1/2}$$

Where X_1 and X_2 are the sample means of groups 1 and 2, S_p^2 is the variance, and N_1 and N_2 are the sample sizes.

Levene's test of equality of variances is performed to decide which test to use. It is the common practice to use significance level of 0.05 to test if the means of two samples are different.

There are a few dichotomous choices for the respondents in the Customer Survey Questionnaire. These are questions 13, 14, 15, 16, 23, 24, 25, and 26.

Independent samples T-Test is applied to test if those respondents split into these two subgroups according to their answers are significantly different at 0.05 level, with their satisfaction on Coats' overall performance (question 30).

4.2.7.1   Result on overall satisfaction level with Coats

Table 58:   T-tests for independent samples of Question 13 THREAD SUPPLIER NEED ISO

```
                        Number
      Variable         of Cases   Mean      SD      SE of Mean
   -------------------------------------------------------------
     CO_22   SAT: OVERALL PERFORMANCE

     YES                104      2.6154    .780        .076
     NO                  50      2.3200    .868        .123
   -------------------------------------------------------------

     Mean Difference = .2954

     Levene's Test for Equality of Variances: F= .131   P= .718


      t-test for Equality of Means                        95%
   Variances  t-value   df    2-Tail Sig   SE of Diff   CI for Diff
   -------------------------------------------------------------------
   Equal      2.12     152        .035        .139      (.020, .571)
   Unequal    2.04     88.12      .044        .145      (.008, .583)
   -------------------------------------------------------------------
```

The Levene's Test for equality of variance suggests that the variances of the two groups are equal. Hence the satisfaction level of those who expect their thread suppliers to have ISO is less satisfied with Coats than those who do not expect ISO certification by their thread suppliers at 0.035 significance level. This is because those who expect ISO certification from their suppliers are more demanding customers. They expect a higher performance standard from their suppliers.

Table 59: T-tests for independent samples of Question 14 THREAD
SUPPLIER NEED OKO-TEX

```
                        Number
          Variable      of Cases   Mean      SD      SE of Mean
        -------------------------------------------------------------
          CO_22  SAT: OVERALL PERFORMANCE

          YES             102      2.5294    .767       .076
          NO               50      2.4800    .909       .129
        -------------------------------------------------------------

          Mean Difference = .0494

          Levene's Test for Equality of Variances: F= 2.461  P= .119


          t-test for Equality of Means                     95%
        Variances t-value   df    2-Tail Sig  SE of Diff   CI for Diff
        -------------------------------------------------------------
         Equal      .35    150        .726       .141     (-.229, .328)
         Unequal    .33    84.20      .741       .149     (-.248, .346)
        -------------------------------------------------------------
```

The two groups with different views on Oko-Tex Standard 100 requirement are not
statistically different in their satisfaction with Coats' Overall Performance.

Table 60: T-tests for independent samples of Question 15 THREAD
SUPPLIER NEED OTHER QUALITY STD

```
                        Number
          Variable      of Cases   Mean      SD      SE of Mean
        -------------------------------------------------------------
          CO_22  SAT: OVERALL PERFORMANCE

          YES              35      2.6857    .758       .128
          NO               96      2.3750    .811       .083
        -------------------------------------------------------------

          Mean Difference = .3107

          Levene's Test for Equality of Variances: F= .387   P= .535


          t-test for Equality of Means                     95%
        Variances t-value   df    2-Tail Sig  SE of Diff   CI for Diff
        -------------------------------------------------------------
         Equal     1.97    129        .051       .157     (-.001, .622)
         Unequal   2.04    64.29      .046       .153     (.006, .616)
        -------------------------------------------------------------
```

The Levene's test suggests that the variances are equal for the two groups which
differ on other quality requirement from the thread suppliers. The difference is not
significant at 0.05 level.

Table 61:   T-tests for independent samples of Question 16   RESPONSIBLE

FOR COLOR MATCHING

```
                          Number
            Variable     of Cases   Mean      SD      SE of Mean
          ----------------------------------------------------------
            CO_22  SAT: OVERALL PERFORMANCE

            YES              114     2.5789    .830       .078
            NO                43     2.3721    .846       .129
          ----------------------------------------------------------

            Mean Difference = .2069

            Levene's Test for Equality of Variances: F= .024   P= .876


            t-test for Equality of Means                       95%
          Variances  t-value   df    2-Tail Sig   SE of Diff   CI for Diff
          ----------------------------------------------------------
            Equal     1.39    155        .168        .149     (-.088, .502)
            Unequal   1.37    74.38      .174        .151     (-.093, .507)
          ----------------------------------------------------------
```

The difference of the means of the two groups are not significant at 0.05 level.

Table 62:   T-tests for independent samples of Question 23   GARMENT

ACCESSORY DELIVERED IN CHINA

```
                          Number
            Variable     of Cases   Mean      SD      SE of Mean
          ----------------------------------------------------------
            CO_22  SAT: OVERALL PERFORMANCE

            YES              112     2.5714    .877       .083
            NO                49     2.4694    .739       .106
          ----------------------------------------------------------

            Mean Difference = .1020

            Levene's Test for Equality of Variances: F= 2.451  P= .119


            t-test for Equality of Means                       95%
          Variances  t-value   df    2-Tail Sig   SE of Diff   CI for Diff
          ----------------------------------------------------------
            Equal      .71    159        .478        .144     (-.181, .386)
            Unequal    .76    107.75     .449        .134     (-.164, .368)
          ----------------------------------------------------------
```

The difference of the means of the two groups are not significant at 0.05 level.

Table 63: T-tests for independent samples of Question 24   PLAN TO HAVE

THREAD DELIVERED IN CHINA

```
                       Number
        Variable      of Cases   Mean      SD      SE of Mean
     ---------------------------------------------------------------
       CO_22   SAT: OVERALL PERFORMANCE

       YES              111     2.5856    .858       .081
       NO                46     2.4565    .751       .111
     ---------------------------------------------------------------

       Mean Difference = .1291

       Levene's Test for Equality of Variances: F= 1.454  P= .230


        t-test for Equality of Means                      95%
      Variances  t-value   df    2-Tail Sig   SE of Diff   CI for Diff
     ---------------------------------------------------------------
       Equal      .89     155        .376       .145     (-.158, .416)
       Unequal    .94     95.34      .350       .137     (-.144, .402)
     ---------------------------------------------------------------
```

The difference of the means of the two groups are not significant at 0.05 level.

Table 64: T-tests for independent samples of Question 25   INTEREST IN

TECHNICAL ADVISORY SERVICE

```
                       Number
        Variable      of Cases   Mean      SD      SE of Mean
     ---------------------------------------------------------------
       CO_22   SAT: OVERALL PERFORMANCE

       YES               68     2.5882    .815       .099
       NO                80     2.4500    .825       .092
     ---------------------------------------------------------------

       Mean Difference = .1382

       Levene's Test for Equality of Variances: F= .033   P= .857


        t-test for Equality of Means                      95%
      Variances  t-value   df    2-Tail Sig   SE of Diff   CI for Diff
     ---------------------------------------------------------------
       Equal     1.02     146        .309       .135     (-.129, .406)
       Unequal   1.02     142.74     .308       .135     (-.129, .406)
     ---------------------------------------------------------------
```

The difference of the means of the two groups are not significant at 0.05 level.

**Table 65:   T-tests for independent samples of Question 26   PLAN SET UP
EDI WITH THREAD SUPPLIER**

```
                       Number
          Variable     of Cases   Mean      SD      SE of Mean
          CO_22  SAT: OVERALL PERFORMANCE

          YES             21      2.2857    .845      .184
          NO             126      2.5238    .817      .073
```

```
     Mean Difference = -.2381

     Levene's Test for Equality of Variances: F= .108   P= .743
```

```
     t-test for Equality of Means                        95%
  Variances  t-value   df    2-Tail Sig   SE of Diff   CI for Diff
  Equal      -1.23    145       .220        .193      (-.621, .144)
  Unequal    -1.20    26.61     .240        .198      (-.645, .169)
  ----------------------------------------------------------------
```

The difference of the means of the two groups are not significant at 0.05 level.

As an action learning research, the research findings have to be as pragmatic as possible.   The eight dichotomous questions (i.e. questions13, 14, 15, 16, 23, 24, 25, and 26) should be tested against the 21 "gaps" for Coats. The gaps are the areas for improvement for Coats. The management of Coats needs to know which "customer segment" have different gap perceptions so that appropriate actions can be taken.

In order to save space for this report, only statistically significant items are reported in a consolidated format.

4.2.7.2   Result on Gap scores with Coats

Table 66:   Gap Analysis by Question 13   THREAD SUPPLIER NEED ISO

Question 13: Require Suppliers to have ISO management standard	Mean of "Yes" Group (143 counts)	Mean of "No" Group (78 counts)	Significance Level
GAPCO_1 Brand Image	-0.20	-0.56	0.099
GAPCO_2 Product performance	0.65	0.58	0.665
GAPCO_3 Product Range	0.54	0.08	0.015*
GAPCO_4 Colour Range	0.93	0.57	0.072
GAPCO_5 Packaging	-0.08	-0.62	0.030*
GAPCO_6 Price	2.32	2.13	0.330
GAPCO_7 Special Colour Services	1.26	0.45	0.009*
GAPCO_8 Thread Sample	0.97	0.58	0.078
GAPCO_9 Technical Advisory Services	0.68	0.03	0.032*
GAPCO_10 Delivery Quality and Reliability	1.39	1.00	0.032*
GAPCO_11 Accurate Quantity Delivery	1.30	0.84	0.008*
GAPCO_12 Delivery Lead-time	1.65	1.14	0.005*
GAPCO_13 Stock Availability	1.72	1.69	0.870
GAPCO_14 Flexible Dyed Quntity Policy	1.47	1.14	0.172
GAPCO_15 China Delivery	1.28	1.29	0.995
GAPCO_16 Supplier Reputation	0.78	0.35	0.032*
GAPCO_17 Responsiveness of Sales Representative	0.84	0.54	0.127
GAPCO_18 Professionalism of Sales Representative	0.78	0.76	0.903
GAPCO_19 Effective Communication	0.79	0.47	0.090
GAPCO_20 Partnership Orientation	0.65	0.27	0.075
GAPCO_21 International Coverage	-0.08	-0.44	0.295

From the above table, items which are different significantly (at 0.05 level) are related with quality and service. It is natural that the customer segment that requires ISO quality management standards from their thread suppliers are more demanding on quality and hence there are larger gaps in these quality aspects (marked with an asterisk (*) in the table above). In order to attract this particular customer segment, Coats management needs to bridge these quality related performance gaps. The higher the means of the "gaps" the more important it is to improve on these areas.

Table 67:   Gap Analysis by Question 14   THREAD SUPPLIER NEED OKO-TEX

Question 14: Require Suppliers to be qualified for Oko-Tex Standard 100	Mean of "Yes" Group (141 counts)	Mean of "No" Group (75 counts)	Significance Level
GAPCO_1 Brand Image	-0.30	-0.48	0.433
GAPCO_2 Product performance	0.55	0.68	0.478
GAPCO_3 Product Range	0.45	0.13	0.093
GAPCO_4 Colour Range	0.81	0.77	0.852
GAPCO_5 Packaging	-0.15	-0.52	0.142
GAPCO_6 Price	2.17	2.28	0.603
GAPCO_7 Special Colour Services	0.93	0.93	0.996
GAPCO_8 Thread Sample	0.69	0.98	0.194
GAPCO_9 Technical Advisory Services	0.64	0.04	0.053
GAPCO_10Delivery Quality and Reliability	1.29	1.16	0.512
GAPCO_11Accurate Quantity Delivery	1.14	1.08	0.720
GAPCO_12 Delivery Lead-time	1.49	1.33	0.391
GAPCO_13 Stock Availability	1.64	1.70	0.792
GAPCO_14 Flexible Dyed Quntity Policy	1.38	1.15	0.369
GAPCO_15 China Delivery	1.21	1.50	0.531
GAPCO_16 Supplier Reputation	0.65	0.53	0.548
GAPCO_17 Responsiveness of Sales Representative	0.71	0.67	0.871
GAPCO_18 Professionalism of Sales Representative	0.70	0.84	0.496
GAPCO_19 Effective Communication	0.62	0.68	0.767
GAPCO_20 Partnership Orientation	0.47	0.56	0.690
GAPCO_21 International Coverage	-0.24	0.07	0.416

No significant difference at 0.05 level is detected in the means of the gaps for the customer segments that expect Oko-Tex Standard 100. It can be concluded that thread customers do not treat the Oko-Tex Standard 100 as an important requirement for their suppliers.

From Coats' perspective, it is somewhat irrelevant to obtain or maintain the Oko-Tex Standard 100. Perhaps this is just a nice to have quality requirement.

Table 68:   Gap Analysis by Question 15   THREAD SUPPLIER NEED

OTHER QUALITY STD

Question 15: Require Suppliers to have other international quality standard	Mean of "Yes" Group (51 counts)	Mean of "No" Group (131 counts)	Significance Level
GAPCO_1 Brand Image	-0.12	-0.52	0.104
GAPCO_2 Product performance	0.55	0.67	0.557
GAPCO_3 Product Range	0.47	0.25	0.335
GAPCO_4 Colour Range	0.94	0.74	0.413
GAPCO_5 Packaging	-0.06	-0.51	0.106
GAPCO_6 Price	2.26	2.17	0.730
GAPCO_7 Special Colour Services	1.12	0.90	0.399
GAPCO_8 Thread Sample	0.81	0.76	0.832
GAPCO_9 Technical Advisory Services	1.05	0.17	0.009*
GAPCO_10 Delivery Quality and Reliability	1.51	1.08	0.105
GAPCO_11 Accurate Quantity Delivery	1.15	1.06	0.679
GAPCO_12 Delivery Lead-time	1.50	1.45	0.810
GAPCO_13 Stock Availability	1.53	1.76	0.379
GAPCO_14 Flexible Dyed Quntity Policy	1.63	1.23	0.160
GAPCO_15 China Delivery	1.58	1.13	0.324
GAPCO_16 Supplier Reputation	0.91	0.43	0.041*
GAPCO_17 Responsiveness of Sales Representative	0.88	0.64	0.329
GAPCO_18 Professionalism of Sales Representative	0.78	0.75	0.890
GAPCO_19 Effective Communication	0.82	0.61	0.352
GAPCO_20 Partnership Orientation	0.94	0.34	0.016*
GAPCO_21 International Coverage	0.57	-0.59	0.000*

The customer segment that requires suppliers to have other international quality standard felt a larger performance gap on "Technical Advisory Services". In other words, they have a much higher expectation on receiving technical advisory services from the thread suppliers.

Similarly they have a higher gap on the supplier reputation. They expect more from the partnership orientation than the other customer segment that does not require other international quality standard.

Lastly, the gap for "International Coverage" is larger for customer segment that require supplier to have other international quality standard. Knowing these

differences between the two customer segments, Coats can devise its marketing plans more effectively, by bridging those perceived gaps (marked in asterisks).

Of course if the performance gaps are not "real" but are perception only, then this become a communication issue (i.e. to devise a proper promotion campaign to rectify misconception by customers).

Table 69: **Gap Analysis by Question 16 RESPONSIBLE FOR COLOR MATCHING**

Question 16: Respondent is responsible for colour matching and approval	Mean of "Yes" Group (163 counts)	Mean of "No" Group (60 counts)	Significance Level
GAPCO_1 Brand Image	-0.25	-0.68	0.060
GAPCO_2 Product performance	0.62	0.58	0.826
GAPCO_3 Product Range	0.39	0.39	0.984
GAPCO_4 Colour Range	0.82	0.78	0.846
GAPCO_5 Packaging	-0.29	-0.41	0.652
GAPCO_6 Price	2.15	2.40	0.251
GAPCO_7 Special Colour Services	0.91	1.00	0.736
GAPCO_8 Thread Sample	0.79	0.95	0.508
GAPCO_9 Technical Advisory Services	0.55	0.20	0.272
GAPCO_10 Delivery Quality and Reliability	1.32	1.12	0.307
GAPCO_11 Accurate Quantity Delivery	1.21	1.02	0.331
GAPCO_12 Delivery Lead-time	1.44	1.53	0.652
GAPCO_13 Stock Availability	1.72	1.67	0.847
GAPCO_14 Flexible Dyed Quntity Policy	1.43	1.09	0.206
GAPCO_15 China Delivery	1.14	1.67	0.277
GAPCO_16 Supplier Reputation	0.69	0.51	0.417
GAPCO_17 Responsiveness of Sales Representative	0.81	0.53	0.203
GAPCO_18 Professionalism of Sales Representative	0.79	0.65	0.508
GAPCO_19 Effective Communication	0.67	0.56	0.609
GAPCO_20 Partnership Orientation	0.52	0.35	0.452
GAPCO_21 International Coverage	0.10	-0.76	0.009*

There is only one significant difference at 0.05 for international coverage. The customer segment that is not responsible for colour matching and approval themselves, have a negative performance gap on International coverage with Coats (i.e. Coats' international coverage is better than they expect).

