

ESHOM NUCLEAR GENERATION: RISK MITIGATION THROUGH  
QUALITY MANAGEMENT DEVELOPMENT OF SMALL SUPPLIERS

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**ESKOM NUCLEAR GENERATION: RISK MITIGATION THROUGH  
QUALITY MANAGEMENT DEVELOPMENT OF SMALL SUPPLIERS**

by

**VAN RENEN OLAF PIETER**

**Dissertation submitted in fulfilment of the requirements for the  
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**at the Cape Peninsula University of Technology**

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**Bellville**

**November 2009**

## DECLARATION

I, Olaf van Renen, hereby declare that the contents of this dissertation represent my own unaided work, and that the dissertation has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed



Date

14 April 2010

## ABSTRACT

There is a South African Government initiative to use State-owned Enterprises (SOE's) to roll out a programme for the development and stimulation of local small businesses in South Africa. The state has requested SOE's to set targets on a voluntary basis to increase trade with small businesses, with the purpose of developing small enterprises to eventually enhance skills transfer, training and employment. However, when large customers such as Eskom Nuclear Generation require ISO certification as a prerequisite for a supplier to provide goods and/or services to them, most small businesses are unable to comply.

The requirement of ISO9000 compliance inhibits the ability of most small businesses to compete with their larger counterparts. Small businesses constitute as much as 90% of most world economies. They have many advantages to offer customers, such as a high level of flexibility, innovation and responsiveness to customer needs. These attributes can introduce healthy competition to the supply chain.

Small businesses, by their very nature experience more risks, such as a higher vulnerability to volatile market forces and skills loss. In addition, they are generally less specialised. They are under continuous competitive pressure, and are generally not able to provide assurance of a sustainable product over a longer period. Although there is an imperative to develop and use small suppliers, they introduce higher risk to the supply chain.

The primary research objective of this dissertation is to develop a robust model to identify risks inherent to small businesses, and to propose measures to mitigate such risks. A classification of problems with small suppliers that have occurred at Koeberg Nuclear Power Station over a period of 3 years (from June 2005 to May 2008), will form the basis of the research methodology.

The anticipated findings of the research include the following.

- Several common critical issues of failure will be identified in the internal processes of small suppliers, with variations between types of suppliers, which

will indicate which elements within the context of ISO9000 can be applied to address shortcoming in the suppliers' processes.

- A matrix will be compiled from this by which the customer can identify the type of supplier, the types of risks inherent to that supplier, and which elements of ISO9000 the customer should insist upon to be adopted into an elementary quality management system of that small supplier. This should be executed as part of a larger supplier development programme.

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# **CHAPTER 1 : SCOPE OF THE RESEARCH**

## **1.1 INTRODUCTION AND MOTIVATION**

There is a South African Government initiative to use State-Owned Enterprises (SOE's) to roll out a programme for the development and stimulation of small businesses in South Africa. The state has requested that the SOE's set targets on a voluntary basis to increase trade with small businesses, with the purpose of developing small enterprises to enhance skill transfer and training, and ultimately raise employment. However, when large customers such as Eskom Nuclear Generation require ISO certification as a prerequisite for a supplier to provide goods and/or services to them, most small businesses are unable to comply. This due to the fact that the costs of developing and maintaining a full quality management system would be a financial burden for most small businesses.

Small businesses constitute as much as 90% of most world economies. They have many advantages to offer customers, such as a high level of flexibility, and innovation and responsiveness to customer needs. These attributes can introduce healthy competition into the supply chain. Yet, the requirement of ISO9000 compliance is a serious barrier for small businesses to compete with their larger counterparts.

Small businesses by their very nature have more risks, such as a higher vulnerability to volatile market forces and skills loss, and they are generally less specialised. They are also under continuous competitive pressure, and are generally not able to offer assurance of providing a sustainable product over a longer period. These obstacles however are generally not insurmountable.

The analogy can be drawn that in spite of the problems commonly associated with small enterprises, the advantages they have to offer exceeds the disadvantages, and customers could prosper should they protect the small businesses in their supply chains. This can be achieved if they adopt an effective strategy to manage the risks small businesses introduce into their supply chains.

## **1.2 BACKGROUND TO THE RESEARCH PROBLEM**

There are opposing forces at work in the supply chain of Nuclear Generation. From the one perspective, there is the ever-present need for suppliers to be highly regulated and stable, together with the strict governance of the National Nuclear Regulator (NNR). Both factors emphasise reliability, an attribute indispensable to nuclear safety, and unfortunately not a common characteristic of small businesses. From the other perspective, there is the need for healthy competition in the supply chain, and the expectation of the South African Government of state owned enterprises is to help stimulate the economy by engaging and developing small businesses.

In spite of this imperative and the desire to develop small suppliers, the reality is that small organisations introduce higher risk into the supply chain. The challenge is therefore for Eskom Nuclear Generation to identify and mitigate such risks. This against the background of Eskom who wishes to be a good corporate citizen by satisfying the need for world class nuclear safety, and simultaneously yet meaningfully, contribute to the economy through the development of small businesses.

## **1.3 STATEMENT OF THE RESEARCH PROBLEM**

Against the above background, the research problem to be researched within the ambit of this dissertation reads as follows: *“Eskom Nuclear Generation has no strategy to reduce the risks that small suppliers introduce into their supply chains as a result of the inherent weaknesses commonly associated with small enterprises”*.

## **1.4 THE RESEARCH QUESTION**

The research question to be researched within the ambit of this dissertation reads as follows: *“How can Eskom Nuclear Generation identify and mitigate supply chain risk by using small suppliers?”*

## **1.5 INVESTIGATIVE (SUB-) QUESTIONS**

The investigative questions to be researched in support of the research question reads as follows:

- Is there a generic supply fulfillment process, from customer request to delivery or service, within small organisations?
- What are the weaknesses in the supply process of small organisations?
- Are there factors external to the supply chains of small businesses that pose risk to the supplied product?

## **1.6 PRIMARY RESEARCH OBJECTIVES**

The primary research objectives of this dissertation read as follows:

- To determine the risks inherent to small suppliers.
- To determine how Nuclear Generation experience failures of small suppliers.
- To determine how the failures of small suppliers can be classified in terms of the supply fulfillment process.
- To determine which elements of ISO are related to the failures.
- To design a model that can be applied to reduce the risks that small suppliers introduce into the supply chain and to establish how to incorporate specific elements of ISO into an elementary quality management system.

## **1.7 THE RESEARCH PROCESS**

The research process provides insight into the process of 'how' the research will be conducted from developing the research proposal to submitting the dissertation. Remenyi, Williams, Money and Swartz (2002:64-65), explains the research process as consisting of eight specific phases, which will be applied to this research study. The phases include:

- Reviewing the literature.
- Formalizing a research question.
- Establishing the methodology.
- Collecting evidence.
- Analyzing the evidence.

- Developing conclusions.
- Understanding the limitations of the research.
- Producing management guidelines or recommendations.

## 1.8 RESEARCH DESIGN AND METHODOLOGY

There are four categories of triangulation identifiable, namely theoretical, data, investigator and methodological triangulation (Easterby-Smith, Thorpe & Lowe, 1996:133-134). In this research study in which methodological triangulation will be applied, both quantitative and qualitative research paradigms will apply for the purpose of data collection.

In the field of information systems research as in the instance of this research study, there has been a tendency in the past to focus on traditional empirical research, yet according to Galliers & Land (1987:900-901) such results are often inconclusive. The authors contend that there is an increased awareness that it is appropriate to include behavioural and organisational considerations into the research approach. Although there are not many examples of successful mixed methodology research that have been performed in the information systems field, a notable exception is with the 'action research' approach. The benefits of action research are applicable to all fields of research.

Galliers & Land (1987:900-901) suggest that more than one class of research approach should be used in which a clear distinction is drawn between the 'object' in focus and the 'mode' that is being used. A scientific model is not always the correct approach to follow, and a more holistic approach that includes other considerations could be more accurate eventually. Here is an explanation of two such approaches:

- **The subjective/argumentative approach:** Quoting the research of Vogel & Wetherbe, this approach is defined by Galliers & Land (1987:901), as: “. . . creating management information systems research based more on opinion and speculation, than observation”.
- **The descriptive/interpretative approach:** Citing Boland, this approach is defined by Galliers & Land (1987:900), as: “. . . being in the tradition of

phenomenology, i.e. concerned with description”. Emory & Cooper (1995:11), in describing the essence and importance of descriptive research, point out that: “The very essence of description is to name the properties of things: you may do more, but you cannot do less and still have description. The more adequate the description, the greater is the likelihood that the units derived from the description will be useful in subsequent theory building”.

## **1.9 DATA COLLECTION DESIGN AND METHODOLOGY**

The attention of the reader is drawn to the fact that the process of data collection design and methodology is comprehensively expanded upon within the ambit of Chapter 4.

### **1.10 DATA VALIDITY AND RELIABILITY**

According to Collis and Hussey (2003:186), ‘validity’ is concerned with the extent to which the research findings accurately represents what is happening. More specific, whether the data is a true picture of what is being studied. According to Cooper and Schindler (2006:318-320), three major forms of validity can be identified, namely ‘content validity’, ‘criterion-related validity’ and ‘construct validity’.

Reliability (also referred to as ‘trustworthiness’), is concerned with the findings of the research (Collis & Hussey, 2003:186). The findings can be said to be reliable if you or anyone else repeated the research and obtained the same results. There are three common ways of estimating the reliability of the responses to questions in questionnaires or interviews, namely:

- Test re-test method.
- Split halves method.
- Internal consistency method.

## 1.11 ETHICS

In the context of research, according to Saunders, Lewis and Thornhill, (2001:130), "... ethics refers to the appropriateness of your behavior in relation to the rights of those who become the subject of your work, or are affected by it".

The following ethical issues will be observed in this research study:

- **Informed consent:** Participants should be given the choice to participate or not to participate, and furthermore be informed in advance about the nature of the study.
- **Right to privacy:** The nature and quality of participants' performance must be kept strictly confidential.
- **Honesty with professional colleagues:** Findings must be reported in a complete and honest fashion, without misrepresenting what has been done or intentionally misleading others as to the nature of it. Data may not be fabricated to support a particular conclusion.
- **Confidentiality/Anonymity:** It is good research practice to offer confidentiality or anonymity, as this will lead to participants giving more open and honest responses.

## 1.12 RESEARCH ASSUMPTIONS

The following assumptions would apply to this research study:

- There is a generic model of how small suppliers should respond to their customers' requests, from enquiry to the supply of goods and services.
- The interviewees will not be defensive in truthfully answering the questions to determine the weaknesses in their supply fulfillment process, which result in the failures.
- The weaknesses in the generic supply fulfillment model will correlate with elements of ISO9001.

### **1.13 RESEARCH CONSTRAINTS**

The following constraints apply to the research:

- Limitations:
  - The model to identify and mitigate risk cannot be assumed to be equally accurate for all small businesses, as the model is based on a generic supply fulfillment process. Small business processes vary widely.
  - In attempting to build a generic supply fulfillment model that fits the processes of all small service and goods suppliers, the nature of the generic model could be so generalised that the link between the ISO elements, failures and weaknesses may become tenuous.
- Delimitations:
  - The research was limited to the Western Cape for practical reasons, such as logistics, response times and ease of access.
  - The research only included small suppliers to Koeberg Nuclear Power Station who supply goods and services that impact directly on the plant.

### **1.14 CHAPTER AND CONTENT ANALYSIS**

The following chapter and content analysis will be applicable to the research study:

**Chapter 1** – Scope of the research

**Chapter 2** – The research environment

**Chapter 3** – Small businesses: A literature review

**Chapter 4** – Supplier process risk research design and methodology

**Chapter 5** – Survey results

**Chapter 6** – Conclusion

### **1.15 SIGNIFICANCE OF THE PROPOSED RESEARCH**

The value of this research will map to its eventual use. The model which will be formulated as a result of the research, will enable the Eskom Nuclear Generation supply chain to motivate the utilising of small suppliers for any level of work that the supplier is technically and commercially capable of. The risks of the supply

processes will be identified at the outset, and measures as outlined by the risk mitigation model can be initiated before the procurement process is started.

This ability to manage risks in the absence of ISO9000, will allow greater access to small suppliers to the supply chain of Eskom Nuclear Generation. It will also serve as a platform to develop small suppliers by providing a guideline to the building of a tailor-made quality management system.

Furthermore, the model could be used as a catalyst for further examining other areas for co-operation between Eskom and the small supplier, such as the sharing of resources of information, research data, technical expertise, access to data and infrastructure.

## **CHAPTER 2 : THE RESEARCH ENVIRONMENT**

### **2.1 NUCLEAR ELECTRICITY GENERATION BACKGROUND**

There are few discussion topics as provocative as that of nuclear power stations. Historically, the concept of nuclear power generation has evoked emotional debate, worldwide. This debate intensified progressively after the two landmark incidents at Three Mile Island and Chernobyl, where respectively a partial fuel core and a full core meltdown occurred. Although these incidents happened under significantly different circumstances, the combined result left in its wake a perpetual sense of impending disaster in the mind of the global population.

It is then not surprising that internationally programs for the expansion of nuclear electricity generation, with the exception of France, have ground to a halt. Governments yielded to the pressure of the anti-nuclear lobby, and re-directed the public funds to conventional, or 'safe', sources of power generation, such as coal. This strategy however, is now running into serious trouble. A new threat to earth has been uncovered, namely global warming and coal-fired power stations have been identified as a significant part of the problem.

### **2.2 NUCLEAR RENAISSANCE**

Governments around the world, reacting to the unified voice of the scientific community, are now under severe pressure to provide an affordable alternative to fossil fuel. Realising that renewable energy is the ultimate solution, but also that renewable energy cannot realistically be expected to handle the crisis in the next few decades, the western world is taking a fresh look at nuclear energy generation. The analogy being that one cannot build capacity on unproven technology. A Government cannot develop an expansion program for electricity generation on technology that has not developed a track record.

As a result, some governments with nuclear capacity are forging ahead slowly with their plans to roll out a new generation of nuclear power stations, navigating

their way carefully between pressure groups and national interests. In addition, in response to public concern, they have constituted governmental 'watchdog' bodies with considerable executive powers in an attempt to allay the fears of the public. The National Nuclear Regulator (NNR) is South Africa's counterpart to the Nuclear Regulatory Council (NRC) of the United States of America. They are the two states' champions for nuclear safety.

### **2.3 OPPOSING FORCES**

In the nuclear industry, there are at least two major forces exerting pressure on nuclear power stations. Paradoxically, they are also in direct confrontation to each other. On the one hand is the Government, represented by the NNR, and on the other hand are the environmental pressure groups, represented by a host of organisations. These organisations display a range of attitudes, from outright hostility, to passive disapproval.

Although the Government and the anti-nuclear lobby differ sharply on the right of nuclear power stations to exist, the manifestation of their convictions are similar, namely an adverse and critical attitude towards nuclear power generation. The government's motive for exerting pressure is to prevent another serious error by a nuclear power station, which will by implication benefit the nuclear program very effectively. The anti-nuclear lobby is pressurising Government and Eskom, because they believe that such an error is imminent.

The average worker in the nuclear environment seems to be neither strongly for, nor against. That is a reasonable attitude as people in the nuclear power generation realise what dangers a relaxation of vigilance can bring. They are constantly reminded of the nature of the technology that they are concerning themselves with. At the same token, nuclear workers are probably of the most highly trained of any industry in the world, barring perhaps employees in the medical, military and space industries.

Notwithstanding, there is a common understanding within the nuclear workforce that they do need a diligent and strong 'watchdog', and that even the anti-nuclear

lobby has an important role to play. The public is the conscience of Government, and in response the Government has to be the accountable partner of the nuclear industry. For that reason in another paradoxical twist, the nuclear industry needs the anti-nuclear lobby to heighten the conscience of Government, and to do so in an informed and intelligent way. It is important though, that the anti-nuclear pressure has to stem from reasons that are scientifically sound, and not because of vague and ungrounded fears born from a lack of discernment or knowledge.

As a result, when the anti-nuclear lobby regresses into emotive language and action rather than to bring intelligent debate and pressure to bear on Government, the very public that they endeavour to protect are all the poorer for it, and so is the nuclear industry. After all, nuclear workers are part of that public. They also need the sound protection that effectively and conscientiously applied rules bring with it.

#### **2.4 NATIONAL PRIORITIES**

Over and above the challenge to provide in the energy needs of the country before the demand for electricity outgrows the supply, the Government has identified other factors that could seriously jeopardise its competitiveness in the global market, namely that South Africa has a serious shortage of skills. This scarcity hampers the ability of the industry to produce meaningful and value-added content for export purposes. This in turn limits the foreign earning capacity of the country.

It stands to reason therefore that training and skills transfer has become a national priority. The South African Government needs industry to facilitate this transfer of knowledge to the masses. It is not good practice for multinational organisations to enjoy favourable trading conditions in South Africa and not reciprocate by imparting some of their skills and expertise to the local workforce. The partnership must be mutually beneficial.

Reciprocally, South African companies should have a sense of national responsibility, and understand that their contribution to the growth of the skills

base will ultimately benefit themselves. They should employ nationals and develop them, as did Sasol, Iscor, the South African Railways and most SOE's from the 1950's to the 1980's. Thirty years later the South African economy is still benefiting from those initiatives. Currently, that considerable pool of resources has shrunk to such an extent that the economy is under severe strain.

## **2.5 LOCAL PRIORITIES**

Power stations do not deal directly with their clients, neither do they offer special 'deals', attractive packages and discounts. There is no goodwill that can be gained from direct marketing to the consumer. There is no contact, and therefore the power stations are seriously curtailed in their ability to show a 'personal face'. In fact, the power stations all supply their product to a national grid that has no locality and direct influence in any particular area, or grouping of people.

The power stations' social interaction is limited to public relations activities, which in turn is constrained by tight budgets. Yet it is of vital importance especially for Nuclear Generation, that successful interaction with the public exposes the 'face of humanity' that is obscured behind nuclear technology. For that to happen, Nuclear Generation has to identify and interact with its environment. It has to breach the gap of anonymity and 'facelessness', and engage the community around it as an equal and valuable partner.

If the local economy fails, local businesses close their doors. That leaves the nuclear power station dependent on suppliers in other cities. That could mean longer lead times for goods and services, and slower response times for emergency work at the power station. It also means fewer competitors in the supply chain. In turn, if the national economy fails, the choice of the power station becomes even more restricted, and they have to look towards international suppliers. That translates into paying in expensive foreign currency, which could be compared to hemorrhaging valuable local resources.

In addition to these threats, there is a shortage of skills across the country, including the local community. If one adds that malady to an already high

unemployment figure the result is an unstable community, fraught with social problems and ills, and filled with resentment towards any institution that is representative of the government in power. If the state, with its SOE's, is seen to be indifferent to the plight of the community, any new initiatives from those institutions could run into hostile opposition.

## **2.6 GLOBAL PROBLEMS AND LOCAL IMPACT**

Much of the above scenario has become reality as a direct effect of the global financial meltdown. There is a prolific loss of jobs occurring across South Africa, and more losses are forecasted. South Africa is a predominantly consumer-driven economy, and as the confidence levels in financial institutions dropped, so did investment and spending. When demand drops, manufacturing reigns in their activities, and shareholders withdraw their investments in panic. Companies attempt to prevent losses and they begin to cut down on operational costs. Conventional business wisdom proclaims that it is better if 'some workers' lose their jobs, than for 'all workers' to lose their jobs. The business has to be saved at all costs, even at the costs of some peoples' livelihoods.

There is however little that a business can do to survive in an economy where the demand had declined over a relatively short period of time. Businesses are closing down at an alarming rate, however this trend is more evident in the instances of small businesses. Due to the nature of their budgets and their small profit margins, they carry the highest risk and are the most vulnerable to the dictates of economic pressure. Tragically, it is this very segment of the local economy that also provides the most employment.

Against the above dispensation in the local economy, in order for the local community to survive and enjoy some stability, it is the small business enterprises that should be the most important partner of Government in the fight against poverty. Only in recent years have the importance of this partnership has been recognised and appreciated by the public. Notwithstanding, there still seems to be a persistent lack of understanding among large businesses and State

Owned Enterprises (SOE's) of the critical and beneficial role that small businesses play in their own supply chains.

## **2.7 LOCAL DECISIONS AND ASSOCIATED IMPACT**

### **2.7.1 More than one factor for consideration**

Even the perspective of the above background, and variety of influences that decisions regarding trade and general commercial activity need, it should be carefully balanced. Nuclear Generation is in the business of providing electricity safely and as a result it is appropriate that they should place safety before all else. However, nuclear and conventional safety are not the only factors that influence decision-making.

Other important factors for consideration are social responsibility, healthy supply chain competition, long-term supply chain stability, skills development and knowledge transfer, public relations and the tolerance of the community, supply chain flexibility and responsiveness, and the potential for future expansion.

### **2.7.2 Future nuclear expansion**

It is the extent to which the local community can be convinced that will ultimately determine the level of resistance to future nuclear expansion. Nuclear Generation's budget can have a significant impact on the local economy. If Nuclear Generation were to be seen as champions and benefactors of the local economy, local businesses could be valuable allies when new nuclear capacity is proposed. Voters, who together with their families could be a significant lobbying force, staff local businesses that benefit from interaction with the nuclear power station.

### **2.7.3 Future economic expansion**

Should every large organisation in the local region have the obligation to redirect the bulk of their resources towards empowering local businesses to develop, the

effect would culminate in the stabilisation of the local economy. The goal is not to create an incestuous economy, but to develop the production capabilities of local businesses to focus on export. South Africa, and by implication the local economy needs foreign capital without which there can be no growth in the economy.

The ideal outcome would be to develop the local economy from a consumer base to that of a predominantly export-based economy. Such a scenario would be the counter image to the current reality in the Western Cape, with a predominantly manufacturing-based economy where clothing, tourism and agriculture play dominant roles. The clothing industry has been decimated as a result of competition from the Far East. Both other sectors also produce products that have to compete with the less sophisticated economies of the world. In the local nuclear industry most technology enhanced goods have to be imported from across South African borders, and the rest freighted in from other national economic centers.

#### **2.7.4 Conservatism**

It would by its very nature culminate in an exercise of futility to argue against the conservative decision-making policy of Government. However, when the decision-making processes lack the multidimensional ability that is demanded from it by the diverse needs of Nuclear Generation's stakeholders, it is cause for concern and requires remedial action. There are valuable opportunities to be comprehended in order to foster closer co-operation and build strong partnerships with the local community. There are mutually beneficial initiatives that can be launched within the local business community. Furthermore, there is knowledge to be shared, skills to be transferred and efficiencies to be enhanced in the close proximity to Koeberg Nuclear Power Station, in the Western Cape itself.

## **2.8 CONCLUSION**

The NNR initiative RD-0034 and current standards in Nuclear Generation regarding the requirement that suppliers of certain categories of goods and

services are to be certified to international standards such as ISO9001, can be seen by the small businesses in the local community to be exclusive and curtailing. This exclusivity and perceived bias are regarded as creating an unfair playing field for suppliers, where local suppliers are effectively disadvantaged.

Local suppliers experience vast sums of capital leaving the South African shores, while they are convinced that they have the capability to be developed into good competition for those international suppliers. All that they need is an opportunity to prove that they have equal competence. They are convinced that non-compliance to a standard cannot be assumed to be evidence of bad business practice. There are other models for good quality management systems, and hybrids of them, which could be just as effective as ISO9001, if not more effective and more practical.

## **CHAPTER 3 : SMALL BUSINESSES: A LITERATURE REVIEW**

### **3.1 INTRODUCTION**

In this literature review, media categories such as journal articles, books, news and the Internet were searched for source documentation on the viability of small business enterprises. In addition, the keynote addresses of two conferences, as well as a ministerial speech were cited. Moreover, certain aspects pertaining to the interaction between small suppliers, customers, quality management and risk were identified and expanded upon.

By identifying the strengths of small organisations and benefits of using local suppliers, the need for small local suppliers in the supply chain were highlighted. The literature review also elaborates on the challenges faced by small organisations and the responses of customers to those risks. Some considerations pertaining to quality management systems and the ISO standard are examined, as well as the active role customers can take to manage risk and improve their suppliers' performance.

### **3.2 THE IMPORTANCE OF SMALL BUSINESSES TO THE ECONOMY**

In an Internet article of Fin24.com on 15 March 2009, the opinion was raised that the demise of SME's, "...could lead to structural problems in the economy" (Doneva, 2009:**Online**). These structural issues would result should SME's disappear, so that when the economic upturn occurs there would be a severe lack of skills available. (The CEO of South African Council of Commerce and Industry (Sacci) cited by Doneva 2009:**Online**).

Doneva (2009:**Online**), also cited Old Mutual's market development manager for SME's, as stating that big businesses are increasingly partnering with small suppliers by outsourcing to them. With the current economic decline big

businesses are downsizing, leaving small suppliers to struggle with the shrinking demand for their services and products.