Table 70: **Gap Analysis by Question 23 GARMENT ACCESSORY DELIVERED IN CHINA**

Question 23: Respondent has garment accessory delivered in China by suppliers	Mean of "Yes" Group (156 counts)	Mean of "No" Group (77 counts)	Significance Level
GAPCO_1 Brand Image	-0.37	-0.30	0.750
GAPCO_2 Product performance	0.60	0.64	0.859
GAPCO_3 Product Range	0.39	0.40	0.980
GAPCO_4 Colour Range	0.83	0.78	0.792
GAPCO_5 Packaging	-0.35	-0.15	0.421
GAPCO_6 Price	2.17	2.39	0.294
GAPCO_7 Special Colour Services	0.95	1.00	0.856
GAPCO_8 Thread Sample	0.80	1.02	0.332
GAPCO_9 Technical Advisory Services	0.48	0.38	0.755
GAPCO_10 Delivery Quality and Reliability	1.20	1.48	0.151
GAPCO_11 Accurate Quantity Delivery	1.14	1.22	0.622
GAPCO_12 Delivery Lead-time	1.46	1.58	0.519
GAPCO_13 Stock Availability	1.64	1.98	0.126
GAPCO_14 Flexible Dyed Quntity Policy	1.22	1.67	0.081
GAPCO_15 China Delivery	1.50	0.31	0.015*
GAPCO_16 Supplier Reputation	0.65	0.63	0.903
GAPCO_17 Responsiveness of Sales Representative	0.75	0.70	0.804
GAPCO_18 Professionalism of Sales Representative	0.75	0.79	0.864
GAPCO_19 Effective Communication	0.63	0.79	0.463
GAPCO_20 Partnership Orientation	0.53	0.44	0.707
GAPCO_21 International Coverage	-0.20	-0.19	0.964

The customer segment that has garment accessory delivered in China perceived a larger performance gap on "China Delivery" for Coats than the other customer segment. Improvement in China Delivery service is needed for Coats.

Table 71:   Gap Analysis by Question 24   PLAN TO HAVE THREAD DELIVERED IN CHINA

Question 24: Respondent plans to have sewing thread delivered in China by the suppliers	Mean of "Yes" Group (158 counts)	Mean of "No" Group (71 counts)	Significance Level
GAPCO_1 Brand Image	-0.36	-0.35	0.985
GAPCO_2 Product performance	0.58	0.66	0.673
GAPCO_3 Product Range	0.33	0.58	0.218
GAPCO_4 Colour Range	0.82	0.80	0.952
GAPCO_5 Packaging	-2.84	-0.32	0.904
GAPCO_6 Price	2.23	2.26	0.899
GAPCO_7 Special Colour Services	0.90	1.08	0.530
GAPCO_8 Thread Sample	0.84	0.92	0.736
GAPCO_9 Technical Advisory Services	0.49	0.32	0.585
GAPCO_10 Delivery Quality and Reliability	1.25	1.33	0.674
GAPCO_11 Accurate Quantity Delivery	1.15	1.18	0.878
GAPCO_12 Delivery Lead-time	1.49	1.47	0.900
GAPCO_13 Stock Availability	1.71	1.75	0.877
GAPCO_14 Flexible Dyed Quntity Policy	1.28	1.53	0.416
GAPCO_15 China Delivery	1.52	-0.33	0.001*
GAPCO_16 Supplier Reputation	0.69	0.48	0.316
GAPCO_17 Responsiveness of Sales Representative	0.79	0.58	0.332
GAPCO_18 Professionalism of Sales Representative	0.80	0.66	0.516
GAPCO_19 Effective Communication	0.72	0.56	0.435
GAPCO_20 Partnership Orientation	0.62	0.22	0.075
GAPCO_21 International Coverage	-0.12	-0.54	0.281

The customer segment that plans to have sewing thread to be delivered in China perceived a larger performance gap on "China Delivery" for Coats than the other customer segment. Improvement in China Delivery service is needed for Coats.

Table 72:   Gap Analysis by Question 25   INTEREST IN TECHNICAL ADVISORY SERVICE

Question 25: Respondent is interested in Technical Advisory Services	Mean of "Yes" Group (91 counts)	Mean of "No" Group (114 counts)	Significance Level
GAPCO_1 Brand Image	-0.10	-0.54	0.038*
GAPCO_2 Product performance	0.67	0.51	0.355
GAPCO_3 Product Range	0.45	0.23	0.240
GAPCO_4 Colour Range	0.92	0.69	0.205
GAPCO_5 Packaging	-0.11	-0.51	0.094
GAPCO_6 Price	2.15	2.28	0.518
GAPCO_7 Special Colour Services	1.08	0.76	0.226
GAPCO_8 Thread Sample	0.99	0.64	0.103
GAPCO_9 Technical Advisory Services	0.78	0.06	0.010*
GAPCO_10 Delivery Quality and Reliability	1.26	1.23	0.875
GAPCO_11 Accurate Quantity Delivery	1.19	1.07	0.493
GAPCO_12 Delivery Lead-time	1.24	1.63	0.033*
GAPCO_13 Stock Availability	1.66	1.75	0.661
GAPCO_14 Flexible Dyed Quntity Policy	1.30	1.37	0.775
GAPCO_15 China Delivery	1.33	1.15	0.671
GAPCO_16 Supplier Reputation	0.71	0.53	0.374
GAPCO_17 Responsiveness of Sales Representative	0.76	0.70	0.777
GAPCO_18 Professionalism of Sales Representative	0.86	0.60	0.180
GAPCO_19 Effective Communication	0.83	0.51	0.088
GAPCO_20 Partnership Orientation	0.69	0.24	0.029*
GAPCO_21 International Coverage	0.16	-0.80	0.006*

The customer segment that is not interested in Technical Advisory Service (TAS) has a high negative "gaps" on Brand Image with Coats. Obviously, the customer segment with interest in TAS has a larger gap on TAS (i.e. they felt this service to be very important and were somewhat not satisfied), than the other customer segment.

The other "gaps" which are different at 0.05 significance level are Delivery Lead Time, Partnership Orientation, and International Coverage.

These items with asterisks are areas of attention for Coats China if they want to capitalize their TAS, in order to devise a proper market plan to generate most profits from segmenting the market according the criterion on TAS.

Table 73:   Gap Analysis by Question 26   PLAN SET UP EDI WITH THREAD SUPPLIER

Question 26: Respondent plans to set up (Electronic Data Interchange) EDI with thread supplier	Mean of "Yes" Group (32 counts)	Mean of "No" Group (171 counts)	Significance Level
GAPCO_1 Brand Image	0.10	-0.43	0.067
GAPCO_2 Product performance	0.65	0.54	0.659
GAPCO_3 Product Range	0.26	0.34	0.770
GAPCO_4 Colour Range	0.68	0.76	0.777
GAPCO_5 Packaging	-0.22	-0.35	0.716
GAPCO_6 Price	2.10	2.25	0.607
GAPCO_7 Special Colour Services	1.21	0.84	0.314
GAPCO_8 Thread Sample	0.80	0.78	0.958
GAPCO_9 Technical Advisory Services	1.31	0.29	0.004*
GAPCO_10Delivery Quality and Reliability	1.25	1.20	0.857
GAPCO_11Accurate Quantity Delivery	1.53	1.03	0.053
GAPCO_12 Delivery Lead-time	1.55	1.40	0.570
GAPCO_13 Stock Availability	2.00	1.63	0.232
GAPCO_14 Flexible Dyed Quntity Policy	1.47	1.29	0.592
GAPCO_15 China Delivery	1.79	1.20	0.239
GAPCO_16 Supplier Reputation	0.68	0.60	0.775
GAPCO_17 Responsiveness of Sales Representative	0.67	0.73	0.825
GAPCO_18 Professionalism of Sales Representative	0.80	0.72	0.783
GAPCO_19 Effective Communication	0.60	0.67	0.808
GAPCO_20 Partnership Orientation	0.65	0.43	0.444
GAPCO_21 International Coverage	0.58	-0.36	0.020*

There are only two items (i.e. Technical Advisory Services and International Coverage) which have means of gaps significantly different for the customer segment that intend to set up EDI with thread suppliers and the other customer segment.

Obviously EDI has some relations with technical and international attributes. The high gaps for the "Yes" group imply that this customer segment has a higher expectation than the other customer segment.

4.2.8   One-way Analysis of Variance (ANOVA)

ANOVA is a collection of statistical methods and models that deal with differences in the means of a variable across different groups of cases. Analysis of Variance is perhaps a misnomer. Thus "analysis of means" may be a better alternative name (Iversen, 1987).

ANOVA employs ratios of variance in order to test whether the means are different. The word "One-way" means there is only one independent (explanatory) variable in the model. Some assumptions are needed for correct application of the ANOVA test. Independent samples from normally distributed population with the same variance must be selected.

ANOVA is used to test the difference of means of more than two groups. Independent samples T-test (Cross Reference: Section 4.2.7) should be used for comparing mean of two groups.

Post Hoc Multiple comparison tests can be applied to test which groups' means are different.
-   Least-significant difference (LSD) : This is equivalent to performing multiple T-tests between all pairs of groups.
-   Bonferroni : It is a modified LSD test which takes care of the errors arising from the multiple comparison.

From a practical point of view, it is useful for Coats's management to understand the extent of satisfaction of the different customer segments on the overall performance. Since the dichotomous questions (i.e. question with two possible outcomes) have been dealt with in the previous section 4.2.8, ANOVA is applied in this section on the following questions (which divide the respondents into different segments by different dimensions):

Question 1: by nature of respondents' business

Question 2: Kind of thread purchased

Question 3: Size of respondent by office staff

Question 4: Size of respondent by factory employees

Question 5: Size of respondent by number of sewing machine

Question 6: Size of respondent by garment production volume

Question 7: Size of respondent by sales turnover

Question 17: Standard of colour matching & approval

Question 18: Kind of light source for colour matching

Question 19-a: Type of problem with yarn

Question 19-b: Type of problem with finishing

Question 19-c: Type of problem with aesthetic aspects

Question 20: Expected delivery lead time for shade card colours

Question 21: Expected delivery lead time for colour lap-dip

Question 22: Expected delivery lead time for special colour thread

Question 27: Expected frequency from thread supplier

4.2.8.1 Results on overall satisfaction level with Coats

If the means of the Overall Performance perceived by the customer segments are not significant at 0.05 level by the Bonferroni test, this would simply be mentioned.

Question 1: by nature of respondents' business

The satisfaction with Coats's overall performance of the nine business nature segments (viz. Others, Licensee, Buying Office, Trading, Trading/Buying Office/Others, Manufacturer, Manufacturer/Buying Office, Manufacturer/Trading, Manufacturer/Trading/Buying Office/Others) are not different at 0.05 level.

Question 2: Kind of thread purchased

There are altogether 27 segments by kind of thread purchased (Cross reference: Table 2). No two groups are significantly different at the .050 level.

Question 3: Size of respondent by office staff

There are four segments by size of office staff. No two groups are significantly different at the .050 level.

Question 4: Size of respondent by factory employees

No two groups are significantly different at the .050 level.

Question 5: Size of respondent by number of sewing machine

No two groups are significantly different at the .050 level.

Question 6: Size of respondent by garment production volume

No two groups are significantly different at the .050 level.

Question 7: Size of respondent by sales turnover

No two groups are significantly different at the .050 level.

Question 17: Standard of colour matching & approval

There are seven segments (Cross reference: Table 17). No two groups are significantly different at the .050 level.

Question 18: Kind of light source for colour matching

There are sixteen customer segments by the kind of light source (Cross Reference: Table 18). No two groups are significantly different at the .050 level.

Question 19-a: Type of problem with yarn

There are seven segments by Problem with Yarn (Cross Reference: Table 19.1). No two groups are significantly different at the .050 level.

Question 19-b: Type of problem with finishing

There are seven segments by Problem with Finishing (Cross Reference: Table 19.2). No two groups are significantly different at the .050 level.

Question 19-c: Type of problem with aesthetic aspects

There are twelve segments by Problem with Aesthetic (Cross Reference: Table 19.3). No two groups are significantly different at the .050 level.

Question 20: Expected delivery lead time for shade card colors

No two groups are significantly different at the .050 level.

Question 21: Expected delivery lead time for colour lap-dip

No two groups are significantly different at the .050 level

Question 22: Expected delivery lead time for special colour thread

```
Variable  CO_22      SAT: OVERALL PERFORMANCE
  By Variable  S22        SPECIAL COLOR LEAD TIME

Group                  Count     Mean

Grp 1    (1 day)         4      2.7500
Grp 2    (2 days)       17      2.4706
Grp 3    (3 days)       34      2.9412
Grp 4    (4 days)       49      2.3469
Grp 5    (5 days)       29      2.4483
Grp 6    (6 days)        4      2.0000
Grp 7    (7 days)       18      2.5556
Grp 8    (>7 days)       3      3.3333

Total                  158      2.5506
```

```
Multiple Range Tests:  Modified LSD (Bonferroni) test with significance
                       level .05

The difference between two means is significant if
  MEAN(J)-MEAN(I)  >= .5723 * RANGE * SQRT(1/N(I) + 1/N(J))
  with the following value(s) for RANGE: 4.50

   (*) Indicates significant differences which are shown in the lower triangle

                            G G G G G G G G
                            r r r r r r r r
                            p p p p p p p p

                            6 4 5 2 7 1 3 8
      Mean      S22

      2.0000    Grp 6
      2.3469    Grp 4
      2.4483    Grp 5
      2.4706    Grp 2
      2.5556    Grp 7
      2.7500    Grp 1
      2.9412    Grp 3        *
      3.3333    Grp 8
```

The Grp 4 (customers expecting special colour lead time to be 4 days) is more satisfied with Coats' overall performance than Grp 3 (customers expecting special colour lead time to be 3 days). This is probably due to Grp 3 has a higher quality expectation than Grp 4.

Question 27: Expected frequency from thread supplier

No two groups are significantly different at the .050 level.

From the above ANOVA tests, virtually all customer segments have no significant difference with their satisfaction with Coats's overall performance.

4.2.8.2   Results on gap scores with Coats

If the means of the gap scores perceived by the customer segments are not significant at 0.05 level by the Bonferroni test, this would simply be mentioned.

Question 1: by nature of respondents' business

The 21 performance gap scores with Coats of the nine business nature segments (viz. Others, Licensee, Buying Office, Trading, Trading/Buying Office/Others, Manufacturer, Manufacturer/Buying Office, Manufacturer/Trading, Manufacturer/Trading/Buying Office/Others) are not different at 0.05 level.

Question 2: Kind of thread purchased

There are altogether 27 segments by kind of thread purchased (Cross reference: Table 2). No two groups are significantly different at the .050 level.

Question 3: Size of respondent by office staff

There are four segments by size of office staff. No two groups are significantly different at the .050 level.

Question 4: Size of respondent by factory employees

No two groups are significantly different at the .050 level.

Question 5: Size of respondent by number of sewing machine

No two groups are significantly different at the .050 level.

Question 6: Size of respondent by garment production volume

No two groups are significantly different at the .050 level.

Question 7: Size of respondent by sales turnover

No two groups are significantly different at the .050 level.

Question 17: Standard of colour matching & approval

There are seven segments (Cross reference: Table 17). No two groups are significantly different at the .050 level.

Question 18: Kind of light source for colour matching

There are sixteen customer segments by the kind of light source (Cross Reference: Table 18). No two groups are significantly different at the .050 level.

Question 19-a: Type of problem with yarn

There are seven segments by Problem with Yarn (Cross Reference: Table 19.1). No two groups are significantly different at the .050 level.

Question 19-b: Type of problem with finishing

There are seven segments by Problem with Finishing (Cross Reference: Table 19.2). No two groups are significantly different at the .050 level.

Question 19-c: Type of problem with aesthetic aspects

There are twelve segments by Problem with Aesthetic (Cross Reference: Table 19.3). No two groups are significantly different at the .050 level.

Question 20: Expected delivery lead time for shade card colors

```
     Variable  GAPCO10       Gap scores on Delivery quality and reliability
   By Variable  S20          SHADE CARD COLOR LEAD TIME


Multiple Range Tests:  Modified LSD (Bonferroni) test with significance
                       level .05

The difference between two means is significant if
  MEAN(J)-MEAN(I)  >= .7781 * RANGE * SQRT(1/N(I) + 1/N(J))
  with the following value(s) for RANGE: 4.22

   (*) Indicates significant differences which are shown in the lower triangle

                            G G G G G G
                            r r r r r r
                            p p p p p p

                            5 3 4 2 7 1
      Mean       S20

       .5000     Grp 5
       .5625     Grp 3
       .6000     Grp 4
      1.0185     Grp 2
      1.5000     Grp 7
      1.6538     Grp 1          *   *
```

Grp 1 (Expected 1 day delivery lead time for shade card color) has the largest gap with 1.6538 on the "Delivery Quality & Reliability" services than Grp 2 (Expected 2 days delivery lead time for shade card color with 1.0185 mean of gap scores) and Grp 3 (Expected 3 days delivery lead time for shade card color with 0.5625 mean of gap scores) at 0.05 significant level.

In short, Group 1 people has a higher demand and expectation on the delivery quality and reliability services.

```
Variable  GAPCO16              Gap scores on Supplier Reputation
   By Variable  S20            SHADE CARD COLOR LEAD TIME

Multiple Range Tests:  Modified LSD (Bonferroni) test with significance
                       level .05

The difference between two means is significant if
  MEAN(J)-MEAN(I)  >= .8112 * RANGE * SQRT(1/N(I) + 1/N(J))
  with the following value(s) for RANGE: 4.22

   (*) Indicates significant differences which are shown in the lower triangle

                         G G G G G G
                         r r r r r r
                         p p p p p p

                         3 4 5 2 1 7
     Mean      S20

     -.2000    Grp 3
      .4000    Grp 4
      .5000    Grp 5
      .7200    Grp 2
      .8082    Grp 1       *
     1.0000    Grp 7
```

Grp 1 (Expected 1 day delivery lead time for shade card color) has a larger gap with 0.8082 mean of gap scores on "Supplier Reputation" than Grp 3 (Expected 3 days delivery lead time for shade card color) who have a negative gap score - 0.20 at 0.05 significant level.

Negative gap implies an over-provision of service performance to the customer. Positively, negative gap can be interpreted as delighting customers. Conversely, it could be interpreted as waste of company resources.

Question 21: Expected delivery lead time for colour lap-dip

```
       Variable  GAPCO10       Gap scores on Delivery quality and reliability
   By Variable  S21          COLOR LAP-DIP LEAD TIME

Multiple Range Tests:  Modified LSD (Bonferroni) test with significance
                       level .05

The difference between two means is significant if
  MEAN(J)-MEAN(I)  >= .7880 * RANGE * SQRT(1/N(I) + 1/N(J))
  with the following value(s) for RANGE: 4.50

   (*) Indicates significant differences which are shown in the lower triangle

                         G G G G G G G G
                         r r r r r r r
                         p p p p p p p p

                         6 5 3 7 4 2 8 1
    Mean      S21

     .0000    Grp 6
     .6667    Grp 5
     .8108    Grp 3
    1.0000    Grp 7
    1.2500    Grp 4
    1.3729    Grp 2
    1.5000    Grp 8
    1.8333    Grp 1            *
```

Grp 1 (Expected 1 day delivery lead time for the Color lap-dip) has a larger gap on the "Delivery Quality and Reliability Services" than Grp 3 (Expected 3 days delivery lead time for the Color lap-dip) at 0.05 significant level. Simplify say that Grp1 people have a higher expectation on the quality of delivery service than Grp 3 people.

Question 22: Expected delivery lead time for special colour thread

No two groups are significantly different at the .050 level.

Question 27: Expected frequency from thread supplier

No two groups are significantly different at the .050 level.

From the above ANOVA tests, virtually all customer segments have no significant difference with their performance gaps with Coats, except the gap on "Delivery quality and reliability service".

4.3. Qualitative data analysis

In order to supplement quantitative analysis, some qualitative data are collected in the form of verbatim comments from one-to-one interviews with selected colleagues in Coats China and a customer of Coats. The interview is on a semi-structured basis. The full verbatim comments are contained in Appendix 4.

Qualitative approach tends to be less structured and more specific than the quantitative approach. The computer software, NUD.IST is used to analyse the qualitative data. Grounded theory is used as a guide for systemizing and coordinating data collection. It is also used as a procedure for data analysis and for the subsequent development and refinement of theory, which is derived from the collected data (Battershy, 1981). The grounded theory has two inter-related elements: theoretical sampling, and constant comparative analysis.

Theoretical sampling is the process of data collection, whereby the gathering of data is guided by an analysis of that data collected previously, rather than by a pre-planned itinerary. The initial data provide a foothold from which further data are collected and analysed.

Constant comparative analysis involves ongoing systematic organization and classification of the data into various categories. As a category of data begins to emerge, and other data fit that category, sub-themes within that category may be identified. In turn, hunches based on the data can also be formulated. In conjunction with this process of data organization and classification, a constant comparison of data within and between categories is also undertaken. Information collection on a particular category stops at theoretical saturation (i.e. no additional data can further enrich that category).

There are four one-to-one interviews. The four interviewees are: Technical Advisory Service Manager of Coats, two senior sales representatives of Coats, and one garment manufacturer, who is a customer of Coats.

NUD.IST uses a hierarchical node structure for various categories. The following node structure with fourteen nodes has been developed:

- Root Node
    - SWOT
        - [Strengths]
        - [Weaknesses]
        - [Opportunities]
        - [Threats]
    - [Coats]
    - [Competitors]
    - [Segment]
    - Attributes
        - [Price]
        - [Quality]
        - [Delivery]
        - [Promotion]
        - [Technical Advisory Services (TAS)]

The qualitative data analysis (observations and interpretations are typed in block capital letters) of the above nodes in square brackets are as follows:

Node [Strengths]:

*THE FOLLOWINGS ARE THE PERCEIVED STRENGTHS OF COATS:
(CROSS REFERENCE SECTION 3.1.3)
STRENGTHS PERCEIVED BY A FOCUS GROUP ARE:
1. DIVERSIFIED PRODUCT RANGES
2. BEING A MARKET LEADER IN A SEWING THREAD INDUSTRY
3. INTERNATIONAL OPERATIONS IN VARIOUS PRODUCT LINES
TAKING THE GEOGRAPHICAL ADVANTAGES OF THE COUNTRIES IN
WHICH THE PRODUCTION FACILITIES ARE LOCATED.
4. ECONOMY OF SCALE BENEFIT ARISING FROM LARGE SCALE OF
COATS OPERATIONS
5. EFFECTIVE COMMUNICATION ACROSS CONTINENTS USING
INTERNET TECHNOLOGY
6. CLSOE AND LONG TERM RELATIONSHIPS WITH CUSTOMERS AND
SUPPLIERS
7. HIGH TECHNOLOGICAL INNOVATION
8. LOYAL AND COMMITTED EMPLOYEES
9. EFFECTIVE TRAINING PROGRAMS FOR STAFF
10. ISO9000 ACCREDITATION*

*SaleA: Having developed an international / global network, being
financially strong & influential and possessing diversified and wide
customer coverage.*

*SaleB: Globalization, Self-owned Research and Technology Centre to
produce special types of thread, such as Bulked Polyester (Delta) and
Polyester Cotton Corespun (Koban). The main competitor of Coats,
Gunzetal does not have the above mentioned thread types.*

*Cust: Short delivery lead time, good sales services, quick response of
sales, and wide color range*

Node [Weaknesses]:

THE FOLLOWING ARE THE PERCEIVED WEAKNESSES OF COATS:

HIGH PRICE FROM THE PERSPECTIVE OF THE CUSTOMER IS NOT NECESSARILY A WEAKNESS FROM THE PERCEPTIVE OF COATS. (CROSS REFERENCE SECTION 3.1.3)
THE INTERNAL WEAKNESSES PERCEIVED BY FOCUS GROUP ARE:
1. RISING OPERATING COST
2. DIVERSIFIED AND DIFFERENT CULTURAL SETTINGS CAN CAUSE MANAGING AND INTEGRATING PROBLEMS BETWEEN CHINA AND HONG KONG.

SaleA: Too many departmental barriers, which cause inflexibility and miscommunication between departments

SaleB: Slower in responding to market news and requirements than its main competitor, Gunzetal, who has good connection with textile tycoon. Little marketing research. Imbalance of knowing each other's organizational structure between Coats and its competitors. Coats knows very little about its competitors but competitors knows more about Coats. Therefore, Coats starts to collect newspaper cuttings to overcome the problem of slow response to market news.

Cust: High price.

Node [Opportunities]:

THE FOLLOWING SO CALLED EXTERNAL "OPPORTUNITIES" ARE IN FACT THE INTERNAL STRENGTHS OF COATS. POSSIBLY, UNDER THE PREVAILING ADVERSE ECONOMIC SITUATION, THE INTERVIEWEES COULD NOT READILY THOUGHT OF ANY FAVOURABLE EXTERNAL FACTORS (I.E. OPPORTUNITIES !) (CROSS REFERENCE SECTION 3.1.3)

THE EXTERNAL OPPORTUNITIES PERCEIVED BY FOCUS GROUP ARE:
1. GROWTH OPPORTUNITIES IN NEW GEOGRAPHIC MARKETS. (E.G. CHINA AND SOUTH EAST ASIA)
2. EXPANSION OPPORTUNITIES IN NEW NEW PRODUCT LINES THROUGH NEW TECHNOLOGIES
3. HONG KONG'S RE-UNION TO CHINA ON FIRST OF JULY IN 1997. THE ESTABLISHED CHINA EXPERIENCE AND EXPOSURE PROVIDE AN EDGE OVER COATS' COMPETITORS.

SaleA: Diversified global portfolio can reduce Coats' risks. Coats has been specified by many big buying offices to their garment manufacturers. Specifiers nominate their preferred brand name of thread, which occupies 70% in the thread market. The remaining 30% are the free choice in thread market.

SaleB: 60 countries have production plants, including Middle East and Africa for the simple clothes due to cheaper cost of production. Our main competitor, A&E does not have branch in Middle East and Africa, therefore Coats has a competitive edge over its competitors by its global network. ISO9000 & Oko-Tex Certification as a market tool can help Coats win over its competitors too.

Cust: Due to fast changing market, customers need rapid response time from their suppliers. Coats can achieve our needs in terms of short delivery lead time, and this means Coats has more opportunity in this market.

Node [Threats]:

THE FOLLOWING ARE PERCEIVED THREATS (I.E. UNFAVOURABLE EXTERNAL FACTORS). MOST OF THE THREATS MENTIONED BY COATS EMPLOYEES ARE RELATED TO ECONOMIC FACTORS DIRECTLY OR INDIRECTLY.

DUE TO LACK OF UNDERSTANDING OF COATS'S OPERATION, THE CUSTOMER PERCEIVED NO THREATS FOR COATS.
(CROSS REFERECE SECTION 3.1.3)

THE EXTERNAL THREATS OF COATS PERCEIVED BY FOCUS GROUP ARE:
1. KEEN COMPETITION FROM DEVELOPING COUNTRIES
2. CLUSTOMERS ARE MORE DEMANDING IN QUALITY AND PRICE THAN EVER BEFORE
3. MORE AND MORE DIFFICULT TRADING ENVIRONMENT
4. UNCERTAINTY IN POLITICAL AND ECONOMIC MEASURES IN CHINA. DISPUTES BETWEEN CHINA AND THE WESTERN COUNTRIES ARE NOT UNCOMMON. (E.G. HUMAN RIGHT)
5. DIFFICULTY IN RECRUITING AND RETAINING GOOD MANAGERIAL AND SUPERVISORY STAFFS IN CHINA
6. HIGHER RAW MATERIAL COSTS AND PRICE

SaleA:
Economic turmoil. Customs inspection due to "quota abuse" between Hong Kong and China, too many restriction in garment quota to US and Europe from China and Hong Kong. These affect business of garment & thread manufacturers. Increasing competition from developing countries, which have very low cost of production. For example Mexico and India can supply low end products to the US market.

SaleB:
High and fluctuating quota price causes production drop in the first 6 months in Hong Kong and China. The other threat includes the adverse chain effect on price-cutting by garment manufacturers on their suppliers.

Coats' domestic Sales in China are very difficult because Coats must export the finished products. If not, 50% tax need to add to the finished products and it is very hard to compete with the local thread suppliers in China due to different product quality standards.

Cust: No Threat is perceived for Coats.

Node [Coats]:

A&E has similar TAS operation. Gunzetal uses expert TAS consultant.
Coats uses TAS to differentiate from its competitors.
Only the three major thread suppliers (Coats, Gunzetal, A&E) have TAS.
Only Coats has published a booklet named "The Technology of Thread &
Seam" It is part of the TAS services.

Key successes factors for Coats
(as perceived by Coats's employees):
Innovation, reengineering, large market share, and competent staff,
Advanced technology such as ColorTalk, computerized automatic
color matching through terminals in every part of the world. Free
monthly seminars for buying offices and garment manufacturers by using
computerized presentation skills

(as perceived by customer):
Quick response time, high product quality, sales service in both
responsiveness and professionalism, quick lap-dip delivery.
(THERE ARE PERCEPTION DIFFERENCE ON THE KEY SUCCESS
FACTORS OF COATS BETWEEN COATS EMPLOYEES AND CUSTOMER.
EMPLOYEES FOCUS MORE ON THE TECHNICAL ASPECTS WHEREAS
CUSTOMERS FOCUSES MORE ON THE SERVICE ASPECTS.

Coats is facing now the following major difficulties
(as perceived by Coats's employees):
Poor economic market and pessimistic attitude for the whole industry.
(as perceived by customer):
High costs, and fast changing market are the main difficulties for
Coats.

THE PERCEIVED DIFFICULTIES ARE MORE SIMILAR BETWEEN COATS
EMPLOYEES AND THE CUSTOMER.

Node [Competitors]:

SMALL COMPETITORS DO NOT HAVE TAS SERVICE. ONLY COATS AND A&E HAVE IN-HOUSE TAS EXPERT. GUNZETAL EMPLOYS EXTERNAL TAS SERVICE FOR ITS CUSTOMER ON NEED BASIS.

EDGE OVER COMPETITORS:
Self-owned Research and Technology Centre to produce special types of thread, such as Bulked Polyester (Delta) and Polyester Cotton Corespun (Koban). The main competitor of Coats, Gunzetal does not have the above mentioned thread types.

Coats has 60 countries have production plants, including Middle East and Africa. It has a competitive edge over its competitors by its global network.

ISO9000 & Oko-Tex Certification as a market tool can help Coats win over its competitors too.

Advanced technology such as ColorTalk, computerized automatic color matching through terminals in every part of the world.

Free monthly seminars for buying offices and garment manufacturers by using computerized presentation skills, which are Coats' competitive advantages. Coats has Organized Factory Visits for customers, which its main competitors, Gunzetal and A&E do not have. Coats has three designated staff members dealing with buying offices. Gunzetal and A&E have only one staff member each dealing with buying offices.

ARAES WHERE COATS IS WEAKER THAN ITS COMPETITORS:
Slower in responding to market news and requirements than its main competitor, Gunzetal, who has good connection with textile tycoon. Little marketing research. Imbalance of knowing each other's organizational structure between Coats and its competitors. Coats knows very little about its competitors but competitors knows more about Coats.

Node [Segment]:

THE FOLLOWING ARE SUGGESTED SEGMENTATION APPROACH:
SaleA: Segmentation needs to respond to the fast changing market.
SaleB: Segmentation should be by garment type, such as Apparel, Embroidery,
Footwear, or Jean, Woven shirt etc...
Cust: Segmentation should be by different levels of quality standard.

IT IS DISAPPOINTING THAT EMPLOYEES OF COATS HAVE A RATHER
WEAK UNDERSTANDING OF SEGMENTATION. ON THE OTHER HAND,
THE CUSTOMER HAS A RATHER INNOVATIVE APPROACH TO
SEGMENTATION (I.E. USING QUALITY TO SEGMENT THE MARKET).

Node [Price]:

*OBVIOUSLY PRICE IS A VERY IMPORTANT ELEMENT OF SUCCESS.
YET COATS IS UNDER SEVERE PRESSURE TO CUT ITS PRICES.*

**Koo: What kinds of attribute do the garment mfrs (thread customers) use
to choose the thread suppliers?*
Lam: Mainly Price.
*Koo: Always or recently?
Lam: Customers are always concerned on price.