Sacci urged Government to support small businesses with their cash-flow problems in order to save them from bankruptcy (Doneva, 2009: **Online**). The author added that it is generally accepted that small and medium sized businesses play a key role in creating jobs. Small businesses are however suffering and are closing down culminating in many jobs being lost.

### **3.2.1 Electricity generation expansion**

If jobs are being lost to the labour market, so are the means that facilitate crucial skills transfer, training and development. Of concern is that this 'skill hemorrhaging' is occurring while the country is facing serious skill shortages. In a keynote address at an ASME Nuclear Codes and Standards workshop with the title 'Supporting new build and nuclear manufacturing in South Africa', the general manager of Research and Development, Nuclear Energy Corporation of South Africa, forecasted enormous growth in the nuclear sector (De Villiers, 2008:Keynote Address). Furthermore, an additional generating capacity of 20000 Megawatts was envisaged by the South African Government to be added to the existing nuclear capacity of 1800 Megawatts of Koeberg Nuclear Power Station over the next 20 years (De Villiers, 2008:Keynote Address). This equates to roughly another 10 nuclear power stations the size of Koeberg. Even if that forecast has been moderated somewhat by the current economic slowdown, any future development will emphasise the growing skills shortages in industry.

A growing economy will increasingly consume energy as manufacturing grows. Should the economic downturn reverse with new international growth, the demand for products from South Africa would climb. The manufacturing sector will need to increase capacity in order to satisfy that demand, so that the country can benefit from such an international economic upswing. The demand for products and services would not only escalate internationally, but also nationally as consumer confidence grows. If however, the generating capacity of the electricity suppliers has not increased to meet that demand for energy, the entire

country would have lost an opportunity to earn valuable revenue through increased local sales and exports.

### **3.2.2 The need for partnerships between big and small business**

Over and above the challenges that small businesses are facing such as the financial crisis and skills loss, they have to contend with the industry standards that large customers are enforcing on their suppliers. In another keynote address, held at the SAATCA 2008 Convention in Cape Town, the CEO of 'Proudly South African' stated that SME's perceive standard-setting as barriers to trade, negatively impacted upon due to the complexity of the standards. The speaker contended that the entire issue of quality should be simplified (Moroka, 2008:Keynote Address). With visionary business leadership start-up small businesses can be mentored and nurtured, which is highly important in order to build a prosperous society (Moroka, 2008:Keynote Address).

Moroka (2008:Keynote Address), stated that there is a need, even a moral imperative, for big businesses to facilitate and assist in the growth of smaller businesses, in a sustainable manner. Moroka (2008:Keynote Address), was of the opinion that such assistance could take the form of procuring from SME's, forming inter-firm linkages to improve employee skill levels, as well as to create market opportunities and access for SME's to raw materials at better prices through economies of scale. "It means that our SME's and smaller enterprises should be guided and supported in implementing quality systems and processes" (Moroka, 2008:Keynote Address).

Furthermore, Moroka (2008:Keynote Address), was also of the opinion that big businesses had a good knowledge of the principles underlying quality. It is these principles that need to be taught to small businesses. It would mean mentoring small suppliers to understand the link between quality and competitiveness, and to transfer that knowledge in such a manner that small suppliers can understand the necessity for implementing those principles (Moroka, 2008:Keynote Address).

### **3.2.3 Protecting and facilitating small business**

As a result of the restriction of barring suppliers from supplying certain categories of goods and services due to their lack of compliance with ISO9001, many local suppliers cannot gain free access to the market in which they compete with larger organisations. As a result, much needed revenue is being directed away from local industry, and by implication away from the local community. The bulk of these financial resources sadly are being employed across South African borders supporting foreign suppliers.

In the nuclear industry the loss of resources is exacerbated by the local scarcity of nuclear products and services. Nuclear goods and services are highly regulated. Goods are produced under stringent quality assurance programs. This elevates the prices for these commodities considerably. However, as a result of the level of assurance required by nuclear governance, competition for a wide range of products with local suppliers is prohibited. As a result, specific products and services have to be procured in foreign currency from the original equipment manufacturers, which are mainly based abroad.

Notwithstanding the above statement, open trade with multinationals that are based locally could also be perilous. For a variety of valid business reasons, local businesses could be at a disadvantage if they have to compete with multinationals. International companies have access to skills and resources in other countries. These skills can be deployed at considerably less cost wherever these companies have a presence. In another example, these companies can avoid local taxes by using equipment and products that have been imported, using the structures of the company and disguising the imports as in-company property transfers.

To practice open trade without constraints with overseas partners may seem like good business sense against the background of globally-prevailing free-market, however this may not necessarily be the ideal strategic approach for Eskom Nuclear Generation to take. John Ralston Saul, in his book 'The Collapse of Globalism and the Reinvention of the World', contends that there is a growing awareness amongst many nations' leaders of the perils of neglecting social

commitment in favor of free, unregulated trade. Companies and by implication governments, have ethical obligations towards the communities located around them whom they serve (Saul, 2005:222-229).

Boundless free trade does not guarantee stronger economies, nor does it guarantee a better quality of life. In fact, unrestricted free trade throughout modern history has resulted in increased strife and wars during periods of wide-ranging deregulation. Conversely, economies experienced peaks of solid growth during periods of sophisticated regulation (Saul, 2005:42). This trend is also reflected in the gap between rich and poor, which broadens during deregulation and diminishes during sophisticated regulation (Saul, 2005:73).

#### **3.2.4 National focus on developing local business**

In his budget speech for 2009, Finance Minister Trevor Manuel reflected on the near-collapse of the world economy, and agreed that careful regulation is needed to protect South Africa against exploitation (Manuel, 2009:1). While the Minister allocated R1.6 billion to industrial development and small businesses, he acknowledges that SME's need to be protected and nurtured. Manuel (2009:3), also has this to say about the global economy in the light of the 2008/2009 financial collapse: "...financial systems cannot go unregulated, trade arrangements cannot be subordinate to short-sighted protectionist influence, the distribution of income cannot be entrusted to the merciless counterpoise of executive greed and unsupervised labour market dynamics".

Using words that are reminiscent of John Ralston Paul's visionary criticism of licentious globalism, Manuel (2009:3), added the following statement: "...in facing these things that are greater and more important than the arithmetic of our revenue and expenditure plans, we will at least begin the re-evaluation of our world." With these words Manuel underpinned the need for national re-evaluation of economic priorities. This statement also confirms the Government's commitment to developing local suppliers, as evidenced by the Competitive Supplier Development Policy drafted by the Department of Public Enterprises (DOE) and approved by Cabinet in January 2007. The DOE points to the fact that

the development of local supplier industries will be key to the successful investment programme of the SOE's in the economy between 2008 and 2013 (South Africa, 2008:1).

Eskom's response to this policy was the drafting of the Competitive Supplier Development Programme (CSDP). This programme will endeavour to develop local suppliers to become more competitive, and to produce meaningful content, not only for local consumption, but also for export purposes. Not only did Eskom propose this programme, but it also required of each business unit to propose a strategy to accomplish the goals. Business units within Eskom in response to accomplish the goals are to produce a comprehensive plan together with targets and deadlines.

### **3.3 BENEFITS OF USING LOCAL SUPPLIERS**

To maximize on economies of scale, it makes business sense to use local suppliers when the expertise is available and the controls are adequate (Chetty & Campbell-Hunt, 2003:810). Even in the car manufacturing industry, which has a recognised a culture of high safety awareness, the role of 2<sup>nd</sup> party audit is growing as a mechanism to gain acceptable levels of quality assurance, in lieu of supplier certification to industry standards (Theobald, 2007:**Online**). By ensuring quality through 2<sup>nd</sup> party verification, manufacturers can gain access to local non-ISO suppliers.

Some of the benefits that can be gained by using local suppliers include:

- **Strong customer-supplier relationships:** Contact with local suppliers through face-to-face communication, site visits and interaction with multiple staff across departmental barriers has obvious advantages (Lee, 2004:190; Wong & Aspinwall, 2004:58). A culture of support and commitment should follow as a result.
- **Supporting the local economy:** By using local suppliers, employment is supported (Schlenker & Crocker, 2003:10). A strong local community, benefiting from supplier interaction, can work to the organisation's advantage

for future projects. The goodwill of the community is crucial for new commercial initiatives.

- **A more motivated, flexible supplier:** A supplier who knows the customer's system can make quick and informed decisions (Chetty & Campbell-Hunt, 2003:810).

### 3.4 STRENGTHS OF SMALL ORGANISATIONS

Small and Medium Enterprises (SME), make up 98% of all EMEA (Europe, Middle East and Africa) companies. They provide employment to 66% of the labour force and generate 54% of the total private sector turnover (Schlenker & Crocker, 2003:10). Figures released by The Confederation of Indian Industry (CII, 2003:**Online**), confirm that this dispensation also holds true for South Africa. In fact, SME's in South Africa, which consist of less than 20 employees, employ 39% of the country's labour force. Many of Nuclear Generation's small suppliers fall into this category. Some of the benefits small organisations can offer are elaborated upon below:

- Good knowledge management processes. The dissemination of information in the organisation is highly efficient, once the hierarchical barrier drops (Gustafsson, Berggren & Gransfors-Wellemets, 2001:243; Wong & Aspinwall, 2004:58).
- Quick decision-making (Wong & Aspinwall, 2004:58).
- Strong culture of unity and purpose, and increased employee involvement resulting from improved communication across flat organisational structures (Lee, 2004:190; Wong & Aspinwall, 2004:58).
- Flexible processes reduced bureaucracy to adapt to new demands (Davig, Brown, Friel & Tabibzadeh, 2003:75; Wong & Aspinwall, 2004:58). This is an important attribute for large customers who stress that agility and flexibility are more important for supply chain efficiency than economies of size (Geiger, Honeyman & Dooley, 1997:**Online**).
- High quality product awareness (Gustafsson *et al.*, 2001:243). Small suppliers focus on delivering excellent products.
- Localised knowledge and presence to deliver after-sale service, and "...site-specific customisation to large numbers of customers with distinctive needs"

(Chetty & Campbell-Hunt, 2003:810). This approach of utilising local distributors who display these attributes have been the preference of large international manufacturers (Chetty & Campbell-Hunt, 2003:810). Customers as a rule seek partnerships with suppliers/distributors who display these attributes (Geiger *et al.*, 1997:**Online**).

- High customer-orientation. Macpherson and Wilson (2003:167), describe it as a focus on external and supply-chain processes. Small suppliers are committed to excellence and go to extra effort for buyers in the customer organisation (Geiger *et al.*, 1997:**Online**).

### **3.5 RISKS FACING SMALL ORGANISATIONS**

Most small businesses are ISO9001 non-compliant organisations. In addition, there are other factors that will render a small organisation's business vulnerable, over and above the size of its infrastructure and operating ability. These aspects are elaborated upon below:

- Poor leadership skills (Taylor, 1994:10; Schlenker & Crocker, 2003:10; Lewis, Pun & Lalla, 2005:981). This is reflected not only internal to the company, but also business-to-business. It is reflected in the ineffective flow of information between the different hierarchical layers, and also in poor use of information technology.
- Lack and stability of resources (Bryar, 1999:4; Gustafsson *et al.*, 2001:234; Wong & Aspinwall, 2004:58; Thomas and Barton, 2005:419). This lack is across the spectrum and includes time, financial, human, knowledge and expertise. The size of the organisation exacerbates losses, i.e. the loss of one highly trained employee could be a serious threat to the business. This is especially true if taken into account that intellectual capital holds the key for future competitiveness (Perez & De Pablos, 2003:82), and that capable personnel are crucial to the viable core of the business (Scherrer, 2003:58).
- Lack of specialisation, from a need of employees to be cross-trained to perform multitasking (Davig *et al.*, 2003:75).
- Lack of skills, including quality and financial acumen, especially of management (Taylor, 1994:24; Bryde & Slocock, 1998:477; Ahmed & Hassan, 2002:795; Tucker & Lean, 2003:53).

- Lack of bargaining power (Lee, 2004:193). This weakness can impact the small supplier's ability to negotiate favourably with its own suppliers because of economies of scale, eroding its competitive edge, with Nuclear Generation ultimately paying the price.
- A lack of formal procedures (Wong & Aspinwall, 2004:52).

### **3.6 MEASURES THAT CUSTOMERS CAN TAKE TO IMPROVE THEIR SMALL SUPPLIERS' PERFORMANCE**

Customers who attempt to gain a competitive edge by partnering with small suppliers in a supply chain arrangement can take measures to protect their interests, which are elaborated upon below:

- **Encourage benchmarking:** Share knowledge regarding quality management systems, and facilitate the sharing of such information (Prado, 2001:69). This can take the form of lectures, visits to facilities, dissemination of knowledge and quality training.
- **Assist small suppliers in redesigning their product:** This can be executed to integrate the characteristics of service and information. Furthermore, it will add value to the product, and distinguish it from the offering of the competition. This can be improved by providing resources in and access to information technology, such as the Internet (Schlenker & Crocker, 2003:9). The Internet is most effective as a tool to better understand the needs of the customer, the supply chain in general and its own costs (Scherrer, 2003:55; Schlenker & Crocker, 2003:11).
- **Encourage small suppliers to develop formal processes for crisis management:** Formal processes for crisis managers address prevention, response and mitigation (Smith, 2005:312). Furthermore, assist the small supplier in times of decline to turn his business around. The customer is a stakeholder, and has a vested interest in the success of the small supplier (Scherrer, 2003:58).
- **Encourage small suppliers to develop a knowledge management programme:** This should explain how to identify, store and protect the critical skills and information they possess, and to have contingency plans in place when critical skills are lost (Wong & Aspinwall, 2004:57, 58). This should

include increasing their knowledge base through quality training (Thomas and Barton, 2005:420).

- **Encourage small suppliers to seek ISO9001 certification:** This should be executed where practical (Chow-Chua, Goh & Wan, 2002:949-950). If appropriate, the supplier should be subsidised if the technology is a critical asset and the requirement for certification is required (Barrier, 1994:**Online**). However, meeting the standard should be more important than certification itself (Geiger *et al.*, 1997:**Online**).
- **Subcontract to or place contracts with small suppliers:** Build supply chain linkages with small suppliers (Tewari & Goebel, 2002:27). Form strategic alliances and sole supplier relationships with small suppliers (Seetharaman, Khatibi & Ting, 2004:269; Geiger *et al.*, 1997:**Online**).
- **Develop a strong supply chain information exchange with the small supplier:** This should include information regarding product development, cost data, demand schedules and production schedules. This should also include financial information, gain sharing, joint design work and fostering a comparable culture (Geiger *et al.*, 1997:**Online**).

### **3.7 BENEFITS ASSOCIATED WITH QUALITY MANAGEMENT SYSTEMS**

There is an abundance of academic literature in journals, magazines and on the Internet promoting the benefits to be gained from employing a Quality Management System (QMS). Certification to ISO9001 is objective evidence that the organisation has a QMS compliant to the standard. The importance of certification, lies not in the physical certificate, but in the fact that the organisation has a working QMS that is compliant to ISO9001 (Geiger *et al.*, 1997:**Online**).

#### **3.7.1 Competitiveness**

Possibly the most well known of the benefits associated with Quality Management systems is that certification allows an organisation to compete worldwide. Organisations need standards to do business (Amponsah, DeCouette, Dew, Pogue & Wilson, 2008:**Online**). The authors also contend that small organisations can use certification to prove that they are in control of their own

business processes. They should be considered as serious competitors (Amponsah *et al.*, 2008:**Online**).

### **3.7.2 Productivity and performance**

Chow-Chua *et al.* (2002:938), agree that there is consensus amongst academics that in addition to access to international markets, there is an increase in productivity. The authors proceed to state that certification also guarantees that procedures are consistent and that there is a mindset of control and command present in the organisation (Chow-Chua *et al.*, 2002:937). A further benefit for certified organisations is better financial performance (Chow-Chua *et al.*, 2002:948). The authors add that certification allows for better-defined internal processes, improved profitability and ultimately leads to increased competitiveness (Chow-Chua *et al.*, 2002:949).

### **3.7.3 Controlled processes**

Barrier (1994:**Online**), notes that although certification does not guarantee that the product of the organisation is of high quality, it at least indicates that they have documented their system and is operating it. Geiger *et al.* (1997:**Online**), points to the importance of a strong quality inspection programme, and mention that according to the feedback from a series of interviews with top organisations, certification to ISO9001 is important, although not essential.

### **3.7.4 People involvement**

According to Lee (2004:196), small companies introducing low-cost elements of a QMS such as rearranging processes, developing quality programs and getting employees involved, can culminate in many benefits. These benefits are getting top management involved, changing their thinking and attitude, educating employees and winning support.

From the above the obvious analogy can be drawn that there are benefits to be gained by developing and implementing a quality management system that complies with ISO9001.

### 3.8 RISKS ASSOCIATED WITH THE ABSENCE OF A QMS

It is also evident that should an organisation not have a QMS, there is no mechanism for the customer to be certain that good management is being practised. The lack of a QMS may indicate potential risks in the very areas the benefits are realised, and include the following:

- Diminished capability to do business internationally (Amponsah *et al.*, 2008:**Online**).
- Productivity and financial performance could be substandard, procedures and processes poorly described, and control impaired (Chow-Chua *et al.*, 2002:937, 948, 949).
- Any procedures there that may be, may not be operated within (Barrier, 1994:**Online**).
- Quality inspection may be weak, non-existent (Geiger *et al.*, 1997:**Online**).
- There could well be no employee support, or management involvement (Lee, 2004:196).

### 3.9 LIMITATIONS OF ISO9001

While the benefits of ISO9001 seem to be well established, there are also issues which hold that compliance thereto, is not a panacea to solve an organisation's problems, nor does it serve as a guarantee of a quality product.

#### 3.9.1 Impaired flexibility

Smith (2005:310), in a paper exploring the vulnerabilities and crisis management within organisations, argues that the very processes and procedures that are supposed to guard against failure, could lock an organisation into falling into error traps. In a debate about the effectiveness of ISO9001, a working team pointed out that the standard has simply failed to guarantee improvement in quality, or increased profitability (Heffner, Larson, Lowder & Stites, 2008:**Online**). In addition, it stifles customisation, inhibits the ability to adapt quickly to changes in the professional fields. ISO's very focus on standardisation is counterproductive- it suppresses flexibility (Heffner *et al.*, 2008:**Online**).

### **3.9.2 'Window dressing'**

Lewis *et al.* (2005:981), also concede that despite improvements to ISO, the standard does not guarantee excellence. Versan (2006:**Online**), goes further by stating that the consumer's confidence in the ISO standard is falling. The author adds that in assessing the implementation of the ISO standards, ISO/TC 176 had found that many organisations are simply adopting the quality management system to obtain the certificate. Car manufacturers are using the more sector-specific ISO/TS 16949, and softening their approach to insist on ISO9001 certification as entry barrier for fledgling business. A partnership approach seems to be favoured with the purpose of developing the supplier.

### **3.9.3 Costliness**

There is a general perception that ISO9001 is expensive to implement and to run, especially for small businesses (Taylor, 1994:10). Furthermore, not only is it recognized that small firms have implementation problems, but that the engineering sector does not view the standard to be of much benefit or value (Taylor, 1994:26). Bryde and Slocock (1998:467), report that there is a common complaint that the certification route is inappropriate and expensive to small companies. In fact, there is a great deal of resentment towards certification, and this could be related to the reasons why organisations feel bound to seek certification, and the negative expectation regarding the costs as compared to the benefits (Bryde & Slocock, 1998:479). Barrier (1994:**Online**), agrees that for the smallest firms, the expected costs are inhibitive.

## **3.10 INDUSTRY MEASURES TO MANAGE THE ABSENCE OF A QMS**

The automotive industry places a high premium on customer safety. This has necessitated the car manufacturing sector to add compliance with the more stringent ISO/TS 16949:2002 to the basic requirement of being certified to ISO9001. Yet, even in this industry there is acknowledgement that not all suppliers can achieve ISO9001 certification.

As a result, the programme SI 5 06 - ISO/TS 169494:2002 7.4.1.2, '*Supplier quality management system development*' was introduced (adopted in December 2006), to set out the minimum requirements under which suppliers without ISO certification may be used by manufacturers. Suppliers for development are prioritised by the importance of the product or service they deliver to the organisation based on their delivery history. The following now applies as a result:

- Second party audits to verify conformance to ISO9001, in lieu of certification, if it is repeated annually.
- On the provision that decision criteria to determine acceptable small suppliers are defined, and records kept of this process, specified elements of ISO9001 and ISO/TS 169494:2002 may be waived. 'Small' may refer to either the size of the supplier, or of the product.

It is of importance to understand that the principle underlying this development is to achieve compliance with the technical specification ISO/TS 169494:2002 and ISO9001 under a programme (IAOB, 2008:**Online**). Theobald (2007:**Online**), notes that 2<sup>nd</sup> party auditing has become a growing trend, and that the adoption of the new programme reflects this trend. In a typical example of the way this programme is applied, Freudenberg Nonwovens (2007:**Online**), has developed a comprehensive measurement system to evaluate its suppliers and to determine critical points for development intervention and technical assistance.

### **3.11 SUPPLIER CAPABILITY DEVELOPMENT**

From the previous paragraph it is evident that the principle underlying the approach of the automotive industry is assist suppliers without quality management systems to develop their quality and technical abilities. It is not enough to simply manage the risk through second and third party evaluation and monitoring. The supplier is to be guided and mentored until conformance to the desired standard is achieved. Partners however, should comprehend and understand certain principles pertaining to potential partners, which are elaborated upon below.

- **Meaningful relationships:** When a meaningful relationship with a supplier exists, suppliers are more willing to improve their products and services (Boyett, Brown & Robinson, 1994:17). It is therefore reasonable for a customer to initiate a development programme with a supplier by creating an understanding of their shared interests and goals. This in turn means that the customer needs to analyse what the value of the supplier is to his business (Boyett *et al.*, 1994:16). It is critical for a customer to be able to recognise the potential value of a supplier's capabilities, and to match those with the required capabilities of the type of supply that is needed (Damgaard, Johnsen & Philipsen, 2008:26,31). The customer should understand the implications of aligning their suppliers' capabilities with the needs of the organisation, and the benefits to be gained through better relations and knowledge (Damgaard *et al.*, 2008:27).
  
- **Skills focus:** Damgaard *et al.* (2008:23), contend that there are a number of ways to develop a small supplier's capabilities, namely by suggesting that small suppliers should concentrate on one type of supply only. This will enable them make to better choices on which capabilities to develop. In addition, better supplier capabilities, properly aligned with the customer's needs, will create more opportunities for partnership growth.
  
- **Risk reduction:** One area where supplier capability development was found to be key in reducing risk, was the ability to analyse, understand and manage the risks that sub-suppliers pose to the supply chain (Jansson & Norrman, 2004:450). After an incident which resulted at a supplier that caused serious damage to sales at Ericsson, the company not only embarked on mapping out the risks in their entire supply chain, but also encouraged their suppliers to develop similar capabilities. Similar areas of development that could be embarked upon between a customer and a supplier, may include the technical field, quality management or information management.
  
- **Resource investment:** Boyett *et al.* (1994:17), note in a study of the dynamics of partnership sourcing, that purchasers tend to invest in their suppliers through training, consultancy and equipment. Generally, a decision by a

customer to develop the capabilities of a supplier would be taken on the importance of the supplier to its business. Such a commitment would mean investment of time and resources by both customer and supplier. To protect such an investment an agreement of a measure of exclusivity, or partnership, could be reached between the two parties.

### **3.12 PARTNERSHIPS**

It is evident that for an organisation to strengthen and develop the capabilities within its supply chain, considerable investment would be needed before benefits are to be gleaned. To protect such an investment, a protective transactional framework is needed. Partnership agreements between suppliers and customers are examples of such frameworks. Aspects pertaining to the advantages of and prerequisites for, and some barriers to successful partnerships, are elaborated upon below.

#### **3.12.1 Advantages of successful partnerships**

There is a worldwide trend towards forming partnerships in supply chains in order to gain a competitive edge. Partnerships have certain common characteristics that have appeal in industry, especially where the conventional approach of competitive bartering has not managed to yield the desired results. The following three characteristics seem to be paramount, and are also prerequisites for a successful partnership.

- **Mutual advantage:** Partnerships between customers and suppliers are commonly understood as an arrangement of exclusive commitment to varying degrees. Little (1996:19) defines partnership sourcing as a process wherein the customer and the supplier work together to obtain maximum commercial advantage for both parties. The author contends that this type of relationship is not adversarial. Both parties have to agree on common goals, and they have to develop a framework of trust and cooperation, wherein those goals would be achievable.