*Koo: What kinds of external threats exist?
*SaleB: The adverse chain effect on price-cutting by garment manufacturers
on their suppliers.*

*Koo: What are the major difficulties Coats is facing now?
SaleB: Increased competition leads to price-cutting to retain customers.

*Koo: What are the areas for improvements (weaknesses) for Coats?
Cust: High price.

*Koo: What are the most important factors in choosing a thread supplier?
Cust: Price and Color. Color in terms of both color range and color fastness.

Node [Quality]:

COATS' EMPLOYEE PERCEIVED THE IMPORTANCE OF SUCCESS FACTORS IN THE FOLLOWING DECENDING ORDER: PRICE, DELIVERY, QUALITY. THIS QUALITATIVE FINDING IS MORE OR LESS IN LINE WITH THE QUANTITATIVE QUESTIONNAIRE SURVEY FINIDNGS (SEE TABLE 29.2).

*Koo: How important is Quantity & Quality Delivery to the customers?
Lam: Delivery is the Second most Important item. Most important is Price. Third most important is Quality.

*Koo: How do you define good quality of threads?
Lam: Comparison by experience. e.g. the thread breakage frequency rate in different periods of time. For example, thread breakage 10 times previously; and thread breakage 15 times now for a cone, then result is bad quality.

SaleB: ISO9000 & Oko-Tex Certification as a market tool can help Coats win over its competitors too.

Cust: Whole industry tends to adopt a high quality approach, such as color fastness.
Cust: Quick response time, high product quality, sales service in both responsiveness and professionalism, quick lap-dip delivery.
Cust: Segmentation should be by different levels of quality standard.

OTHER ISSUE RELATING TO QUALITY:
SaleB: Local thread supplier in China has different product quality standard.

POOR QUALITY MEANS:
Thread breakage, Thread skipping, Thread shrinkage, Needle breakage.

Node [Delivery]:

CUSTOMER PERCEIVED "DELIVERY" AS AN IMPORTANT REASON FOR CHOOSING THREAD SUPPLIER. DELIVERY MEAN SHORT DELIVERY LEAD TIME, QUICK RESPONSE TIME, QUICK LAP-DIP DELIVERY.

*Koo: How important is Quantity & Quality Delivery to the customers?
Lam: Delivery is the Second most Important item. Most important is Price.

*Koo: What are the strengths of Coats?
Cust: Short delivery lead time, good sales services, quick response of sales, and wide color range.

*Koo: What external opportunities are available for Coats?
Cust: Due to fast changing market, customers need rapid response time from their suppliers. Coats can achieve our needs in terms of short delivery lead time, and this means Coats has more opportunity in this market.

*Koo: What are the key successes factors for Coats?
Cust: Quick response time, high product quality, sales service in both responsiveness and professionalism, quick lap-dip delivery.

Node [Promotion]:

COATS'S EMPLOYEES FEEL THAT THERE IS A STRONG NEED TO PROMOTE TECHNICAL ADVISORY SERVICE TO CUSTOMERS. THIS IS ECHOED BY THE FACT THAT THE CUSTOMER INTERVIEWED DOES NOT KNOW THE AVAILABILITY OF TAS BY COATS.

SaleA: TAS needs more promotion to customer because not many customers are aware that Coats has technical advisory services, which is very useful to them.

SaleB: We need more promotion since not many customers know this services. Only big buying offices know Coats has Technical Advisory Services for them. Garment manufacturers or factories do not know what is Technical Advisory Service.

Node [Technical Advisory Service (TAS)]:

TAS IS AN UNIQUE SERVICE PROVIDED ONLY BY THE LEADING THREAD SUPPLIERS IN HONG KONG. THIS IS AN UNIQUE QUALITY SERVICE TO DIFFERETIATE COATS FROM ITS COMPETITORS. HOWEVER, IT IS PERCEIVED THAT MORE PROMOTION ON THE AVAIALBILITY AND BENEFIT OF TAS TO CUSTOMERS ARE REQUIRED.

*Koo: What are the objectives to set up TAS?
Lam: Help customer to solve technical & application problems during their usage of thread.
TAS aims to introduce product usage & teach customer how to avoid thread usage problems.
Lam: The major reason to have TAS in Coats is because the buying office put much emphasis on TAS, we need to differentiate us from the normal thread suppliers.

CHARACTERISTICS OF TAS:
- TAS belongs to Sales Dept.
- Customers use TAS when it is required.
- TAS is Free of Charge.
- If TAS goes to the factory, we will mainly visit the production & technical staff, (e.g. relating sewing machine responsible person, factory manager, technical or QC Manager)
- Customers request for TAS to visit their factories. For example, the garment manufacturer has imported some new garment fabric, and they are not sure which thread will suit for that particular garment fabric, then the garment mfrs will ask TAS for consultation. TAS will take the sample of the garment fabric back to office and test the garment fabric, in order to find out the most suitable thread type, and best thread ticket for that particular garment fabric.
- Mostly Old Customer established customers use TAS.
- Most of the small garment manufacturer get business from the large garment manufacturer or the specifier (buying office), therefore, most of the time large manufacturers would request for TAS in the first place. If small factories encounter thread problems, they will report to the large manufacturers who have subcontracted businesses to them, then the large factories will approach TAS to solve their thread problems, and then they redirect the solution back to the small factories. It is rare for the small factories to ask for TAS.
- Mostly large thread suppliers have TAS. For example, A&E has similar TAS, and Gunzetal uses an external consultant for the TAS.
- The greatest job difficulties and challenges for TAS are: Too many garment fabric types in this fast changing environment.

*- Although TAS's role as a consultant, we always see things from the
     company's point of view.*
*- Coats has published a booklet named "The Technology of Thread & Seam"
     as part of the TAS services.*
*- All the lab testing (e.g. elongation, color fastness etc..) is done in the lab in
     Guangzhou factory.*
*- TAS has high demand from the thread users / garment manufacturers to seek
     advice in the ever-changing environment.*

*-SaleA: TAS needs more promotion to customer because not many customers
     are aware that Coats has technical advisory services, which is very useful
     to them.*

-Cust: I do not know Coats has Technical Advisory Services.

4.4.   Hypothesis Testing

There are six hypotheses to be tested. They are:

> *Hypothesis 1: Thread customers with higher quality expectation are less price sensitive*

> *Hypothesis 2: Thread users who export to Europe have higher quality expectation than those who export to other countries*

> *Hypothesis 3: Larger thread users are more quality oriented than those smaller thread customers*

> *Hypothesis 4: Firms with high Purchase Decision Involvement (PDI) are more conscious of quality requirement in selecting their thread suppliers than those with lower PDI*

> *Hypothesis 5: Customer satisfaction is positively correlated with share of customer wallet which in turn is positively correlated with price sensitivity*

> *Hypothesis 6: Thread customers who experience more problems with thread usage are more interested in Technical Advisory Services*

Integrating these hypotheses together, a model emerges with Quality Expectation as the focus. If the model can be established from this empirical study, then quality attributes can be used effectively as the basis for segmenting the thread market. Apart from contribution to the body of knowledge, the findings are of practical value to the thread suppliers in providing them a framework to develop their marketing strategies.

In reading the following model diagram, it should be borne in mind that TAS is a quality service provided to the thread customers hence it is related to "Higher Quality Expectation".

Similarly, Share of Customer Wallet is assumed to be related with price sensitivity and therefore more satisfied customers are less price sensitive.

As there are altogether 21 thread important attributes for "Quality Expectation" used in hypothesis testing. In order to arrive at a more parsimonious set of predictor variable, factor analysis will be used to reduce the 21 attributes into smaller set of variables.

In the section below, Factor analysis will conduct on all I-S-G dimensions. The factors for Importance dimension are for hypothesis testing. The factors for Satisfaction and Gap dimensions are for comparison purpose only and not used in hypothesis testing.

4.4.1. Factor Analysis

Factor analysis is a statistical technique used to identify a smaller number of factors that can represent relationship among sets of many interrelated variables.

Factor analysis assumes that underlying dimensions, or factors, can be used to explain complex phenomena. The purpose of factor analysis is to find out the not-directly-observable factors based on a set of observable variables.

4.4.1.1.   Quality Aspects - Importance score of thread attributes

There are 21 thread attributes measuring the various quality aspects under questions 29 and 30. These were considered by the management team of Coats to be the determining factors affecting customers' overall satisfaction and hence their purchase decision. It is therefore important to have an in-depth understanding of these variables in terms of their importance (i.e. question 29) and their satisfaction level

with Coats (question 30) and their gaps (operationally defined as the difference between the importance score and the satisfaction scores).

Intuitively these 21 quality aspects are grouped under the following categories:
- Product
- Services
- Relationship
- Geographic

However it would be useful to examine the underlying dimensions, or factors, of these thread quality aspects.

A factor analysis is performed on the importance scores (i.e. the 21 items in question 29) with varimax rotation and pairwise deletion. As an algorithm for orthogonal rotation to a simple structure, varimax rotation is commonly used to minimize the number of variables that have high loadings on a factor.

The Kaiser-Meyer-Olkin (KMO) measure for sampling adequacy is computed. The KMO is 0.83 which can be described as meritorious (Norusis, 1994). This suggests that the factor analysis can be comfortably applied.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
S29_10	**.87823**	.13821	.04941	.02523	.14137
S29_11	**.87818**	.10244	.06630	.15705	.04591
S29_12	**.80193**	.10595	.19484	.12416	.10680
S29_13	**.75117**	-.06344	.14171	.18816	.16862
S29_6	**.48289**	-.17473	.18713	.23539	.32848
S29_17	**.38210**	.32580	.30528	.33402	.34298
S29_5	.09280	**.79366**	-.01773	-.18111	.16761
S29_9	.14649	**.77198**	.07764	.02593	.03935
S29_21	-.11317	**.55203**	.15867	.24820	.19753
S29_1	-.08932	**.53518**	.24833	.21233	.22008
S29_16	.21037	**.46172**	.23123	.40346	.05689
S29_15	.07713	-.03301	**.71901**	-.00345	.15334
S29_20	.14767	.46967	**.65766**	.13246	-.08783
S29_19	.41654	.41291	**.54520**	.16120	.01493
S29_18	.43869	.32440	**.54420**	.09692	.10516

```
S29_4            .20689          -.03250          .01600         .80465          .16542
S29_3            .14191           .44438         -.13805         .65910          .07811
S29_2            .20063           .01732          .42294         .61838          .08176

S29_8            .14107           .11087          .01351         .23256          .79928
S29_7            .13705           .30003         -.00233         .11111          .78823
S29_14           .29671           .12445          .33089        -.09386          .56554
```

Five factors are identified for the importance scores for thread quality aspects. These factors with their reliability coefficients can be labeled as follows:

Factor 1 (**Logistic Reliability**) Cronbach alpha = 0.86.

- S29_10   Delivery quality and reliability
- S29_11   Accurate quantity delivery
- S29_12   Delivery lead-time
- S29_13   Stock availability
- S29_6   Price
- S29_17   Responsiveness of Sales representative

Factor 2 (**Supplier Support**) Cronbach alpha = 0.75.

- S29_5   Packaging
- S29_9   Technical advisory services
- S29_21   International coverage
- S29_1   Brand image
- S29_16   Supplier reputation

Factor 3 (**Professional Partnership**) Cronbach alpha = 0.74.

- S29_15   China delivery
- S29_20   Partnership orientation
- S29_19   Effective communication
- S29_18   Professionalism of sales representative

Factor 4 (**Product Feature**) Cronbach alpha = 0.68.

- S29_4   Colour range
- S29_3   Product range
- S29_2   Product performance

Factor 5 (**Tailored Services**) Cronbach alpha = 0.72.

- S29_8   Thread sample
- S29_7   Special colour services
- S29_14   Flexible dyed quantity policy

These five factors are parsimonious and can explain the quality attributes more succinctly.   The usefulness of performing a factor analysis in a marketing research, including segmenting the market, is to help the researchers understand the expectations of the customers better.

4.4.1.2.   Quality Aspects - Satisfaction score of thread attributes with Coats

Similarly the factor analysis can be performed on the satisfaction scores with Coats (question 30). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is 0.71. This is described as middling. Still factor analysis is acceptable. Four factors are identified.

	Factor 1	Factor 2	Factor 3	Factor 4
CO_19	**.84536**	.17087	.22704	.16331
CO_20	**.77890**	.23295	.13407	.17712
CO_17	**.76221**	.18254	.26963	.04334
CO_18	**.73801**	.28777	.20966	.12214
CO_21	**.69182**	.36632	-.07015	.34510
CO_8	**.62436**	.28527	.33032	-.05089
CO_9	**.50628**	.36392	.27498	.11026
CO_5	.28055	**.74966**	.06412	.07910
CO_3	.34664	**.70117**	.16854	.06736
CO_1	.28800	**.68972**	.31350	.01174
CO_4	.22750	**.64540**	.18585	.29200
CO_2	.16936	**.63842**	.51240	-.03438
CO_7	.39361	**.45732**	.27085	.31451

```
CO_13            .05817          .13091          .77659          .26273
CO_12            .19341          .13986          .69416          .27832
CO_11            .31501          .18863          .67002          .08024
CO_10            .29718          .22988          .63701          .07707
CO_16            .45785          .38822          .48659          .09495

CO_15            .22468         -.13481          .07706          .82649
CO_6             .06354          .20797          .19027          .70623
CO_14            .08338          .23814          .32414          .51519
```

The four factors with their reliability coefficients can be described in bold as follows:

Factor 1 (**Partnership**) Cronbach alpha = 0.89.

- CO_19   Effective communication

- CO_20   Partnership orientation

- CO_17   Responsiveness of sales representative

- CO_18   Professionalism of sales representative

- CO_21   International coverage

- CO_8   Thread sample

- CO_9   Technical advisory service

Factor 2 (**Product**) Cronbach alpha = 0.85.

- CO_5   Packaging

- CO_3   Product range

- CO_1   Brand image

- CO_4   Colour range

- CO_2   Product performance

- CO_7   Special color services

Factor 3 (**Logistic**) Cronbach alpha = 0.82.

- CO_13   Stock availability

- CO_12   Delivery lead-time

- CO_11   Accurate quantity delivery

- CO_10   Delivery quality and reliability

- CO_16   Supplier reputation

Factor 4 (**Others**) Cronbach alpha = 0.64.

- CO_15   China delivery
- CO_6   Price
- CO_14   Flexible dyed quantity policy

4.4.1.3.   Quality Aspects - Gap score of thread attributes with Coats

The gaps are also an important concept in the study of customer behaviors. The factor analysis is similarly performed with varimax rotation and pair-wise deletion. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.80 which can be described as meritorious (Norusis, 1994).