- **Mutual commitment:** This type of relationship seems to be the ideal platform to invest resources in supplier development. Feldman (1998:290) notes that increased commitment by the customer has a positive influence on the willingness of the supplier to invest his own resources. The caveat being that this investment trend is dependent on the supplier's conviction that the relationship will last long enough for them to reach the expected profits (Feldman, 1998:289).
  
- **Shared advantages:** There are many advantages in partnering between customers and suppliers, namely:
  - Increased organisational performance (Khan & Pilliania, 2008:1521).
  - Increased supply chain agility (Khan & Pilliania, 2008:1521).
  - Increased commitment, collaboration and supply chain performance (Ryu, 2009:503).
  - Competitive resources are increased (Gould, 1997:10).
  - Strong alliances outperform weaker ones (Stuart, 1997:545).
  - Partners go beyond basic requirements (Goffin, Lemke & Szejczewski, 2003:29-30).

In addition Little (1996:19), points to reduced cost, access to expertise, increased quality of products and services, reduced inventory, shared benefits and the reduction in the number of suppliers as benefits being gained. Boyett *et al.* (1994:15), point out that the Japanese corporations have been fostering closer relationships with their suppliers for a long time. They even share sensitive information, share staff and assist each other to survive difficult economic periods.

### 3.12.2 Prerequisites for successful partnerships

Four areas of focus seem to be reflected in literature as issues of prerequisites for successful partnerships. These four areas of successful partnerships, are elaborated upon below:

- **Attitudes and Behaviour:** There are certain practical prerequisites for the formation of successful partnerships, namely:
  - Suppliers must be committed to continuous improvement (Bullington & Bullington, 2005:194).
  - Both partners must demonstrate a cooperative spirit (Campbell, 1997:428).
  - Expectations should be moderate (Stuart, 1997:548)(Campbell, 1997:428).
  - Buyers should willingly share information (Stuart, 1997:549).
  - Suppliers should willingly share information (McCutcheon & Stuart, 1996:14).
  - Good problem solving requires good relationships (Goffin *et al.*, 2003:18).
  - Proximity and active interaction is desirable (Goffin *et al.*, 2003:29-30).
  - Auditing for improvement and not to find fault (Saunders, 1994:41).
  - The ability, will and authority to commit to a partnership (Ackerson & Roethlein, 2004:330).
  - Shared values, objectives and willingness to provide information (McCutcheon & Stuart, 1996:7).
  
- **Multi-partnering:** The cooperative approach should not be limited to two parties. According to Gentry (1996:24), where more than two partners have transactional involvement, the relationships should reflect the same dimensions as those in dyadic partnerships. Successful partnerships of this nature reflect a culture of effective, regular communication regarding all operational aspects. Gould (1997:10), confirms that alliances should extend across multiple partners in the supply chain.
  
- **Natural role-players:** An interesting observation made by Spina and Zotteri (2000:1179-1180), is that partnership relations should be managed by the

technical staff of the customer and the supplier, after the original phase of contract negotiation has been completed. This is consistent with the principle that the practical value of the product or service is mostly determined by the end user. It is therefore the end user who should be communicating with the technical staff of the supplier regarding the characteristics of the product or service. That is the level at which the relationship should be working effectively to resolve problems and to gain maximum benefit through interaction.

- **In-depth mutual knowledge of partners:** Ellegard (2006:137), remarks that suppliers need to be profiled, with their characteristics detailed and accessible to the purchaser. The author believes that critical suppliers need in-depth analysis, while more generic and non-complex suppliers could be managed through a more general approach. This suggests that a technical focus to supplier management should be applied, where technical and quality evaluations are performed and the results analysed. It also suggests that a graded approach to supplier management, is advisable.

### 3.12.3 Barriers to successful partnerships

There are barriers and obstacles to effective partnerships that are important for potential partners to understand. The following factors are to be taken into consideration, when partnerships are considered, namely:

- When one partner perceives that he is too dependent on the other or too vulnerable, he will seek to reduce this dependency. Not only should both partners be equally committed, but they should understand what should be done to prevent such a withdrawal of commitment (Feldman, 1998:288, Little, 1996:20).
- Should the buyer not honour his side of the arrangement and sales should drop, it is a market principle that the supplier should react to correct the imbalance. This could take the form of reducing supply or seeking other buyers (Feldman, 1998:289-290).

- For both partners the lack of knowledge could be a threat. An even greater threat than a lack of technical know-how, is the internal and external lack of knowledge of how to make the partnership work (Little, 1994:20).
- There could be internal resistance to the concept of partnerships within the organisation, of one or both partners (Little, 1996:20).
- It could be difficult to find suitable partners with the correct skills, resources and commitment to form a working relationship (Little, 1996:20).

### **3.13 CONCLUSION**

In this literature review, industry research about the characteristics of small businesses were investigated. The challenges to customers and small suppliers to interact successfully and the potential benefits that can be gleaned were elaborated upon, as well as industry views on possible solutions to minimise risks. In addition, an alternative industry (the South African Motor Industry) with a similar focus on safety as the nuclear industry was used to glean an understanding of current trends in small supplier management.

Certain trends in current macro economic thinking, national and governmental priorities with regards to economic empowerment, and subsequent Eskom prerogatives in addressing those priorities were highlighted. In conclusion, current global trends with regard to partnering for competitive edge were elaborated upon. This literature review was conducted to find possible industry solutions towards risk mitigation that could be applicable to Eskom Nuclear Generation, particularly when engaging with small suppliers.

## **CHAPTER 4 : SUPPLIER PROCESS RISK SURVEY DESIGN AND METHODOLOGY**

### **4.1 INTRODUCTION**

The research survey had the objective to determine supplier process risk, which resulted due to the triangulation of historical problems that had been experienced by Eskom Nuclear Generation with 32 suppliers over a three-year period. Four categories of suppliers were identified. For all four categories both the historical problems and the quality process capability evaluation were translated into a risk factor.

For three of the four categories, historical data was gleaned from databases with records of problems associated with delivered goods, and for the fourth category, historical data on problems experienced during the rendering of services under contracts was obtained from Eskom contract managers. Quality process capability data was furthermore obtained from all four categories of suppliers via a survey. The surveys of the suppliers constituted structured interviews, whereas the surveys of the contract managers were a series of questions posed during telephonic interviews.

In addition, an anonymous opinion survey was conducted among the 32 suppliers in the study group to evaluate whether suppliers identify obstacles or risks in the Nuclear Generation supply chain.

### **4.2 THE SURVEY ENVIRONMENT**

The Procurement Quality Engineering section of the Procurement Department of Eskom Nuclear Generation has to perform various duties in the management of suppliers. These duties include auditing and assessment of suppliers to determine their capability to deliver goods and services to the requirements set by international standards, including ISO9001. The capabilities of quality processes

of small suppliers without a quality management system as listed below will serve as the research environment:

- Contract review.
- Planning.
- Process control.
- Records and traceability.
- Customer focus and non-conformance.
- Purchasing.
- Preservation.

Furthermore, the opinion survey of supplier perceptions of elements of the supply chain addressed four categories of risks, which include the following:

- Attitude towards nuclear power generation.
- Experience and skills in the KNPS supply chain.
- Communication with and access to the KNPS supply chain.
- Co-operation and partnering.

### **4.3 AIM OF THIS CHAPTER**

The aim of this chapter and the research contained therein is to determine the key risks that small, local suppliers pose to Nuclear Generation due to their lack of a quality management system. The ultimate objective will be to find an answer to the research question as defined in Chapter 1, Paragraph 1.4, and which reads as follows: *“How can Eskom Nuclear Generation identify and mitigate supply chain risk by using small suppliers?”*

### **4.4 CHOICE OF SAMPLING METHOD**

Procurement Quality Engineering (PQE) has a wealth of information on received items that had been stored over a period of 23 years in a Receipt Inspection database. The resultant issues that had been experienced over a three-year period was gathered and analysed. In addition, interviews with contract managers were conducted to determine supplier performance in the seven quality processes. Suppliers were further divided into four categories, which will serve as the

individual strata for the research survey. Each category contains eight suppliers.

The categories are:

- Agents/stockists.
- Manufacturers.
- Repair services.
- Skilled services.

In order that each identifiable stratum of the population were taken into consideration (Collis and Hussey, 2003:157) (Easterby-Smith, Thorpe and Lowe, 1996:48), eight respondents were randomly selected from each stratum.

#### **4.5 THE TARGET POPULATION**

In any survey the target population must be clearly defined. Collis and Hussey (2003:157), defines a population as follows:

*“A population is any precisely defined set of people or collection of items which is under consideration”.*

A ‘sampling frame’ is defined by Vogt (1993), and cited by Collis and Hussey (2003:155-160), as ‘a list or record of the population from which all the sampling units are drawn’. For this survey, 32 suppliers were randomly selected from a total population of 72 possible suppliers who fit the profile and represent the sampling frame. This transposes in 8 suppliers being randomly selected from each of the following identified research strata:

- Agents/stockists of spares and consumables.
- Manufacturers of goods, including engineering.
- Repair services, including refurbishment, overhaul and maintenance.
- Skilled services, including design, special processes, professional skills.

The suppliers have been chosen from organisations with 20 full-time employees or less. These suppliers do not have an operational quality management system. In addition, the suppliers are all based in and around Cape Town. All the

suppliers have been involved with Koeberg Nuclear Power Station for a considerable period, which exceeds three years.

The target population was specifically chosen in order to validate the practicality of the concepts as presented within this research. The purpose was to identify natural partners within geographical reach in order to maintain a sustainable development programme. The risk of bias, which cannot be statistically eliminated, is recognised by the author based on the very definition of the target population as well as the limitations introduced by the small number of respondents selected in each category of suppliers.

#### **4.6 DATA COLLECTION**

Data was collected from a database of records and by survey. Regarding the latter method, Emory and Cooper (1995:278), distinguish three primary types of survey methods, namely:

- Personal interviewing.
- Telephone interviewing.
- Self-administered questionnaires/surveys.

All three primary data collection methods were used in this survey. This allows the researcher to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience.

Collis & Hussey (2003:64), associate interviews with both positivist and phenomenological methodologies. In this data collection exercise, respondents were asked questions to determine what they feel, think or do in terms of a particular statement. The use of personal interviews as an additional element to the data collection process is important. This allows for the identification of key risks within the target environment. A pure survey questionnaire may not be able to identify these risks, as the interviewer is able to interpret responses immediately and allow the interviewee to elaborate on salient information. Furthermore, according to the authors, interviews are associated with both positivist and

phenomenological methodologies. Both are employed within the ambit of this dissertation.

The data collection method used falls within the context of a survey. Collis and Hussey (2003:60), defined this as:

*“A sample of subjects being drawn from a population and studied to make inferences about the population”*

The surveys conducted in this dissertation are defined by Ghauri, Grønhaug and Kristianslund (1995:203), as ‘descriptive surveys’. The approach that is used is to collect primary data through both personal and telephone structured interviews. This approach is an accepted data collection method (Remenyi *et al.*, 2002:48). In addition, questionnaires were distributed to the 32 suppliers to collect primary data to determine their opinions about 20 statements on elements in the Eskom Nuclear Generation supply chain. These elements are related to risk in the supply chain.

The definitions for ‘survey’ and ‘field study’ can both be described as data collection methods. Gay and Diebl (1992:238), describe ‘survey’ as an attempt to collect data from members of a population in order to determine the current status of that population with regards to one or more variables. ‘Field study’ is non-experimental scientific inquiries that attempts to discover the relations and interactions between variables in real structures (Kerlinger, 1986:372). The collection of data is an important part of the overall dissertation, which holds true for most academic research.

This research also extends to the interrogation of historical information captured in databases, with analysis of the historical data as well as survey data on current performance levels within the different strata. Therefore mixed methodologies with both methodological and data triangulation are being employed for greater accuracy (Easterby-Smith, Thorpe & Lowe, 1996:133-134). Problems experienced with goods delivered over three years were calculated as error percentages, and then interpreted as a risk factor.

## **4.7 MEASUREMENT SCALES**

In the survey the respondents were asked to respond to questions or statements, based on the well-known Likert scale (Parasuraman 1991:410). The Likert scale was chosen for the fact that the scale can be used in both respondent-centered (responses differences between people) and stimulus-centered (response differences between various stimuli) studies. It is the most appropriate approach to gather data to address the research problem (Emory and Cooper 1995:180-181). According to Emory and Cooper (1995:180-181) the advantages in using the popular Likert scale are:

- It is easy and quick to construct.
- Each item meets the empirical test for distinguishing ability.
- The Likert scale could be more reliable than the Thurston scale, and it yields more data than the differential scale.
- The Likert scale regarded as an interval scale.

Interval scales facilitate meaningful statistics when calculating means, standard deviation and Pearson correlation coefficients (Remenyi, Money & Twite, 1995:224).

The scores on the Likert scale used in the surveys were then related to a risk factor to enable comparison with historical data from the inspection database.

## **4.8 THE DEMAND FOR A QUALITATIVE RESEARCH STRATEGY**

Greenhalgh and Taylor (1997:740-743) point to the positive characteristics that are inherent in qualitative research:

- Qualitative methods have the objective to make sense of or interpret, phenomena in terms of the meanings people bring to them.
- Qualitative research could define preliminary questions, which can then be approached by quantitative studies.
- Good qualitative studies will address clinical problems through clearly formulated questions, using more than one research method (triangulation).

- Analysis of qualitative data should be done using explicit, systematic, and reproducible methods.

The value of qualitative research can be found in validity (reliability). Good qualitative research, using multiple data collection methods, should yield fundamental truths, not only superficial principles. The reliability of qualitative methods are enhanced through multiple research methods, which is known as 'triangulation'. Analysis of the data by more than one researcher is another way to enhance validity (Greenhalgh & Taylor, 1997:740-743).

This view is consistent with that of Emory & Cooper (1995:156), who state that a strategy of empirical analysis of data collected that is used in business research will deliver results that are as follows:

- **Practical:** Results will be economical, convenient, and interpretable.
- **Valid:** The extent to which the test measures that we actually wish to measure represent the real situation. There are three subsets to the concept of validity. These are construct validity, internal validity and external validity (Yin, 2003:34).
- **Reliable:** The accuracy and precision of the measurement procedure.

#### 4.9 SURVEY SENSITIVITY

There are particular challenges to the researcher, especially in research conducted in areas of a sensitive nature. This survey, as well as the empirical data gleaned by interrogating the database, measures performance levels of suppliers. Therefore this survey is of a sensitive nature. There are guidelines provided by various academics to explain the mitigation process. In areas of a sensitive nature these can be deployed:

- Oskowitz and Meulenberg-Buskens (1997:83), conducted a qualitative investigation of a particularly sensitive nature. They stated the importance of handling critical issues in these words:

*“Thus any type of qualitative investigation could benefit from the researchers being skilled and prepared, and the sensitive nature of an investigation into a*

*stigmatizing condition made the need for such an undertaking even more imperative in the current study”.*

- Meulenberg-Buskens (1997:94), held the view that the sensitivity of certain issues that impacted negatively on the research in the environments being evaluated required intimate personal involvement. It also demanded ‘personal and practical experience’ by the researcher. They regarded it as imperative in order to support the authenticity of the qualitative research that is to be performed. Checkland (1989:152), elaborates that the “... researcher becomes a participant in the action, and the process of change itself becomes the subject of research”.

#### **4.10 SURVEY DESIGN**

Collis and Hussey (2003:60), state that ‘... if research is to be conducted in an efficient manner and make the best of opportunities and resources available, it must be organised.’ If a reliable outcome is sought, then the logical and coherent manner in which it will be found is if the research is conducted systematically. Appropriate methods should be used to collect and analyse the data. Surveys have to be designed with the following stages:

- **Stage one:** Identify the topic, set some objectives.
- **Stage two:** Pilot a questionnaire to find out what people know and what they see as important issues.
- **Stage three:** List the areas of information needed, refine the objectives.
- **Stage four:** Review the pilot responses.
- **Stage five:** Finalise the objectives.
- **Stage six:** Write the questionnaire.
- **Stage seven:** Re-pilot the questionnaire.
- **Stage eight:** Finalise the questionnaire.
- **Stage nine:** Code the questionnaire.

Here the descriptive survey design is used, and not the analytical survey. Collis and Hussey (2003:10), are of the opinion that in business research the descriptive survey is often used in the form of attitude surveys. Although attitude could not

be eliminated, the survey questions in this research, however, were designed to glean process information for the purpose of evaluating risk. Particular care was taken to avoid bias in the formulation of the questions.

The statements within the survey have been designed with the following principles in mind (Watkins, 2008:143):

- Avoidance of double-barreled statements.
- Avoidance of double-negative statements.
- Avoidance of prestige bias.
- Avoidance of leading statements.
- Avoidance of the assumption of prior knowledge.

Questions for the one survey were formulated in such a manner that respondents could elaborate their responses until they were satisfied that full understanding had been reached by the interviewer. This enabled the interviewer to evaluate the responses against preset criteria. Also herein could be found a measure of bias, but in this case by the interviewer. The questions for the other survey were based on the experience of contract managers, based on the contract history and performance of selected suppliers. Herein is also a measure of bias to be found.

#### **4.11 VALIDATION SURVEY QUESTIONS, AND DATABASE PROBLEM MEASUREMENT RISK EVALUATION**

Due to the fact that face-to-face interviews are highly structured, questions were prepared and piloted to ensure they reflected a high degree of 'validity' (Babbie, 2005:285). Six interviews were conducted before the questionnaires were redesigned.

For the survey, four questionnaires were developed. The first three questionnaires have questions that relate to the seven quality processes identified in Paragraph 4.2. The data of errors in the receipt inspection database was also classified to map to the seven quality processes identified in Paragraph 4.2. Finally, both the error percentages and the survey responses were further related to risk. The fourth questionnaire contains statements requiring a response that has been designed to

measure the attitude towards and experience of suppliers with the Nuclear Generation supply chain. The responses were also mapped to risk.

#### 4.11.1 Questionnaire: Risk evaluation interviews with suppliers

The interviewer calculated the responses to the following questions as follows:

<u>Process:</u>	<u>Score:</u>	<u>Risk:</u>
Complex, unclear, undefined:	5	Risk Very High
Complex, clear, undefined:	4	Risk High
Complex, clear, defined:	3	Risk Medium
Simple, clear, defined:	2	Risk Low
Stable, simple, clear, defined:	1	Risk Very Low

‘Defined’; was interpreted as a process that has been mapped in any medium.

‘Clear’; was interpreted as being understood in only one manner. ‘Simple’; was interpreted as uniquely identifiable processes, with known inputs and outputs.

‘Stable’; was interpreted as proven and demonstrated processes.

- **Question 1:** How good are their processes to ensure that they supply exactly what Koeberg asks for, including completing the work fully, with all the certification?
- **Question 2:** How good are their processes to enable them to plan their resources in such a manner that the work/ product is delivered on time?
- **Question 3:** How good are their processes to enable them good control so that all Koeberg's instructions/procedures/controls are obeyed?
- **Question 4:** How good are their processes to ensure good administrative ability, i.e. recordkeeping/documentation/certification?
- **Question 5:** How good are their processes to ensure efficient/quick response to Koeberg complaints in order to address problems?
- **Question 6:** How sound are the supplier's own procurement processes in order to fulfil their mandate to Koeberg, including acquiring the correct skills or goods from reputable sub-suppliers or contractors?
- **Question 7:** How good are their processes to ensure protection or preservation of Eskom property, including identifying/marketing/returning to original condition, right up to final hand-over?

#### 4.11.2 Questionnaire: Risk evaluation interviews with contract managers

The contract managers were requested by the interviewer to respond to the questions below by providing one of following answers, which the interviewer related to risk:

<u>Answer:</u>	<u>Score:</u>	<u>Risk:</u>
Contractor fared very badly:	5	Risk Very High
Contractor fared badly:	4	Risk High
Contractor fared fairly:	3	Risk Medium
Contractor fared well:	2	Risk Low
Contractor fared excellent:	1	Risk Very Low

‘Very badly’; was interpreted as unable to perform successfully without 2<sup>nd</sup> party supervision. ‘Badly’; was interpreted as frequent failures of a process. ‘Fairly’; was interpreted as infrequent failures of certain processes. ‘Well’; was interpreted as failing seldom. ‘Excellent’; was interpreted as negligible failures.

- **Question 1:** How good were they in supplying exactly what Koeberg asked for, including completing the work fully, with all the certification?
- **Question 2:** How good was their ability to plan their resources in such a manner that the work/ product was delivered on time?
- **Question 3:** How good was their control of processes so that all Koeberg's instructions/procedures/controls were obeyed?
- **Question 4:** How good was their administrative ability, i.e. recordkeeping/ documentation/certification?
- **Question 5:** How good were they in responding efficiently to Koeberg complaints in order to address problems, including their response time?
- **Question 6:** How sound were the supplier's own procurement processes in order to fulfil their mandate to Koeberg, including acquiring the correct skills or goods from reputable sub-suppliers or contractors?
- **Question 7:** How good were they in protecting or preserving Eskom property, including identifying/marketing/returning to original condition, right up to final hand-over?

#### 4.11.3 Questionnaire: Receipt inspection and Electronic Problem Management System database error measurement and risk evaluation

Error percentages were based on historical error rates of received goods at Koeberg between 1993 and the present. 'Very High Risk' is determined to be the historically highest recorded failure rate at Koeberg Nuclear Power Station. The current performance level target is set as 'Very Low Risk'. Other categories have been equally spaced between the two extremes. The same seven processes as with the other two questionnaires were measured by investigating the databases, posing the following questions:

<u>Results:</u>	<u>Score:</u>	<u>Risk:</u>
Error >25%:	5	Risk Very High
Error 21% - 25%:	4	Risk High
Error 16% - 20%:	3	Risk Medium
Error 11% - 15%:	2	Risk Low
Error <11%:	1	Risk Very Low

- **Question 1:** Did they supply exactly what Koeberg asked for, including completing the work fully, with all the certification?
- **Question 2:** Did they plan their resources in such a manner that the work/product was delivered on time?
- **Question 3:** Did they control their processes so that all Koeberg's instructions/procedures/ controls were obeyed?
- **Question 4:** Did they demonstrate adequate administrative ability, i.e. recordkeeping/ documentation/certification?
- **Question 5:** Did they respond efficiently to Koeberg complaints in order to address problems, including their response time?
- **Question 6:** Did they demonstrate adequate procurement processes in order to fulfil their mandate to Koeberg, including acquiring the correct skills or goods from reputable sub-suppliers or contractors?
- **Question 7:** Did they protect or preserve Eskom property, including identifying/ marking/ returning to original condition, right up to final hand-over?

#### 4.11.4 Opinion survey to determine attitude towards and experience of suppliers the Nuclear Generation supply chain

For the opinion survey the following statements grouped into four categories were made, which were answered by selecting either Strongly Agree; Agree; Undecided; Disagree or Strongly Disagree:

<u>Answer:</u>	<u>Score:</u>	<u>Risk:</u>
Strongly Disagree:	5	Risk Very High
Disagree:	4	Risk High
Undecided:	3	Risk Medium
Agree:	2	Risk Low
Strongly Agree:	1	Risk Very Low

➤ **A: Attitude towards nuclear power generation**

1. Nuclear power generation has an important role to play in SA.
2. It is a good idea to build more nuclear power stations in SA.
3. Koeberg Nuclear Power Station (KNPS) is a positive contributor to Commerce in the Western Cape.
4. KNPS should do more to develop suppliers in the Western Cape
5. KNPS has the community of the Western Cape at heart

➤ **B: Experience and skills in the KNPS supply chain**

1. KNPS buyers (purchase orders, contracts) are skilled and professional
2. Financial staff (payments) are skilled and professional
3. Engineering staff (technical queries) at KNPS are skilled and professional
4. Quality (PQE) staff (controls, monitoring) are skilled and professional
5. End users (Maintenance, Engineering, Projects) at KNPS are skilled and professional

➤ **C: Communication with and access to KNPS supply chain**

1. Technical information received from KNPS is generally adequate
2. Technical information to fulfil KNPS requirements is easy to obtain
3. We are satisfied with the manner in which the buyers engage us
4. We are satisfied with the manner in which Finance (payments) engage us
5. We are satisfied with the manner in which end users (i.e. Maintenance) engage us

➤ **D: Co-operation and partnering**

1. For the current volume of sales it is worth it to adapt our processes if requested to do so by KNPS
2. We will consider developing certain written procedures to describe our processes if requested to do so by KNPS
3. We want to be fully ISO-compliant
4. We want to be ISO-certified
5. We can afford to become ISO-certified and maintain our certification

#### **4.12 CONCLUSION**

In this chapter, the ‘supplier process risk’ survey design and methodology was addressed under the following functional headings:

- Survey environment.
- Aim of the chapter.
- Choice of sampling method.
- Target population.
- Data collection.
- Measurement scales.
- Demand for a qualitative research strategy.
- Survey sensitivity.
- Survey design.
- The opinion and validation survey questions and database problem measurement risk evaluation.