The factor analysis identifies five factors, which categorically are the key improvement areas for Coats:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
GAPCO19	**.72930**	.35816	.08870	.06005	.29332
GAPCO21	**.71435**	-.12367	.01233	.22890	-.12815
GAPCO17	**.71094**	.21012	.31160	.04643	.11039
GAPCO18	**.68343**	.28218	.12218	-.01242	.24867
GAPCO20	**.65743**	.15917	.00025	.35062	.28172
GAPCO9	**.64821**	.19437	.16037	.41430	-.13520
GAPCO7	**.60149**	.18013	.26778	.13978	.08003
GAPCO16	**.47985**	.22661	.41022	.32925	.04011
GAPCO10	.29956	**.80874**	.13644	.07229	-.10426
GAPCO12	.18247	**.78930**	.16992	-.00607	.10515
GAPCO13	.04064	**.76539**	.23621	-.09790	.25047
GAPCO11	.30544	**.71119**	.11149	.23758	.01566
GAPCO14	-.00029	**.51416**	-.03020	.44064	.37393
GAPCO4	.19421	.16544	**.75321**	.16552	-.08978
GAPCO2	-.01092	.19232	**.65118**	.19777	.30450
GAPCO8	.49910	.23353	**.62310**	-.07925	.04026
GAPCO3	.29031	.11047	**.54868**	.35234	-.39788
GAPCO5	.31873	.04827	.10334	**.75025**	-.05948
GAPCO1	.15753	-.03174	.38397	**.71623**	.08550
GAPCO15	.27154	.04958	-.01226	.05269	**.78285**
GAPCO6	.08702	.46178	.14511	-.04867	**.55930**

The five "gap" factors with their reliability coefficients are listed as below:

Factor 1 (**Relationship**) Cronbach alpha = 0.86.
- GAPCO_19   Effective communication
- GAPCO_21   International coverage
- GAPCO_17   Responsiveness of sales representative

- GAPCO_18   Professionalism of sales representative
- GAPCO_20   Partnership orientation
- GAPCO_9   Technical advisory services
- GAPCO_7   Special colour services
- GAPCO_16   Supplier reputation

Factor 2 (**Place**) Cronbach alpha = 0.82.
- GAPCO_10   Delivery quality and reliability
- GAPCO_12   Delivery lead-time
- GAPCO_13   Stock availability
- GAPCO_11   Accurate quantity delivery
- GAPCO_14   Flexible dyed quantity policy

Factor 3 (**Product**) Cronbach alpha = 0.74.
- GAPCO_4   Colour range
- GAPCO_2   Product performance
- GAPCO_8   Thread sample
- GAPCO_3   Product range

Factor 4 (**Promotion**) Cronbach alpha = 0.71.
- GAPCO_5   Packaging
- GAPCO_1   Brand image

Factor 5 (**Price**) Cronbach alpha = 0.54.
- GAPCO_15   China delivery
- GAPCO_6   Price

Figure 3:   Model emerges with Quality Expectation as the Focus
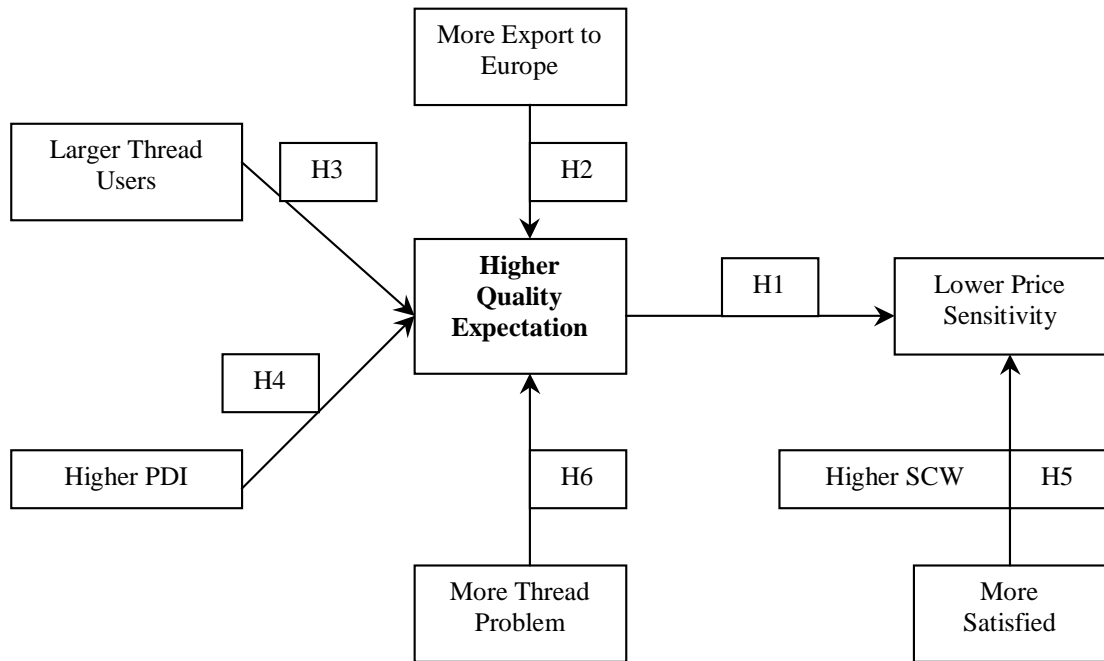
4.4.2. Hypothesis 1: Thread customers with higher quality expectation are less price sensitive

Quality Expectation (or Quality Orientation) is operationally defined and measured by the five factors identified from the factor analysis of the 21 quality related attributes in question 29 (Cross Reference: section 4.4.1.1).

It is assumed that if thread customers feel a particular attribute as important, they would expect that to be well provided by their suppliers. The more they feel the importance of the quality attributes, the more they are quality oriented. The followings are the five quality / service related constructs used in testing the various hypotheses:

Factor 1 QLR (Logistic Reliability)
- S29_10   Delivery quality and reliability
- S29_11   Accurate quantity delivery
- S29_12   Delivery lead-time
- S29_13   Stock availability
- S29_6   Price
- S29_17   Responsiveness of Sales representative

Factor 2 QSS (Supplier Support)
- S29_5   Packaging
- S29_9   Technical advisory services
- S29_21   International coverage
- S29_1   Brand image
- S29_16   Supplier reputation

Factor 3 QPP (Professional Partnership)
- S29_15   China delivery

- S29_20   Partnership orientation
- S29_19   Effective communication
- S29_18   Professionalism of sales representative

Factor 4 QPF (Product Feature)
- S29_4   Colour range
- S29_3   Product range
- S29_2   Product performance

Factor 5 QTS (Tailored Services)
- S29_8   Thread sample
- S29_7   Special colour services
- S29_14   Flexible dyed quantity policy

The Cronbach alphas for testing the reliabilities of the above five quality expectation (orientation) constructs are calculated as follows:

QLR   0.78
QSS   0.75
QPP   0.74
QPF   0.68
QTS   0.62

Price Sensitivity is operationally defined as the perception on importance of pricing. Only two questions in the questionnaire are related to perception towards price (i.e. Question 29_6 on importance perception; and question 30_6 on perceived satisfaction with price.). As satisfaction is reactive to and dependent on the price set by the supplier, it is not really measuring customer expectation. However it is natural to assume that customer who treat price as an important attribute, they are more sensitive to price.

In order to test hypothesis 1, the five quality expectation constructs are correlated with Price Importance / Sensitivity (i.e. question 29_6).

However since S29_6 is a component element in QLR, a revised construct for QLR with Q29_6 removed is constructed. The revised constructed is labeled as QLR_R. The Cronbach alpha for QLR_R is 0.86. The results are as below:

Table 74:   Correlation Coefficients of Quality factors and Price sensitivity

	QLR	QSS	QPP	QPF	QTS	S29_6	QLR_R
QLR	1.0000	.3456	.5367	.4707	.4678	.6570	.9840
	(203)	(189)	(187)	(194)	(193)	(198)	(200)
	P= .	P= .000	P= .000	P= .000	P= .000	**P= .000**	P= .000
QSS	.3456	1.0000	.5419	.4136	.4516	.1450	.3525
	(189)	(189)	(184)	(185)	(185)	(185)	(187)
	P= .000	P= .	P= .000	P= .000	P= .000	**P= .049**	P= .000
QPP	.5367	.5419	1.0000	.4116	.4565	.2783	.5413
	(187)	(184)	(187)	(183)	(182)	(184)	(186)
	P= .000	P= .000	P= .	P= .000	P= .000	**P= .000**	P= .000
QPF	.4707	.4136	.4116	1.0000	.4140	.3283	.4558
	(194)	(185)	(183)	(194)	(187)	(191)	(192)
	P= .000	P= .000	P= .000	P= .	P= .000	**P= .000**	P= .000
QTS	.4678	.4516	.4565	.4140	1.0000	.2923	.4647
	(193)	(185)	(182)	(187)	(193)	(189)	(193)
	P= .000	P= .000	P= .000	P= .000	P= .	**P= .000**	P= .000
S29_6	.6570	.1450	.2783	.3283	.2923	1.0000	.5101
	(198)	(185)	(184)	(191)	(189)	(198)	(195)
	P= .000	P= .049	P= .000	P= .000	P= .000	P= .	P= .000
QLR_R	.9840	.3525	.5413	.4558	.4647	.5101	1.0000
	(200)	(187)	(186)	(192)	(193)	(195)	(200)
	P= .000	P= .000	P= .000	P= .000	P= .000	**P= .000**	P= .

(Coefficient / (Cases) / 2-tailed Significance)

From the above correlation matrix, it can be observed that Price Sensitivity (i.e. S29_6) is positively correlated with all five Quality Expectation Constructs. Hypothesis 1 is <u>not</u> established. The empirical findings suggest that thread customers who have high quality expectation have also high price sensitive. In other words, customers who view quality to be important also view price as important. This also implies that those customers who view quality as unimportant also view price as an unimportant issue. This is an interesting empirical observation.

In order to establish the relationship between the quality factors and price sensitivity, a multiple linear regression was conducted with price sensitivity (S29_6) as dependent variable. The coefficient of determination (R square) is 0.27, viz 27% of data variability of price sensitivity is explained by the following five independent variables:

```
   1..    QTS        Q: Tailor-made Services
   2..    QPF        Q: Product Features
   3..    QSS        Q: Supplier Support
   4..    QLR_R      Q: Revised Logistic Reliability
   5..    QPP        Q: Professional Partnership


Multiple R          .51770
R Square            .26802
Adjusted R Square   .24661
Standard Error      .55180

Analysis of Variance
                  DF        Sum of Squares      Mean Square
Regression         5              19.06404          3.81281
Residual         171              52.06591           .30448

F =      12.52240       Signif F =   .0000


------------------ Variables in the Equation ------------------

Variable           B         SE B        Beta         T   Sig T

QLR_R         .522780     .097526     .449804     5.360   .0000
QPF           .108476     .072262     .116842     1.501   .1352
QPP          -.005968     .082255    -.006392     -.073   .9422
QSS          -.081939     .064608    -.102215    -1.268   .2064
QTS           .064211     .067250     .075939      .955   .3410
(Constant)    .497188     .154427                 3.220   .0015
```

The multiple linear regression is as follows:

Price Sensitivity = 0.50 + 0.52Revised Logistic Reliability + 0.11Product Feature – 0.006Professional Partnership – 0.08Supplier Support + 0.06Tailored Services

From the beta weights, the most influential independent variable is the revised Logistic Reliability.

4.4.3 Hypothesis 2: Thread users who export to Europe have higher quality expectation than those who export to other countries

This hypothesis is made because there is a general belief in the thread industry, at least among colleagues in Coats that customers who export to Europe are more quality conscious than exporters to other countries.

In question 9 of the customer survey questionnaire, respondents were asked to give the percentages for various export markets. Percentage of export business to Europe (i.e. Question P9_2) is correlated with the five quality expectation constructs (QLR, QSS, QPP, QPF, and QTS).

Table 75:   Correlation Coefficients of Quality factors and the Major Export Country to Europe

	QLR	QSS	QPP	QPF	QTS	P9_2
QLR	1.0000	.3456	.5367	.4707	.4678	.0701
	(203)	(189)	(187)	(194)	(193)	(114)
	P= .	P= .000	P= .000	P= .000	P= .000	**P= .458**
QSS	.3456	1.0000	.5419	.4136	.4516	-.0939
	(189)	(189)	(184)	(185)	(185)	(106)
	P= .000	P= .	P= .000	P= .000	P= .000	**P= .338**
QPP	.5367	.5419	1.0000	.4116	.4565	.0261
	(187)	(184)	(187)	(183)	(182)	(105)
	P= .000	P= .000	P= .	P= .000	P= .000	**P= .792**
QPF	.4707	.4136	.4116	1.0000	.4140	.0416
	(194)	(185)	(183)	(194)	(187)	(112)
	P= .000	P= .000	P= .000	P= .	P= .000	**P= .663**
QTS	.4678	.4516	.4565	.4140	1.0000	.0035
	(193)	(185)	(182)	(187)	(193)	(109)
	P= .000	P= .000	P= .000	P= .000	P= .	**P= .972**
P9_2	.0701	-.0939	.0261	.0416	.0035	1.0000
	(114)	(106)	(105)	(112)	(109)	(127)
	P= .458	P= .338	P= .792	P= .663	P= .972	P= .

(Coefficient / (Cases) / 2-tailed Significance)

The findings do not support Hypothesis 2.

The correlation analysis is then supplemented by a multiple linear regression analysis with P9_2 as the dependent variable and the five quality factors as independable variables.

```
1..    QTS        Q: Tailor-made Services
2..    QPF        Q: Product Features
3..    QPP        Q: Professional Partnership
4..    QLR        Q: Logistic Reliability
5..    QSS        Q: Supplier Support


Multiple R          .16597
R Square            .02755
Adjusted R Square  -.02258
Standard Error     32.96789

Analysis of Variance
                 DF      Sum of Squares     Mean Square
Regression        5          2986.44665       597.28933
Residual         97        105427.51452      1086.88159

F =        .54954      Signif F =  .7383


----------------- Variables in the Equation -----------------

Variable          B        SE B        Beta        T  Sig T

QLR          7.364393    7.968082     .120295     .924  .3577
QPF          4.617620    6.343129     .091110     .728  .4684
QPP          -.325338    6.186959    -.007008    -.053  .9582
QSS         -6.066923    5.536703    -.143074   -1.096  .2759
QTS          -.806464    5.468210    -.019565    -.147  .8831
(Constant)  36.078127   12.242068                2.947  .0040
```

The regression equation is:

Percentage of export business to Europe = 36.01 + 7.37Logistic Reliability +

4.62Product Feature – 0.33Professional Partnership –

6.07Supplier Support – 0.81Tailored Service

It is obvious from the low value (0.027) of R Square that there hardly exists any relation between the percentage of export business to Europe and the quality factors. In other words, customers having export to the European market are not having higher expectation of quality than customers having exports to other countries.

4.4.4 Hypothesis 3: Larger thread users are more quality oriented than those smaller thread customers

It is commonly believed that larger companies can afford to be more quality conscious and smaller companies are less quality oriented. Hypothesis 3 aims to establish the relation of size of Thread users and their quality orientation. Among the various possible ways of measuring the size of the customers, the size by the number of sewing machines (Question 5) is used to test this hypothesis. Various measures of customer sizes (Questions 3, 4, 5, 6, and 7) are highly correlated.

Table 76:   Correlation Coefficients of Quality factors and the Size of the thread users

	QLR	QSS	QPP	QPF	QTS	S5
QLR	1.0000 (203) P= .	.3456 (189) P= .000	.5367 (187) P= .000	.4707 (194) P= .000	.4678 (193) P= .000	.0156 (177) **P= .837**
QSS	.3456 (189) P= .000	1.0000 (189) P= .	.5419 (184) P= .000	.4136 (185) P= .000	.4516 (185) P= .000	.0053 (168) **P= .945**
QPP	.5367 (187) P= .000	.5419 (184) P= .000	1.0000 (187) P= .	.4116 (183) P= .000	.4565 (182) P= .000	.0432 (164) **P= .583**
QPF	.4707 (194) P= .000	.4136 (185) P= .000	.4116 (183) P= .000	1.0000 (194) P= .	.4140 (187) P= .000	.0107 (172) **P= .889**
QTS	.4678 (193) P= .000	.4516 (185) P= .000	.4565 (182) P= .000	.4140 (187) P= .000	1.0000 (193) P= .	-.0639 (171) **P= .406**
S5	.0156 (177) P= .837	.0053 (168) P= .945	.0432 (164) P= .583	.0107 (172) P= .889	-.0639 (171) P= .406	1.0000 (208) P= .

(Coefficient / (Cases) / 2-tailed Significance)

It can be observed from the above correlation matrix that the sizes of the companies are not related to their quality orientation.

Similarly, multiple linear regression analysis is performed. The results are as below:

```
Block Number  1.  Method:  Enter
   QLR      QPF      QPP      QSS      QTS


Variable(s) Entered on Step Number
   1..    QTS        Q: Tailor-made Services
   2..    QPF        Q: Product Features
   3..    QPP        Q: Professional Partnership
   4..    QLR        Q: Logistic Reliability
   5..    QSS        Q: Supplier Support


Multiple R           .14597
R Square             .02131
Adjusted R Square   -.01047
Standard Error      2.18603

Analysis of Variance
                DF       Sum of Squares      Mean Square
Regression       5            16.02191          3.20438
Residual       154           735.92184          4.77871

F =        .67055      Signif F =  .6464


----------------- Variables in the Equation -----------------

Variable            B        SE B       Beta         T  Sig T

QLR          -.043158    .432236   -.009788     -.100  .9206
QPF           .131529    .305561    .039803      .430  .6675
QPP           .388964    .349413    .115425     1.113  .2674
QSS          -.162893    .270579   -.059842     -.602  .5480
QTS          -.407670    .286204   -.135940    -1.424  .1564
(Constant)   3.297404    .677339               4.868  .0000
```

The regression equation is as follows:

Size of thread users = 3.30 – 0.04Logistic Reliability + 0.13Product Feature

$\qquad$ **+0.39Professional Partnership – 0.41Supplier Support –**

$\qquad$ **0.41 Tailored Services**

The low R Square (0.021) suggests that the larger thread users are not more quality oriented than those smaller thread customers. The multiple linear regression analysis triangulates the correlation analysis.

4.4.5 Hypothesis 4: Firms with high Purchase Decision Involvement (PDI) are more conscious of quality requirement in selecting their thread suppliers than those with lower PDI

PDI is a measure of the extent of involvement or concern in making the purchase decision. It is reasonable to assume that customers having a high PDI are more conscious of quality in selecting their suppliers. The PDI is correlated with the various quality expectation/concern construct.

Table 77:   Correlation Coefficients of Quality factors and PDI

```
             QLR        QSS        QPP        QPF        QTS        PDI

QLR        1.0000      .3456      .5367      .4707      .4678     -.0094
          (  203)    (  189)    (  187)    (  194)    (  193)    (  176)
          P= .       P= .000    P= .000    P= .000    P= .000    P= .901

QSS         .3456     1.0000      .5419      .4136      .4516      .0484
          (  189)    (  189)    (  184)    (  185)    (  185)    (  168)
          P= .000    P= .       P= .000    P= .000    P= .000    P= .534

QPP         .5367      .5419     1.0000      .4116      .4565      .0061
          (  187)    (  184)    (  187)    (  183)    (  182)    (  165)
          P= .000    P= .000    P= .       P= .000    P= .000    P= .938

QPF         .4707      .4136      .4116     1.0000      .4140     -.0431
          (  194)    (  185)    (  183)    (  194)    (  187)    (  171)
          P= .000    P= .000    P= .000    P= .       P= .000    P= .575

QTS         .4678      .4516      .4565      .4140     1.0000     -.0534
          (  193)    (  185)    (  182)    (  187)    (  193)    (  171)
          P= .000    P= .000    P= .000    P= .000    P= .       P= .488

PDI        -.0094      .0484      .0061     -.0431     -.0534     1.0000
          (  176)    (  168)    (  165)    (  171)    (  171)    (  197)
          P= .901    P= .534    P= .938    P= .575    P= .488    P= .
```

(Coefficient / (Cases) / 2-tailed Significance)

Hypothesis 4 is not supported from the above findings. It appears that PDI is a unique construct which is different and unrelated with quality related constructs (i.e. purchase decision has no quality element in it).

Like in the previous hypothesis testing, the results of regression analysis agree with the correlation analysis. The regression formula is:

Extent of Purchase Decision Involvement = 4.96 – 0.03Logistic Reliability –

0.13Product Feature + 0.19Professional Partnership +

0.05Supplier Support – 0.20Tailored Service

```
    1..    QTS       Q: Tailor-made Services
    2..    QPF       Q: Product Features
    3..    QSS       Q: Supplier Support
    4..    QLR       Q: Logistic Reliability
    5..    QPP       Q: Professional Partnership


Multiple R            .12332
R Square              .01521
Adjusted R Square    -.01656
Standard Error       1.41822

Analysis of Variance
                  DF      Sum of Squares     Mean Square
Regression         5             4.81445         .96289
Residual         155           311.76086        2.01136

F =       .47873      Signif F =  .7917


----------------- Variables in the Equation -----------------

Variable           B        SE B        Beta         T  Sig T

QLR          -.027029     .270709    -.010191     -.100  .9206
QPF          -.130163     .190690    -.064271     -.683  .4959
QPP           .190642     .222180     .092869      .858  .3922
QSS           .049623     .174506     .027669      .284  .7765
QTS          -.202624     .185162    -.106449    -1.094  .2755
(Constant)   4.960076     .430225                11.529  .0000
```

4.4.6 Hypothesis 5: Customer satisfaction is positively correlated with share of customer wallet which in turn is positively correlated with price sensitivity

Share of Customer Wallet is a very useful and important concept. It represents the share in percentage of customers' total business volume. Question 28 addresses the Share of Customer Wallet for the various leading thread suppliers. Coats's share of customer wallet (P28_1) is used to correlate with the overall satisfaction with Coats (i.e. the last item in Question 30, CO_22) and Price Sensitivity (S29_6).

Table 78: Correlation Coefficients of Customer Satisfaction and the Share of Customer Wallet

```
              CO_22       P28_1       S29_6

CO_22        1.0000      -.3021        .0221
            (  163)     (  144)      (  151)
            P= .        P= .000      P= .788

P28_1        -.3021      1.0000       -.1577
            (  144)     (  193)      (  168)
            P= .000     P= .         P= .041

S29_6         .0221      -.1577       1.0000
            (  151)     (  168)      (  198)
            P= .788     P= .041      P= .

(Coefficient / (Cases) / 2-tailed Significance)
```

This hypothesis is supported from the above correlation matrix. The Share of Customer Wallet is "negatively" and significantly correlated with Overall Satisfaction with Coats and Price Sensitivity. Since the scale of CO_22 and S29_6 is designed with smaller number to represent higher satisfaction or more important. The negative correlation sign makes good common sense.

In short the more satisfied a customer is, the more business it gives (i.e. the higher is the share of customer's wallet) to its supplier and the more business it gives to a supplier (i.e. the higher is the share of customer wallet), the more price sensitivity it is.

4.4.7 Hypothesis 6: Thread customers who experience more problems with thread usage are more interested in Technical Advisory Services

The extent of thread problem encountered by the customers can be estimated from question 19 (Cross Reference: Tables 19.1, 19.2, and 19.3). The variables for the three kinds of thread problems (Yarn; Finishing; and Aesthetic) can be recoded to represent the number of counts of each types of specific problem.

The three thread problem new variables are:

M19Y_R   Recoded measure for counts of Yarn related problems

M19F_R   Recoded measure for counts of Finishing related problems

M19A_R   Recoded measure for counts of Aesthetic related problems

The following questions in the questionnaire relate to Technical Advisory Service (TAS):

Question 25:   S25   Interested in TAS?

Question 29 (9th item):   S29_9 Importance level for TAS

Question 30 (9th item):   CO_9 Satisfaction with TAS with Coats

Correlation coefficients for M19Y_T, M19F_R, M19A_R, S25, S29_9, and CO_9 are computed and listed below:

Table 79: Correlation Coefficients of Thread Problems and Technical Advisory Service

	M19Y_R	M19F_R	M19A_R	S25	S29_9	CO_9
M19Y_R	1.0000	.4853	.6383	-.0481	-.0841	-.0167
	(95)	(88)	(60)	(86)	(71)	(48)
	P= .	P= .000	P= .000	**P= .660**	**P= .486**	**P= .910**
M19F_R	.4853	1.0000	.4349	.0404	.0012	-.0549
	(88)	(173)	(101)	(156)	(126)	(90)
	P= .000	P= .	P= .000	**P= .617**	**P= .990**	**P= .607**
M19A_R	.6383	.4349	1.0000	-.0445	-.0169	-.1242
	(60)	(101)	(113)	(102)	(90)	(64)
	P= .000	P= .000	P= .	**P= .657**	**P= .875**	**P= .328**
S25	-.0481	.0404	-.0445	1.0000	.3870	.0843
	(86)	(156)	(102)	(205)	(147)	(107)
	P= .660	P= .617	P= .657	P= .	P= .000	P= .388
S29_9	-.0841	.0012	-.0169	.3870	1.0000	.0740
	(71)	(126)	(90)	(147)	(161)	(100)
	P= .486	P= .990	P= .875	P= .000	P= .	P= .464
CO_9	-.0167	-.0549	-.1242	.0843	.0740	1.0000
	(48)	(90)	(64)	(107)	(100)	(115)
	P= .910	P= .607	P= .328	P= .388	P= .464	P= .

(Coefficient / (Cases) / 2-tailed Significance)

It can be seen that Thread Problem is not related with TAS.

The multiple linear regression is conducted. The results are as follows:

```
   1..   CO_9      SAT: TECHNICAL ADVISORY SERVICE
   2..   S29_9     IMP: TECHNICAL ADVISORY SERVICE
   3..   M19Y_R    Count of Yarn Problem
   4..   M19F_R    Count of Finish Problem
   5..   M19A_R    Count of Aesthetic problem


Multiple R           .27255
R Square             .07428
Adjusted R Square   -.13611
Standard Error       .54272

Analysis of Variance
                DF      Sum of Squares     Mean Square
Regression       5            .51997           .10399
Residual        22           6.48003           .29455

F =        .35306     Signif F =  .8747


----------------- Variables in the Equation -----------------

Variable              B       SE B       Beta       T  Sig T
```

```
M19Y_R          .064073    .177828    .108593      .360   .7221
M19F_R          .142420    .197285    .220072      .722   .4780
M19A_R         -.187448    .199215   -.308532     -.941   .3570
S29_9           .088174    .093974    .196255      .938   .3583
CO_9           -.062709    .133071   -.106281     -.471   .6421
(Constant)     1.417130    .539421                2.627   .0154
```

The regression formula is:

Interest in TAS = 1.42 + 0.06Yarn Problem + 0.14Finishing Problem –

0.19Aesthetic Problem + 0.09 Importance for TAS –

0.06Satisfaction with TAS with Coats

The Coefficient of determination is 0.07 only.

The thread problem variables are then correlated with the five quality expectation constructs.

Table 80:   Correlation Coefficients of Thread Problems and Quality Factors

	M19Y_R	M19F_R	M19A_R
QLR	-.0162	-.0473	-.1559
	(84)	(153)	(103)
	P= .884	P= .561	P= .116
QSS	-.0193	.0550	-.0044
	(78)	(142)	(99)
	P= .867	P= .516	P= .966
QPP	.0209	.0020	-.0689
	(78)	(142)	(98)
	P= .856	P= .981	P= .500
QPF	-.0226	-.0719	-.0365
	(80)	(146)	(101)
	P= .842	P= .388	P= .717
QTS	.0032	-.0282	-.1243
	(82)	(147)	(102)
	P= .977	P= .735	P= .213

(Coefficient / (Cases) / 2-tailed Significance)

None of these correlation coefficients are significant. This suggests that there is no relation between thread problem with quality expectation.

For the dichotomous question 25, it is useful to further examine the issue by performing independent samples T-Tests with the three thread problem variables.

Table 81: **T-tests for independent samples of S25 INTEREST IN TECHNICAL ADVISORY SERVICE with Yarn Problem**

```
                        Number
        Variable       of Cases    Mean        SD      SE of Mean
       ----------------------------------------------------------------
        M19Y_R

        YES               37      1.4324      .689        .113
        NO                49      1.3673      .668        .095
       ----------------------------------------------------------------

        Mean Difference = .0651

        Levene's Test for Equality of Variances: F= .305   P= .582


         t-test for Equality of Means                      95%
        Variances  t-value   df    2-Tail Sig   SE of Diff    CI for Diff
       ----------------------------------------------------------------
        Equal        .44     84       .660         .147      (-.228, .358)
        Unequal      .44    76.36     .661         .148      (-.230, .360)
       ----------------------------------------------------------------
```

Table 82: **T-tests for independent samples of S25 INTEREST IN TECHNICAL ADVISORY SERVICE with Finishing Problem**

```
                        Number
        Variable       of Cases    Mean        SD      SE of Mean
       ----------------------------------------------------------------
        M19F_R   Count of Finish Problem

        YES               74      1.5811      .683        .079
        NO                82      1.6341      .639        .071
       ----------------------------------------------------------------

        Mean Difference = -.0531

        Levene's Test for Equality of Variances: F= .780   P= .379


         t-test for Equality of Means                      95%
        Variances  t-value    df    2-Tail Sig   SE of Diff    CI for Diff
       ----------------------------------------------------------------
        Equal       -.50     154      .617         .106      (-.262, .156)
        Unequal     -.50    149.69    .618         .106      (-.263, .157)
       ----------------------------------------------------------------
```

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Table 83:   T-tests for independent samples of S25   INTEREST IN
**   TECHNICAL ADVISORY SERVICE with Aesthetic Problem**

```
                          Number
            Variable      of Cases   Mean      SD      SE of Mean
          -----------------------------------------------------------
            M19A_R  Count of Aesthetic problem

            YES             48      1.3333    .724       .105
            NO              54      1.2778    .529       .072
          -----------------------------------------------------------

            Mean Difference = .0556

            Levene's Test for Equality of Variances: F= 1.727  P= .192


            t-test for Equality of Means                      95%
          Variances  t-value   df    2-Tail Sig   SE of Diff   CI for Diff
          ------------------------------------------------------------------
            Equal      .45    100      .657         .125       (-.192, .303)
            Unequal    .44    85.15    .663         .127       (-.197, .308)
          ------------------------------------------------------------------
```

The independent samples T-Tests do not support the hypothesis that thread customers
who experience more thread problem are more interested in Technical Advisory
Services.

The following cross-tabulation tables of S25 (Interest in TAS) and with the various
Counts of Thread Problems do not support the hypothesis that customers with more
thread problems are more interested in TAS.

Table 84:   Cross-tabulation Table for S25 INTEREST IN TECHNICAL
**   ADVISORY SERVICE by M19Y_R Count of Yarn Problem**

```
                       M19Y_R
                Count  |
                Row Pct|
                       |                              Row
                       |   1.00|   2.00|   3.00| Total
          S25   --------+--------+--------+--------+
                  1 |    25 |     8 |     4 |    37
             YES    | 67.6  | 21.6  | 10.8  |  43.0
                  +--------+--------+--------+
                  2 |    36 |     8 |     5 |    49
             NO     | 73.5  | 16.3  | 10.2  |  57.0
                  +--------+--------+--------+
                Column     61      16       9      86
                 Total    70.9    18.6    10.5   100.0

Number of Missing Observations:  152
```

Table 85: **Cross-tabulation Table for S25 INTEREST IN TECHNICAL ADVISORY SERVICE by M19F_R Count of Finish Problem**

```
                    M19F_R
            Count |
          Row Pct |
                  |                             Row
                  |   1.00|   2.00|   3.00|   Total
S25       --------+--------+--------+--------+
             1    |   39  |   27  |    8  |    74
           YES    |  52.7 |  36.5 |  10.8 |   47.4
                  +--------+--------+--------+
             2    |   37  |   38  |    7  |    82
           NO     |  45.1 |  46.3 |   8.5 |   52.6
                  +--------+--------+--------+
           Column    76      65      15      156
            Total    48.7    41.7    9.6    100.0
```

Number of Missing Observations: 82

Table 86: **Cross-tabulation Table for S25 INTEREST IN TECHNICAL ADVISORY SERVICE by M19A_R Count of Aesthetic problem**

```
                    M19A_R
            Count |
          Row Pct |
                  |                                      Row
                  |   1.00|   2.00|   3.00|   4.00|   Total
S25       --------+--------+--------+--------+--------+
             1    |   38  |    5  |    4  |    1  |    48
           YES    |  79.2 |  10.4 |   8.3 |   2.1 |   47.1
                  +--------+--------+--------+--------+
             2    |   41  |   11  |    2  |       |    54
           NO     |  75.9 |  20.4 |   3.7 |       |   52.9
                  +--------+--------+--------+--------+
           Column    79      16      6       1      102
            Total    77.5    15.7    5.9     1.0    100.0
```

Number of Missing Observations: 136

Figure 4:   **Revised Model after testing from Hypothesis 1 to Hypothesis 6**
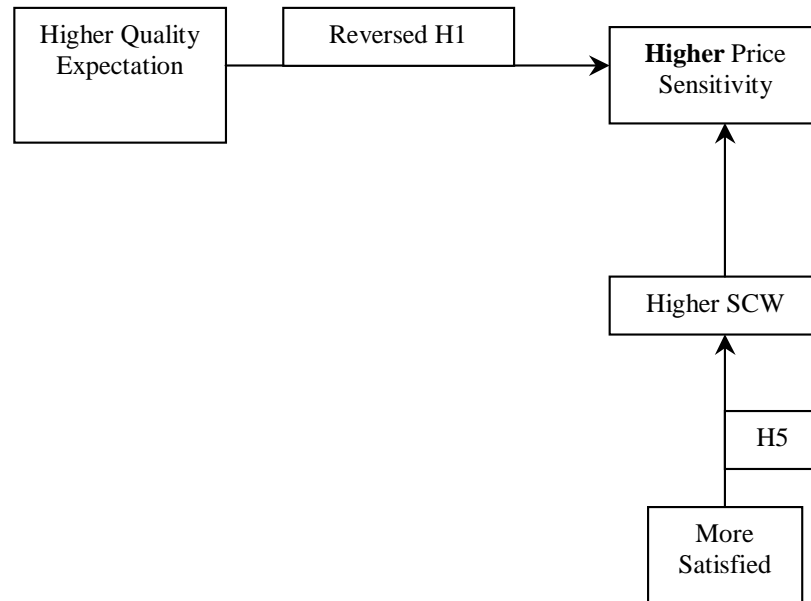
Figure 4 summarizes the empirical findings of the relationships among quality expectation, price sensitivity, share of customer wallet, and customer satisfaction.

- The higher the quality expectation, the higher is the price sensitivity.
- The more satisfied is the customer, the higher is the share of customer wallet.
- The higher the share of customer wallet, the higher is the price sensitivity.