In Chapter 5, results from the survey will be analysed in detail and conclusions drawn.

## **CHAPTER 5 : SURVEY RESULTS**

### **5.1 INTRODUCTION**

Data analysis is “the process of bringing order, structure and meaning to the mass of collected data” (de Vos 2002, 339). This chapter discusses the results of the data analysis of the survey conducted at Eskom Nuclear Generation. The primary objective of this study is to determine, identify and mitigate the risks of using small suppliers to feed into the supply chain of Eskom Nuclear Generation. The data obtained from the completed questionnaires will be presented and analysed by means of various analyses (uni-variate, bi-variate and multivariate) as it becomes applicable.

The data has been analysed by using SAS software. Descriptive statistics and frequency tables are displayed in Paragraph 5.3.2, that shows the distributions of the statement responses. Descriptive statistics are used to summarize the data. As a measure of central tendency and dispersion, Table 5.3 shows the means and standard deviation of all the statements.

### **5.2 ANALYSIS METHOD**

#### **5.2.1 Validation survey results**

Descriptive analyses of the survey results returned by the research questionnaire respondents are reflected below. The responses to the questions obtained through the questionnaires are indicated in table format for ease of reference. Data validation is the process of ensuring that a program operates on clean, correct and useful data. The construct validation however can only be taken to the point where the questionnaire measures what it is suppose to measure. Construct validation should be addressed in the planning phases of the survey and when the questionnaire is developed. This questionnaire is supposed to measure the risks of using small suppliers.

### **5.2.2 Data format**

The data was received in Microsoft Excel format and it was then imported into SAS-format through the SAS ACCESS module. This information was then analysed.

### **5.2.3 Preliminary analysis**

The reliability of the statements in the questionnaire posed to the sample respondents is tested by using the Cronbach Alpha tests. (See Paragraph 5.3.1). Descriptive statistics were performed on all variables; displaying means, standard deviations, frequencies, percentages, cumulative frequencies and cumulative percentages. These descriptive statistics are discussed in Paragraphs 5.3.2 and 5.3.3. (See also computer printouts in Addendum A and B).

### **5.2.4 Inferential statistics**

The following inferential statistics are performed on the data:

- Cronbach Alpha test. Cronbach's Alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct". Construct is the hypothetical variables that are being measured (Cooper & Schindler, 2001:216-217). More specific Cronbach's Alpha measures how well a set of items (or variables) measures a single uni-dimensional latent construct.
- Kruskal Wallis test for interval data with more than 2 independent samples. The Kruskal-Wallis one-way analysis of variance by ranks is a non-parametric method for testing equality of population medians among groups. Intuitively, it is identical to a one-way analysis of variance with the data replaced by their ranks. It is an extension of the Mann-Whitney U test to 3 or more groups. Since it is a non-parametric method, the Kruskal-Wallis test does not assume a normal population, unlike the analogous one-way analysis of variance. However, the test does assume an identically-shaped and scaled distribution for each group, except for any difference in medians.

- Mann-Whitney U test or Wilcoxon rank-sum test for ordinal data with two independent samples. The Mann-Whitney U test (also called the Mann-Whitney-Wilcoxon (MWW), Wilcoxon rank-sum test, or Wilcoxon-Mann-Whitney test) is a non-parametric test for assessing whether two samples of observations come from the same distribution. The null hypothesis is that the two samples are drawn from a single population, and therefore that their probability distributions are equal. It requires the two samples to be independent, and the observations to be ordinal or continuous measurements, i.e. one can at least say, of any two observations, which is the greater. In a less general formulation, the Wilcoxon-Mann-Whitney two-sample test may be thought of as testing the null hypothesis that the probability of an observation from one population exceeding an observation from the second population is 0.05.
- ANOVA for comparison of means between products and type of supplier. Analysis of Variance (ANOVA) is a statistical procedure that uses the F-ratio to test the overall for a linear model. In experimental research this linear model tends to be defined in terms of group means and the resulting ANOVA is therefore an overall test whether group means differ.
- Box plot to show the differences between groups. A box plot is a way of summarizing a set of data measured on an interval scale. It is often used in exploratory data analysis. It is a type of graph which is used to show the shape of the distribution, its central value, and spread. The picture produced consists of the most extreme values in the data set (maximum and minimum values), the lower and upper quartiles, and the median.
- Pairwise t-test or T-test for paired observations. (Also known as the t-test for two correlated samples). This t-test tests if the sum of the change between the two groups differs statistically significantly from zero.

### **5.2.5 Technical report with graphical displays**

A written report with explanations of all variables and their outcome has been compiled. A cross-analysis of variables where necessary was performed, attaching statistical probabilities to indicate the magnitude of differences or associations.

All inferential statistics are discussed in Paragraph 5.3.4.

### **5.2.6 Assistance to researcher**

The conclusions made by the researcher are validated by the statistical report. Help is given to interpret the outcome of the data. The final report written by the researcher was validated and checked by a qualified statistician to exclude any misleading interpretations.

### **5.2.7 Sample**

The target population is Eskom Nuclear Generation suppliers. The sample is drawn from small suppliers who supply goods and services to Koeberg Nuclear Power Station in the Western Cape. The original sample selected was 32 respondents and the sample realised is 21 respondents. As for the determination of the risk, a risk evaluation from historical databases was compiled with respect to 32 different suppliers who supplied goods and services as well as a current analysis through interviews.

## **5.3 ANALYSIS**

In total 21 respondents from the population of small suppliers to Koeberg Nuclear Power Station answered the questionnaire posted to them. The items (statements) in the questionnaire will be tested for reliability in the following paragraph.

### **5.3.1 Reliability testing**

Cronbach's Alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct". Construct is the hypothetical variables that are being measured (Cooper & Schindler, 2001:216-217). Another way to put it would be that Cronbach's Alpha measures how well a set of items (or variables) measures a single uni-dimensional latent construct.

The reliability test (Cronbach's Alpha Coefficient) was done on all the items (statements) which represent the measuring instrument of this survey, with respect to the responses rendered in this questionnaire. The results are represented in table 5.1.

**TABLE 5. 1:** Cronbach's Alpha Coefficients for survey measuring instrument.

<b>Statements</b>	<b>Variable nr.</b>	<b>Correlation with total</b>	<b>Cronbach's Alpha Coefficient</b>
A1. Nuclear power generation has an important role to play in SA.	A1	0.0267	0.8548
A2. It is a good idea to build more nuclear power stations in SA.	A2	0.0566	0.8552
A3. Koeberg Nuclear Power Station (KNPS) is a positive contributor to Commerce in the Western Cape.	A3	0.3852	0.8453
A4. KNPS should do more to develop suppliers in the Western Cape.	A4	0.2042	0.8513
A5. KNPS has the community of the Western Cape at heart.	A5	0.4523	0.8423
B1. KNPS buyers are skilled and professional.	B1	0.0735	0.8538
B2. Financial staff is skilled and professional.	B2	0.4352	0.8438
B3. Engineering staff at KNPS are skilled and professional.	B3	0.5976	0.8353
B4. Quality staff is skilled and professional.	B4	0.1213	0.8526
B5. End users are skilled and professional.	B5	0.7252	0.8285
C1. Technical information received from KNPS is generally adequate.	C1	0.6253	0.8337
C2. Technical information to fulfil KNPS requirements is easy to obtain.	C2	0.7049	0.8291
C3. We are satisfied in the manner in which the buyers engage us.	C3	0.1762	0.8523
C4. We are satisfied with the manner in which Finance engage us.	C4	0.5644	0.8408
C5. We are satisfied with the manner in which end users engage us.	C5	0.7513	0.8261

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
D1. For the current volume of sales it is worth it to adapt our processes if requested to do so by KNPS.	D1	0.5276	0.8393
D2. We will consider developing certain written procedures to describe our processes if requested to do so by KNPS.	D2	0.3231	0.8476
D3. We want to be fully ISO-compliant.	D3	0.2542	0.8506
D4. We want to be ISO-certified.	D4	0.5687	0.8368
D5. We can afford to become ISO-certified and maintain our certification.	D5	0.5866	0.8359
<b>Cronbach's Coefficient Alpha for standardized variable</b>			<b>0.8272</b>
<b>Cronbach's Coefficient Alpha for raw variables</b>			<b>0.8500</b>

According to the Cronbach's Alpha Coefficients (Table 5.1) for all the items in the questionnaire:

0.8500 for raw variables; and

0.8272 for standardized variables;

The values were more than the acceptable level of 0.70, therefore this questionnaire proves to be reliable and consistent.

### 5.3.2 Descriptive statistics

Tables 5.2 to 5.5 shows the descriptive statistics for all the variables in the questionnaire measuring history of risk, current interviews on risk and supplier measurements with the frequencies in each category and the percentage out of total number of questionnaires. It is of importance to note that the descriptive statistics are based on the total sample. These descriptive statistics are also shown in Annexure A.

Due to the voluminous nature of Tables 5.2 – 5.5, the tables for ease of reference are continued within the ambit of Addendum D.

### 5.3.3 Uni-variate graphs

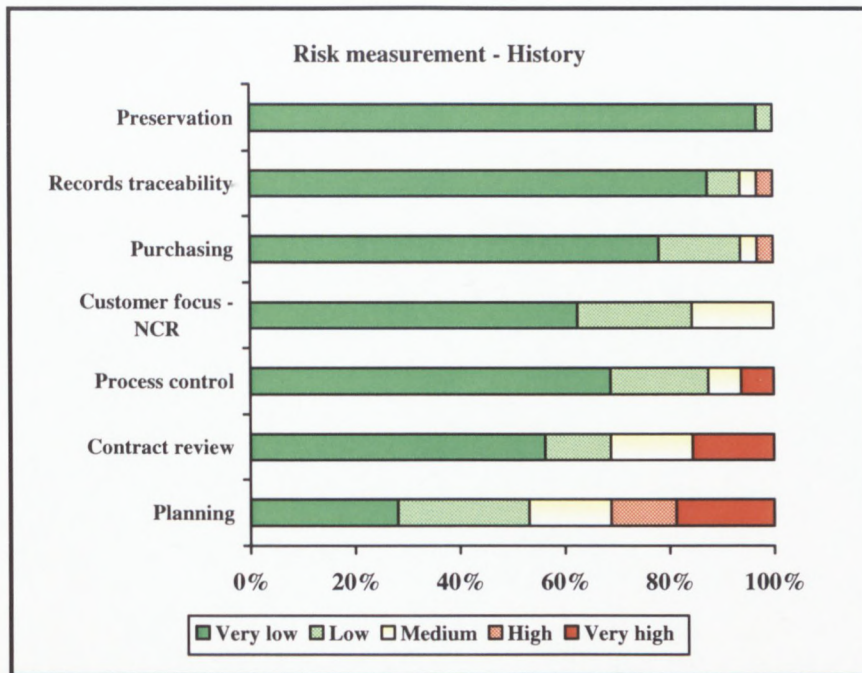


FIGURE 5. 1: 100% stack bar for Risk – History

The statements are sorted from the process with the highest risk to the lowest risk. From the history information it is evident that planning has the highest risk.

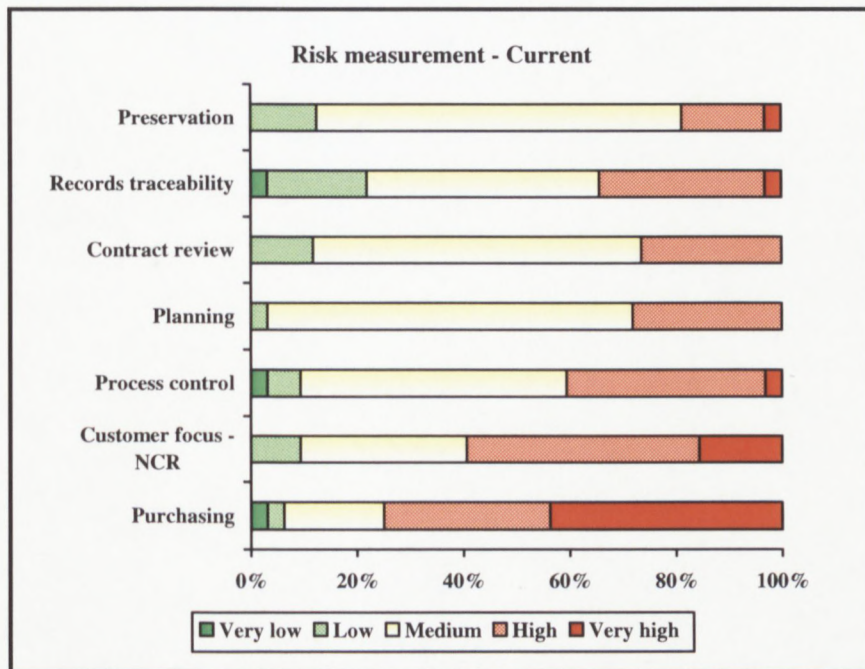


FIGURE 5. 2: 100% stack bar for Risk – Current

From the results; it is evident that purchasing and customer focus are the processes with the highest risk.