4.5.   Chapter Conclusion

This chapter begins with a descriptive summary of all 34 items in the customer survey questionnaire. The table numbers from Table 1 to Table 34 correspond to the question numbers in the questionnaire. Several inferential statistical analyses are employed.

The respondents are clustered by K-Means Cluster Analysis in Importance, Satisfaction and Gap dimensions into four requested segments for each dimension. The demographic patterns of each segment in I-S-G dimensions are then depicted. The ANOVA analyses suggest the four segments are heterogeneous among themselves.

Both Cluster Analysis and CHAID are useful statistical tools to segment the market. Although the objectives are similar for the two approaches, there are distinct differences. Cluster analysis groups items into distinct clusters according to the similarity and dissimilarity of the characteristics of each item. In the cluster analysis, there is no need to know the cluster class in advance. On the other hand for CHAID analysis, the cluster class is known in advance (similar to the Discriminant Analysis) and the grouping of the Nodes of the classification tree is assigned on some statistical algorithm.

For this action research, Cluster analysis appears to be the more appropriate segmentation tool. Under K-Mean Cluster Analysis, any number of segment can be requested. The resulting cluster groups can be linked with the in-house demographic data to see the characteristics of each segment (see Tables 37, 39 and 41).

CHAID is used to segment the market with Coats Overall Satisfaction Performance as a dependent variable. The result is in line with discriminant analysis, the classification accuracy is about 64%. CHAID has an important function / capability

in describing the characteristics of segments. This is important in helping Coats to devise its marketing segmentation strategies.

This is followed by Discriminant Analysis. The customer segments were tested with discriminant analysis with degrees of predictability at 68% for satisfaction cluster grouping.

Artificial Neural Network is used to predict the overall performance of Coats from the satisfaction levels of the 21 thread attributes. The prediction accuracy of 73% is better than Discriminant Analysis and CHAID.

The next tool is Utility Analysis. As the top management of Coats did not want this tool to be administered with their customers, the decentring approach was adopted. The most important attribute is Product Performance with important score of 29.34% The predicted utility scores are compared with the original scores. The predicted scores are amazingly accurate.

Multi-Dimensional Scaling Analysis is used to chart the market positioning of Coats among eight other thread manufacturers. Three clusters result from the MDS analysis. The result should be indicative only as it only represents the subjective of one person.

Independent Samples T-Test is adopted to discern the pattern of the various dichotomous question (Q13,14,15,16,23,24,25, and 26) in the customer survey questionnaire with respect to the overall satisfaction of Coats. As gaps are important for Coats, they are analysed by T-test in details. The findings enable Coats to be more focused in addressing the differences.

One-way ANOVA is administered on the various non-dichotomous questions with Bonferroni test at 0.05 significant level. Most of these analyses have not identified significant differences at 0.05 level among the sub-groups.

These quantitative analyses are complemented by a qualitative analysis of an interview discussion. The interview data are analyzed by the NUD.IST software.

Multiple Linear Regression is used. The overall satisfaction with Coats is regressed on the 21 quality attributes. The key determining variables according to their beta weights are Responsiveness of Sales Representatives; Special Color Service; Delivery Quality and Reliability; Accurate Quantity Delivery; and Product Performance. This information provides useful clues for Coats to develop its marketing plan.

Factor Analysis is used to reduce the 21 quality attributes into smaller sets of underlying factors. The five factors identified are Logistic Reliability; Supplier Support; Professional Partnership; Product Feature; and Tailor-made Services. Similar analyses are conducted with the satisfaction scores and the gap scores. The importance factors are used to test the hypotheses 1, 2, 3, and 4.

The six hypothesis outlined in Chapter One are tested. Hypotheses 2,3,4, and 6 are not supported by the empirical data of this action research. The findings suggest that the relationship mentioned in Hypothesis 1 should be reversed. Hypothesis 1 should be: *"Thread customers with higher quality expectation are more (instead of less) price sensitive"*. The only established hypothesis is Hypothesis 5.

The chapter concludes with a simplified model of the relationship among Quality Expectation, Price, Share of Customer Wallet and Satisfaction.

Chapter Five   Conclusions and implications

5.1.   Key findings

The key findings of this action learning project are that multi-approaches to a research problem can shed light to insight of the problem. This approach is more holistic and revealing. This is the reason why ten statistical approaches were applied to tackle this marketing research project. Being an action learning, the project objectives are oriented as practical as possible.

Different quantitative approaches are applied to tackle the research issue, as a triangulation approach. The power of predictability of different techniques (Discriminant Analysis, Chi-squared Automatic Interaction and Detection, and Artificial Neural Network) were compared. Both CHAID and ANN are relatively new marketing research techniques. Their powers have been demonstrated in this action learning research.

The Associate has done a rather thorough search on literatures about market segmentation. The 65 different approaches are of course not exhaustive. New segmentation approaches are being developed. The Associate originally planned to use Utility Analysis as a new approach to segmenting a thread market in Hong Kong. This innovative idea was unfortunately not endorsed by the Managing Director of Coats China in Hong Kong. Being an employee at that time, the Associates has no alternative but to compromise on working on decentring basis with her colleagues. Therefore, utility segmentation is not testified in this action learning research. The findings from the utility analysis on decentring basis are at best an indicator of the hidden needs of the thread customers.

Cluster analysis has demonstrated to be useful to cluster variables (i.e. thread attributes), as well as cases (i.e. thread customers). For illustration purpose, four cluster of thread customers are selected. In fact, for cluster analysis, any number of clusters can be selected.

Basically, the questionnaire provides information of quality attributes from three perspectives viz. (a) importance scores in question 29; (b) satisfaction scores in question 30; and (c) gap scores derived from the difference between importance and satisfaction scores.

This approach of segmenting customers from their perspectives on **I**mportance, **S**atisfaction, and **G**aps, (coined as **ISG** Segmentation Approach) is unique and useful. The importance dimension prioritizes in a way the perceived needs of the customers. The satisfaction dimension measures the extend of happiness of the service provided by a particular thread supplier. The gap dimension provides clues for improvement for the suppliers concerned. The cluster analysis of ISG dimensions effectively segments the thread customers for Coats China in Hong Kong. The demographic cluster characteristics can be ascertained through linking the database maintained at Coats.

The ISG Approach is applied throughout in this action learning project. Discriminant analysis works with known classes in a category. It is used to predict the four clusters segmented by cluster analysis. The predictability of 68% is quite acceptable. Discriminant analysis is a prediction tool, which has wide application in marketing planning and forecast. Of the ISG dimensions, only satisfaction scores has a dependent variable (i.e. CO_22 Overall Performance for Coats), which is the outcome of the 21 predicted quality attributes. No similar dependent (outcome) variable exists for importance and gap. Discriminant analysis therefore applies to predict the overall satisfaction outcome from its 21 predicted variables with prediction accuracy of 63%. From the discriminant analysis, product performance, special color service, product

range, accurate quantity delivery and effective communication are revealed as the key determinant factors for predicting the overall performance satisfaction with Coats.

From the CHAID analysis, the following predictor variables are identified as discerning factors for predicting overall performance satisfaction with Coats: Product Performance; Special Color Service' Effective Communication; and Product Color Range. The confusion matrix indicates an accuracy rate of 64% in classifying the appropriate outcomes. CHAID has demonstrated to be more powerful than the traditional approaches. CHAID provides the classification rules, which can vividly describe the details of each segment. These segment descriptions provide detailed information, which enables Coats to plan its marketing strategies to attract or avoid a particular market segment. This segment description is outlined in Section 4.2.2. The index percentage provided by CHAID measures the ratio of a selected segment's gain score to the gain score for the entire sample. This gain percentage provided useful information as to the relative contribution made by a particular customer segments.

The next methodology adopted is Utility Analysis. As reported earlier, these utility profile sheets are not administered with the actual customers. Decentring approach (i.e. standing in the shoes of the others) is used. The key findings of utility analysis are the importance scores perceived by the respondents in descending order of importance are: Product Performance; Price; Responsiveness of Sales; Accurate Quantity Delivery; China Delivery; Delivery Lead-time; and Stock Availability. In a maximum preference score of 83, Coats is perceived to have 72. The specific utility scores provide a scientific prediction formula for customer preference towards Coats. The concept of decentring should have a wider business application. It is convenient, easy and risk free to perform.

Factor analysis is performed on all three ISG dimensions. The five I factors are: Logistic Reliability; Supplier Support; Professional Partnership; Product Feature; and Tailored Services.

The four S factors identified are: Partnership; Product; Logistic; and Others.

Five G factors are revealed. They are Relationship; Place; Product; Promotion; and Price. It is interesting to note that four P's in the marketing mix appear after the factor analysis. The G factors are the actionable improvement areas for the company concerned.

Factor analysis enables a more parsimonious set of factors to explain certain phenomena. The results from factor analysis are used in the later part of this action research in testing the hypotheses.

ANN is an interesting research methodology and is gaining wider recognition in various application fields. The Associate predicts that more firms will be using this new and powerful technique. ANN is used to predict the overall performance from the 21 quality attributes in the S dimension of ISG Model. The accuracy rate of 73% is higher than the previous approaches.

MDS is used to position Coats China in the thread market. Three clusters are identified from MDS. They are: Cluster 1 - Coats, A&E, Gunzetal, and Goldlink; and Cluster 2 – Sakura, Wire, and Paris; and Cluster 3 – Tse Yu and Kingfish. The findings of the MDS analysis is helpful for Coats management to portray company image and market positioning through its promotion strategies. The MDS findings reveal two dimensions in describing thread suppliers. The two dimensions are: (a) Nature of the Thread; and (b) Size of Thread Suppliers.

Multiple Linear Regression analysis is performed on the S dimension of ISG Model with Overall Performance Satisfaction as the dependent variable. Five out of 21 independent variable attributes emerge from the stepwise selection. The key variables are: (a) Responsiveness of Sales Representatives; (b) Special Color Services; (c)

Delivery Quality and Reliability; (d) Accurate Quantity Delivery; and (e) Product Performance. The coefficient of determination is 0.75, which is a good fit for this analysis. The findings can be compared with the key determinant factors identified from the other techniques (i.e. Triangulation Approach). By and large, they are similar, for example, Product Performance, Special Color Services, Delivery Quality and Reliability.

Independent Samples T-Test is performed to test the difference of the means of two groups. The following tables summarize all paired of significantly difference means for dichotomous questions (i.e. question 13, 14, 15, 16, 23, 24, 25,and 26) at 0.05 levels for Overall Satisfaction and the G dimension in the ISG Model with Coats.

Table 87:   Summary of the significant difference of means of two groups

Q13. Thread supplier needs ISO	Mean of "Yes" Group	Mean of "No" Group	Significance Level
CO_22 Overall Performance Satisfaction with Coats	2.62	2.32	0.035*

Question 13: Require Suppliers to have ISO management standard	Mean of "Yes" Group (143 counts)	Mean of "No" Group (78 counts)	Significance Level
GAPCO_3 Product Range	0.54	0.08	0.015*
GAPCO_5 Packaging	-0.08	-0.62	0.030*
GAPCO_7 Special Colour Services	1.26	0.45	0.009*
GAPCO_9 Technical Advisory Services	0.68	0.03	0.032*
GAPCO_10Delivery Quality and Reliability	1.39	1.00	0.032*
GAPCO_11Accurate Quantity Delivery	1.30	0.84	0.008*
GAPCO_12 Delivery Lead-time	1.65	1.14	0.005*
GAPCO_16 Supplier Reputation	0.78	0.35	0.032*

Question 14: Require Suppliers to be qualified for Oko-Tex Standard 100	Mean of "Yes" Group (141 counts)	Mean of "No" Group (75 counts)	Significance Level
No pair of means is significantly different at 0.05 level			

Question 15: Require Suppliers to have other international quality standard	Mean of "Yes" Group (51 counts)	Mean of "No" Group (131 counts)	Significance Level
GAPCO_9 Technical Advisory Services	1.05	0.17	0.009*
GAPCO_16 Supplier Reputation	0.91	0.43	0.041*
GAPCO_20 Partnership Orientation	0.94	0.34	0.016*
GAPCO_21 International Coverage	0.57	-0.59	0.000*

Question 16: Respondent is responsible for colour matching and approval	Mean of "Yes" Group (163 counts)	Mean of "No" Group (60 counts)	Significance Level
GAPCO_21 International Coverage	0.10	-0.76	0.009*

Question 23: Respondent has garment accessory delivered in China by suppliers	Mean of "Yes" Group (156 counts)	Mean of "No" Group (77 counts)	Significance Level
GAPCO_15 China Delivery	1.50	0.31	0.015*

Question 24: Respondent plans to have sewing thread delivered in China by the suppliers	Mean of "Yes" Group (158 counts)	Mean of "No" Group (71 counts)	Significance Level
GAPCO_15 China Delivery	1.52	-0.33	0.001*

Question 25: Respondent is interested in Technical Advisory Services	Mean of "Yes" Group (91 counts)	Mean of "No" Group (114 counts)	Significance Level
GAPCO_1 Brand Image	-0.10	-0.54	0.038*
GAPCO_9 Technical Advisory Services	0.78	0.06	0.010*
GAPCO_12 Delivery Lead-time	1.24	1.63	0.033*
GAPCO_20 Partnership Orientation	0.69	0.24	0.029*
GAPCO_21 International Coverage	0.16	-0.80	0.006*

Question 26: Respondent plans to set up (Electronic Data Interchange) EDI with thread supplier	Mean of "Yes" Group (32 counts)	Mean of "No" Group (171 counts)	Significance Level
GAPCO_9 Technical Advisory Services	1.31	0.29	0.004*
GAPCO_21 International Coverage	0.58	-0.36	0.020*

The ANOVA is a generalization of independent samples T-test. It compares means for more than two groups. The non-dichotomous questions are applied on overall satisfaction. The only difference detected by Bonferroni test is on expected delivery lead time for special color thread.

5.2.   Conclusion about hypotheses

The six hypotheses are developed from general belief among colleagues in Coats. The Associate uses these six hypotheses to build a model around the quality expectation attributes as depicted in Figure 3. The arrow shown in the figure does not imply casual relationship but rather it represents correlation relationship. Although it is disappointing that five out of the six hypotheses could not be established from the empirical data from the survey. The only hypothesis affirmed from correlation analysis is hypothesis five (i.e. customer satisfaction is positively correlated with the share of customer wallet which in turn is positively correlated with price sensitivity).

Hypothesis one is not affirmed. However, they are strong correlation in opposite direction. The thread customers with higher quality expectation are shown to be more price sensitive instead of less price sensitive.

The findings of testing the hypotheses resulted in a simpler model depicted in Figure 4.

Although the hypotheses two, three, four, and six are not affirmed. The findings add contribution to the body of knowledge.

- Hong Kong exporters to Europe do not have higher quality expectation than those who export to other countries.
- The quality orientation of large thread users is not statistically different than that of smaller thread users.
- Firms with high PDI are not necessarily more conscious of quality requirement in selecting their thread suppliers than those with lower PDI.
- Thread customers who experience more problems with thread usage are not necessarily more interested in Technical Advisory Service.

5.3. Conclusion about burning issues

Coats is basically faced with two burning issues – identification of customer needs and effective segmentation of its customers. The first burning issue of revealing the hidden needs of thread customers is partially fulfilled due to lack of last minute support from the top management to administer the Utility Analysis.

The partial fulfillment for revealing customer needs is achieved through the decentring approach. Having said that, the ISG model does reveal a lot of customer expressed needs. There are 21 attributes factored into four or five constructs. The findings in this respect, are still invaluable to Coats. To re-iterate, ISG model helps provide information on customer priority on various quality attributes; their happiness level with them; and areas for improvement to the concerned suppliers (Cross Reference: Table 29.2, 30.1.2, and 30.1.3)

The second burning issue relates to market segmentation. Multi research approaches are adopted to highlight key quality attributes, which are important to segment a market effectively. This empirical research suggests that cluster analysis, discriminant analysis, CHAID and ANN are relevant and useful. The findings from this research lay the foundation for Coats to segment the thread market.

The action research started with ten practical business objectives. The achievement of these objectives are commented as below:

1. **To identify the explicit and implicit thread users' requirements.**
   This research objective still remains to be important to Coats. This is tackled mainly by utility analysis, regression analysis, and ISG questionnaire. (See Appendix 5)
   By and large, this research objective has been achieved.

- Explicit users' requirements are thoroughly revealed from the ISG approach. Importance level is summarized in Table 29.2., and Satisfaction level is summarized in Table 30.1.2. The perceived gaps among major thread suppliers are nicely summarized in Table 30.6. These three tables provide much useful information for Coats to identify the explicit thread users' requirements.

- Implicit users' requirements are partially identified through the Utility Analysis by Decentring Approach. The implicit customer needs are listed in Table 54 in the format of utility scores of each important product attribute (i.e. factor level). The key product attributes are: product performance, price, responsiveness of sales, and accurate quantity delivery.

2. **To increase market share of Coats China in Hong Kong, Macau, and China**

The action learning project can at best provide much needed information for Coats's management to develop the relevant marketing strategy and action plans aiming to increase the market share. Whilst the issue remains important to Coats, the recent restructuring (abolishing the Marketing Department) is not supportive to any rigorous marketing effort.

The business objective of increasing market share can be facilitated by the findings of the various methodologies (See Appendix 5). The findings from discriminant analysis, CHAID, utility analysis, and multiple linear regression analysis shed much insightful light on the needs and expectations of various customer segments. Using these information appropriately, Coats can devise strategies and action plans superior to those of its competitors. It is not impossible to increase the market share during the current economic difficult time, as all players in the thread market are equally hard hit. The Associate is prepared to share the research findings with the management of Coats and offer assistance to develop its marketing plans.

3. **To identify Coats China's position in the thread market as perceived by the customers**

   Compared with the others, this business objective is relatively less important to Coats. Coats has always remained as the market leader in the thread industry. The perceived marketing positioning of Coats by the respective customer segments are useful marketing information. This follows from the common sense wisdom (Koo et al. 1998a) : "Reality is reality. Perception is also reality." If the perceived market position is different from that believed by Coats's management, then this is a promotion issue which needs to be addressed.

   In this action research, a MultiDimensional Scaling study with the Marketing Manager of Coats was conducted. This perceived market positioning finding (See Figure 2) may or may not represent that of the respective customer segments. Additional MDS study is required if the management of Coats would like to reveal the market position of the company as compared to its competitors. In short, this research objective is only partially achieved.

4. **To differentiate Coats China from its competitors**

   This research objective is only of average importance. It has been achieved by the findings from the Gap summary of major thread suppliers (See Table 30.6)

   Further, Coats's market positioning relative to its major competitors is revealed from MDS (See Figure 2). From the MDS and the qualitative analysis, Coats has more similarities with Gunzetal and A&E.

5. **To portray a proper brand image to all thread users**

   This research objective deals with the promotion issue. The promotion strategy is part and parcel of the marketing mixes. From the qualitative

analysis findings, promotion on the availability of Technical Advisory Service is needed. This may help portray a unique corporate image among the thread users.

The MDS research methodology can identify the perceived market positions of various thread suppliers. Figure 2 shows the market positioning of thread suppliers as perceived by the Marketing Manager of Coats. Additional MDS studies are required to provide a more accurate picture of the image of Coats among its competitors.

6. **To devise an effective place (distribution) strategy**

Delivery services have been identified as vital items from discriminant analysis, CHAID, utility analysis and multiple linear regression analysis (See Appendix 5). This important business objective is achieved.

Questions 20, 21, 22, 23, and 24 in the ISG customer survey questionnaire provided the information of customer expectation on delivery service. Since questionnaire is on a named basis, Coats can devise proper place strategy to meet customer needs.

7. **To segment the market accurately and reliably**

This action learning researching findings can be combined with the in-house database of Coats to segment the market, according to the broader business direction of Coats. This objective still remains very important to the success of Coats's business. This has been achieved to a very large extent.

The cluster analysis, discriminant analysis, and CHAID are different methodologies for customer segmentation. Their usefulness has been demonstrated in this action learning study. The Associate firmly believes that utility analysis can be a very powerful tool to effectively segment the market

as the latent needs of different customer segments can be scientifically measured.

The use of ISG questionnaire has made a major contribution in the study of marketing segmentation. The customer needs and expectations are tackled from different perspectives viz. Importance, Satisfaction, and Gap. Factor analyses suggest different factors for these three different perspectives (See Appendix 5).

8. **To develop an appropriate market information system to facilitate marketing planning**

    This is still a burning research objective for Coats. This objective can however only be achieved with much additional effort and commitment from the management of Coats.

    The findings of this research at best provide the foundation for implementing a marketing information system at Coats. Much work needs to be done. The research findings have to be combined with the data base maintained at Coats.

9. **To develop an effective target marketing approach through tailor-made services for selected customer segments**

    Target marketing is possible after effective customer segmentation. The management can only devise target marketing plans through knowing the needs of respective segments. This research objective is still important. It is possible with the research findings of this report.

10. **To develop a prediction model of customer needs**

    Discriminant Analysis, CHAID, and Utility Analysis, ANN and multiple linear regression analysis have been shown to be the appropriate tools to help develop prediction model of customer needs (See Appendix 5). Adopting

triangulation approach, the multi-methodologies have revealed similar important determinants for the dependant variable (overall satisfaction level).

The ability of accurately predicting customers' needs is the most important objective. This action learning research has helped Coats achieve this important research objective.

To conclude, the two burning issues and the ten research objectives are largely fulfilled except for some specific areas (i.e. Utility Analysis, MDS, Development of Marketing Information System), where further support from management of Coats is needed.

The achievement of this study is summarized in Appendix 5 in the form of a matrix table. The more "ticks" there are in the table the more relevant is the particular research methodology in achieving the respective objective. The use of so many different methodologies is justified because only through triangulating can the validity of segmentation be established. The apparent disorganized use of methodologies appears to be daunting at first sight. Appendix 5 shows the interrelationships among the research objectives and the methodologies adopted. The incorporation of qualitative data analysis (using NUD.IST) provide a more balanced approach to address the important marketing concept of segmentation. The formalization of ISG questionnaire will provide a new horizon in social science researches in the coming millenium.

5.4.   Implications of findings

Unlike the traditional research, action learning delivers practical business solution to the organization, sponsoring the project. The Associate is the de facto in-house consultant for Coats. She has the benefits of insider knowledge of the thread business as well as the benefits of high level academic training.

The findings from this research affirmed that a lot of common beliefs are untrue. This is evidenced by the failure to support five out of six hypotheses developed based on common beliefs. Intuitive business decision making is risky to any company surviving in a turbulence and unpredictable environment.

The practical implications to Coats would be:
- The role of Technical Advisory Service has to be examined. The qualitative data analysis findings suggest that Coats needs to promote its Technical Advisory Service.
- The S.W.O.T. analysis should help develop a practical business strategy, which should dictate the format of customer segmentation approach.
- Findings of this research should be used for determining its marketing and segmentation strategies.

5.5. Practical application of this action learning research project

The finding of this research can be applied to the entire thread industry in Hong Kong. The approach adopted can be applied to other industries. The triangulation approach has demonstrated the power of using several techniques to tackle a problem from different perspectives. This would add the validity and creditability to the finding of the business research.

Without doubt, this action learning research provides much practical and insightful information for the management to make informed decisions. The design of this research was as pragmatic and practical as possible. Many of the findings have immediate application for use by the management of Coats.

The ISG Approach has proven its usefulness. This approach should be used more widely in other consultancy projects. The detailed practical application of this action learning research project is also covered in the previous section.

5.6.   Limitations

Constraints and limitations are inevitable in any research. The followings are the major limitations encountered during the research period.

- Utility Segmentation is not supported by the top management of Coats.
- Emphasis is placed on phase I (Large customers of Coats) resulting with a response rate of 47% and less emphasis is placed for phase II with a poor response rate of 7%. Thus the findings tend to bias towards the views of the larger thread customers of Coats
- The Customer Survey Questionnaire is on named basis. Even with the covering letter from the Managing Director to ensure confidentiality, some respondents were reluctant to complete and return the questionnaire. Even if they did, they declined to provide some information which they considered to be sensitive.
- The inevitable missing values for some items in the questionnaire
- Embroidery thread suppliers (who are somewhat unique from the general thread suppliers) are not specifically included in the questionnaire. Coats needs to correct the questionnaire manually for the Embroidery thread customers.
- The restructuring of the Marketing function at Coats in August 1997 had an adverse impact of this action learning research

5.7. Recommendation for further research

Further researches should be conducted to address some of the shortfalls of this present research. It was a great regret that utility segmentation was not achieved. The Associate has shown how powerful/useful it would have been if the "hidden" needs of the customers could be revealed. Without the help of Utility Analysis, the genuine needs of the customers are very difficult to identify. The utility analysis can reveal the extent of importance of the various key determinant attributes which have an impact on the buying decision of the customers.

The Utility can provide data for the importance dimension of the Importance-Satisfaction-Gap (ISG) model. The customers should also be asked to express the extent of their satisfaction with each of these attributes. The Gap can then be easily computed to provide a fuller picture of the attitudes/opinion of the customers.

Multi-Dimensional Scaling (MDS) technique was used to describe the positioning of the thread suppliers in Hong Kong from the perspective of the Marketing Manager of Coats. This may or may not be representative of the true situation. In any case, market position of a particular brand or company is subjective. A larger and representative sample is needed in this aspect. Future researches can be designed to construct the perceptual mapping of the suppliers in a more meaningful way. This perceptual mapping exercise can and should be combined with the segmentation research. By definition of a market segment, the customers in a segment should be homogeneous within the segment but heterogeneous across different segments. The MDS perceptual mapping should be conducted and analysed by different segments.

As thread industry is a relatively small market dominated by a few suppliers. Similar market survey should perhaps be extended to the garment and textile industry. Such large scale researches should be supported by the Government or arranged through a syndicated basis. The findings can then be shared by all interested parties. The entire

business community should benefit from such an approach.   The techniques and approaches outlined should be applicable to the other industries as well. As Hong Kong is suffering from the adverse impact from the financial turmoil, the Government is talking about the need to adopt high technology. The traditional marketing research techniques may not be relevant in an era when changes, and rapid changes, become a norm. Businesses need to make sounder and better decisions on informed basis. More powerful research approaches are needed.

5.8.   Overall Summary

Given the constraint and limitations, the Associate is happy with the results achieved from this action learning project. Both the sponsoring organization (i.e. Coats) and the action learner have benefited from this doctoral study project.

The Associate has formalized the Importance-Satisfaction-Gap (ISG) marketing research approach. It should be the standard for most marketing research projects. The usefulness of ISG has be demonstrated.

This project has much practical value to Coats on the one hand, and has made contribution to the body of knowledge on the other hand. The real practical contribution to Coats will depend on how successful they make use of the findings and recommendations in this thesis.

The contribution to the body of knowledge can be summarised as below:
-   The formalization of the ISG Model to understand customers better;
-   (Possible) Segmentation of customers by utility scores;
-   Application of ANN to predict customer groups;
-   Application of CHAID to segment the market and to describe the characteristics of the segment (node);
-   Triangulation approach to customer segmentation: and
-   Identification of a few misconception of customer behavior (i.e. the failure of testing hypotheses 1, 2, 3, 4, and 6)

The completion of this doctoral project is perhaps the starting point of a number of projects and endeavors for the Associate. Action learning is about learning to do what we need to know and do.   Learning is a never ending task.

Chapter Six   Reflection on action learning experience

6.1.   Associate's learning style

This is a good occasion to review the learning process adopted by the Associate.
According to the Learning Style Questionnaire, she has the following preferred styles:

Activist: 9 points

Reflector: 13 points

Theorist: 11 points

Pragmatist: 11 points

The Associate's natural learning style is as a Reflector having the following behaviors
or characteristics:

> *"Likes to stand back and ponders her experiences and observes them from different perspectives. She collects data and analyses it before coming to any conclusions. She tends to be cautious. She actually enjoys observing other people in action and often takes a back seat at meeting"* adapted from IMC 's courseware

On the whole the Associate agrees with the described learning pattern.

6.2.   Benefits of action learning

Action learning provides win-win situation for all concerned parties. This learning approach is particularly relevant to adults who are working and who need to keep abreast of the knowledge required for their current and potential jobs and career. In today business environment, no organization and individual can survive, let alone prosper, in this fast moving and turbulent environment. All external factors (i.e. Social, Technological, Political and Economic) are changing at a speed not imaginable before. The changes are also more unpredictable. Without the necessary and up-to-date knowledge, it would be difficult to cope and adjust to the changes.

The benefits of action learning accruing to the sponsoring employers are:

1. Devoted and committed service from the staff
2. In-house consultancy service with quality standard assured by the action learning provider
3. Retention of good quality staff
4. Tangible savings and gains arising from the action learning project recommendation
5. Career development for potential staff
6. Development of in-house expertise in problem solving

The benefits for the action learners:

1. Opportunity of progressing and learning without the need to give up their jobs
2. Flexible in the learning process
3. Relevance to the work they do
4. Acquisition of new knowledge and techniques
5. Better promotion and career opportunity
6. Networking with other Associates in the Learning Set

7. Access to new and contemporary knowledge from the action learning program per se and via electronic library service

8. Last but not the least a few letters after their names on their business cards !

6.3.   What I have learned

It was an unique opportunity to get exposed to the action learning approach. The completion of this doctoral program is not the end of my journey to quest for new knowledge and challenges.

During the two years' period, there are ups and downs. The important thing I have learned is to inquire continuously. Put simply, I have to constantly ask myself "Why, Why, Why,…." Although the doctoral journey is rather lonely, I find it extremely useful to have the challenges and encouragement from my fellow Set Associates, ,my Set Advisors, my Supervisor and my colleagues. Unexpected events would occur. I learned that if I can sustain my commitment and determination, then there is nothing impossible. Events like organization restructuring which abolish the marketing function in the sponsoring organization would not and should not constitute the end of the world. One has to read widely to acquire the "programmed knowledge" on the one hand, and the constant invoking of questioning insight (i.e. the Why, Why, Why, …). As a reflector learner, I would stop and reflect the events that have happened at work relating to my action learning project. In case of difficulty, I would of course resort to help from others.

Another useful learning experience is the maintenance of my learning log. This records the key thinking processes and events. New ideas may be developed from reviewing the past learning events.

Being humble to advice and comments from others is also important. I find there are obvious synergy benefits from communicating my ideas with others. Indeed learning is more effective in a set setting.

There are a number of key learning milestones. The formulation of a researchable topic was the first hurdle. For a action learning project, I obvious sought help from

the management of Coats. Marketing segmentation was the topic suggested to me.
With this research topic title, I started my literature search. In addition to the brick
and mortar library facilities, I found the electronic libraries (i.e. Emerald and Anbar)
immensely useful in my long journey towards the DMgt. Literature search did not
and should not stop after submission of my Annotated Bibliography.

Writing papers and presenting them at academic conference are helpful. This should
be recommended to all doctoral candidates.

The next milestone is the launch of the research to collect the data needed. I had to
learn many research methodologies relevant to my studies. I got the advice and
guidance from my Set Advisors. My Supervisor has been most helpful guiding me
throughout my entire study. The internet as a communication medium is
indispensable.

When I need to make decisions, I weighed the pros and cons of various different
options. For example, when I knew that the Managing Director was not supporting
the utility analysis, I first tried hard to convince him the usefulness of such a
methodology and even asked him to fill in one profile sheet himself. It was most
unfortunate that he had found the utility profile sheet complicated (anyway, that was
his subjective perception). I had to decide what to do next. After some serious
thinking, I had to drop the "utility segmentation" approach. Instead I decided to
compromise the utility analysis on decentring basis. I also decided to switch the focus
on ISG questionnaire approach.

If I had the opportunity to do the same action learning project again, I would
incorporate the utility profile sheet in the ISG questionnaire. This would avoid the
last minute change of mind by the Managing Director. I would also develop some
contingency plans to cater for the unexpected events. Things like the Asian financial

turmoil, organizational restructuring, job change are unexpected events. Being flexible and adaptive should be the key attributes I need to have and develop.

As a individual, I have changed quite substantially. Apart from constant reflecting and questioning insight, I began to enjoy learning. It has virtually become my "hobby". Also I found that learning can be very flexible and dynamic; and yet it can be useful and relevant to the learner and his/her organization (only if they really appreciate the power of action learning!).

Completing the DMgt is perhaps the beginning of a lot of possible options. As an action learner, I would like to help implement the various recommendations made in this thesis. In particular the segmentation of the thread market and the development of Marketing Information System for Coats would be the priority tasks. Now that I have left the company, I can still help Coats in the capacity of a management consultant. Moreover, I can generalize the application of utility segmentation and ISG questionnaire to other industries.

The other career options for me would be to assume the role as a consultant or a teacher in a higher education institute (say, with IMC?). In either of these capacities, I can pursuit the further researches recommended in this thesis. I will be a life time action learner and will pass on my learning and unique experience to those who are interested.

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