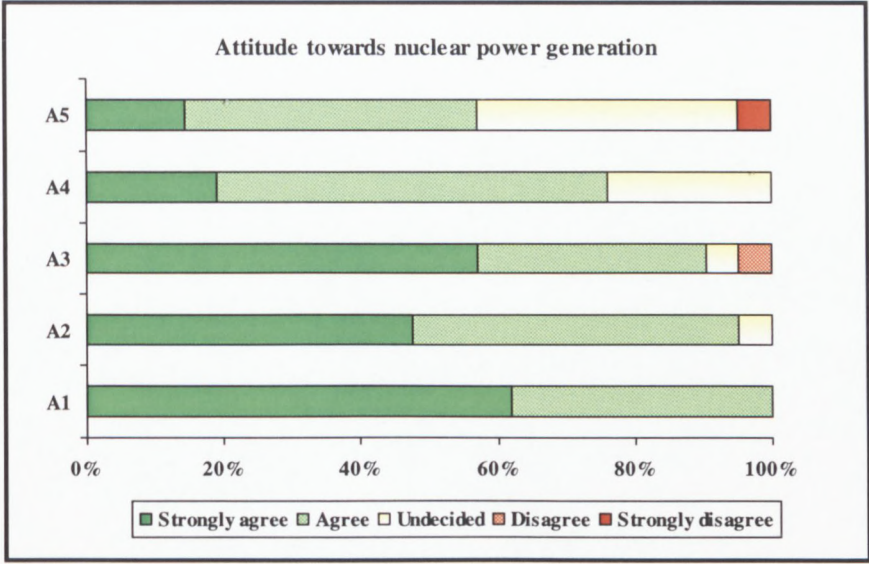


FIGURE 5. 3: 100% stack bar for Attitude

Although most of the respondents agree to strongly agree that Koeberg Nuclear Power Station (KNPS) has the community of the Western Cape at heart, there is still a large percentage (38.1%) who were undecided.

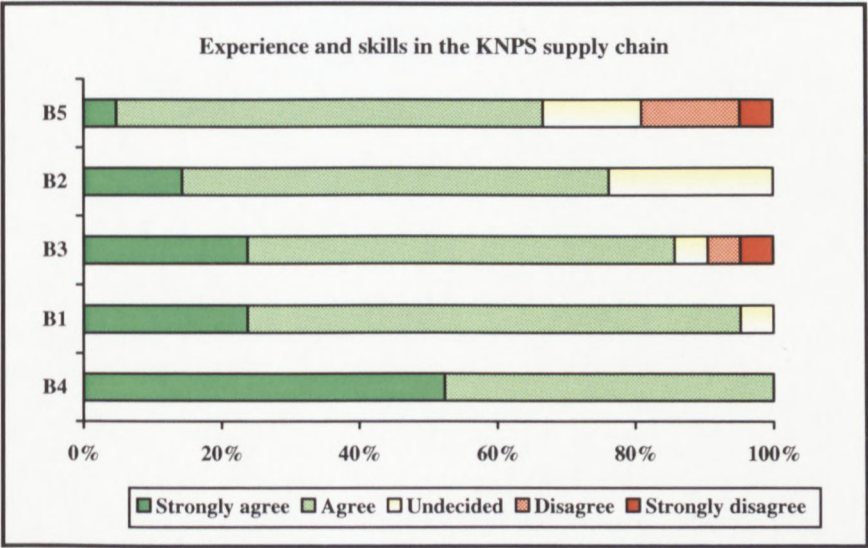
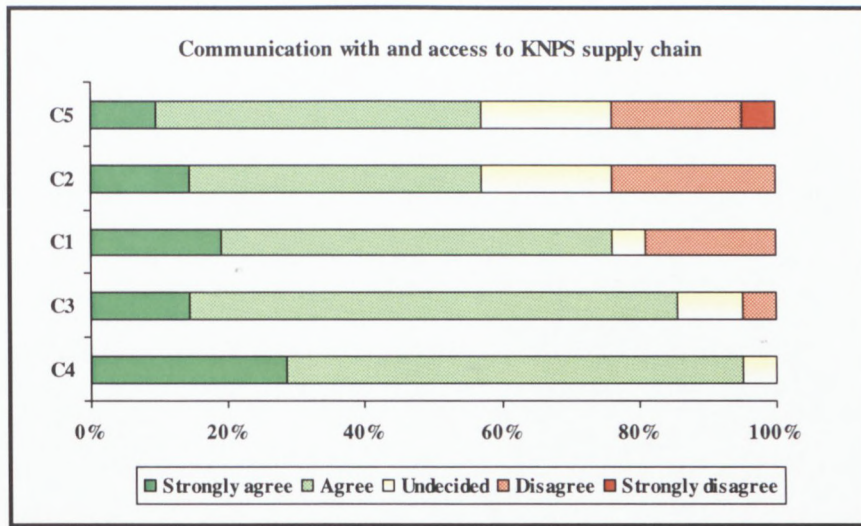


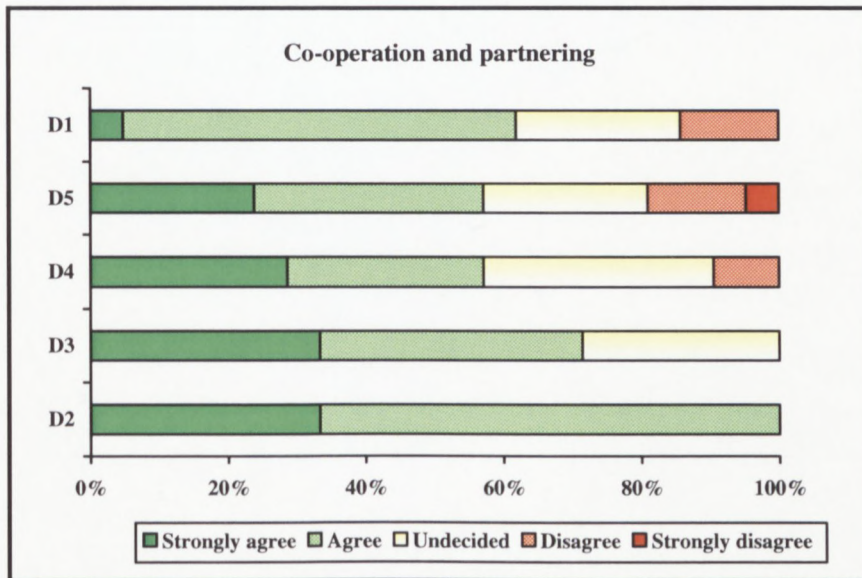
FIGURE 5. 4: 100% stack bar for Experience and skills

Nearly a fifth of the respondents (19.1%) did not think that end users are skilled and professional.



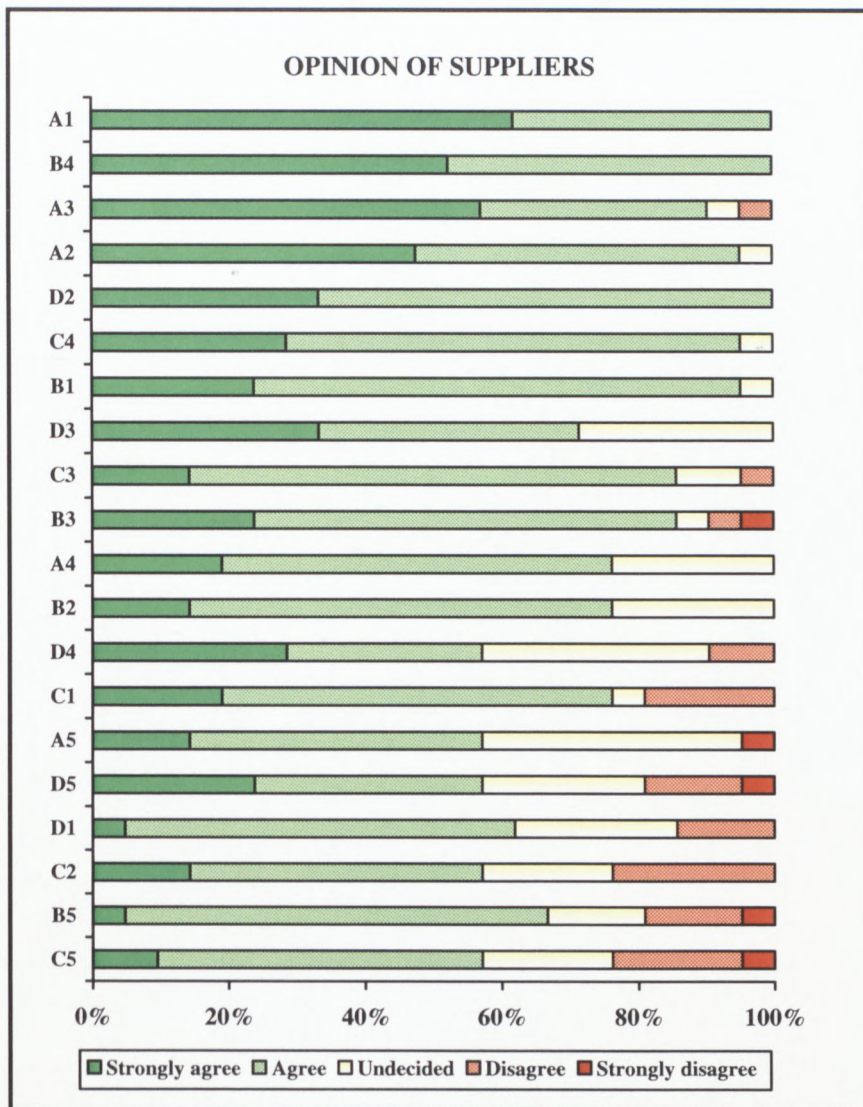
**FIGURE 5. 5:** 100% stack bar for Communication

Nearly a quarter of the respondents (23.8%) is not satisfied with the manner in which end users engage them.



**FIGURE 5. 6:** 100% stack bar for Co-operation & Partnering

Nearly a fifth of the respondents (19.1%) did not think that they could afford to become ISO-certified and maintain their certification.



**FIGURE 5. 7:** 100% stack bar for Attitude

Although the opinion of the suppliers is mostly positive with respect to the different categories regarding KNPS the following aspects should be looked at:

- Satisfaction of suppliers in their engagement with end users
- Whether end users at KNPS engaging with suppliers are skilled and professional
- Quality and availability of technical information to fulfil KNPS requirements

### 5.3.4 Comparative statistic

A comparison is made between product rendered and types of supplier with respect to risk. The risks of “Goods” are compared with the risk of “Services” and risk of “Agents and Stockists”, risk of “Manufacturers”, risk of “Repair Services” and risk of “Skills and labour” are compared in terms of the different processes by using the Analysis of Variance test. Doubt exists whether the distribution is a parametric distribution. Therefore, the Mann Whitney U-test in case of two groups or the Kruskal Wallis test for more than two groups, distribution-free non-parametric tests are also used for comparing the central tendency of the two or more independent samples. These samples are “Goods versus Services”, “Agents and Stockists”, “Manufacturers”, “Repair Services” and “Skills and labour” versus each other. All the statistically significant differences are discussed in this paragraph and all the tests are shown in Addendum D.

As a result of the Analysis of Variance there is a statistical significant difference between the means of the products “Goods” and “Services” for the following processes:

- “Planning” (F-Value=10.61; P-Value=0.0028\*\*),
- “Process control” (F-Value=6.18; P-Value=0.0187\*) and
- “Purchasing” (F-Value=7.98; P-Value=0.0083) in the case of history.

The Mann Whitney U-test statistics also indicate a difference between the scores for:

- “Planning” (Z-value=2.7058; P-Value=0.0068\*\*),
- “Process control” (Z-Value=-2.3737; P-Value=0.0176\*),
- “Records traceability” (Z-Value=-2.0664; P-Value=0.0388\*) and
- “Purchasing” (Z-Value=-2.9013; P-Value=0.0037\*\*) in the case of history.

In the case of the historical interviews the type of suppliers did not differ statistically significantly with respect to the different processes. There were also no statistically significant differences between the products and type of suppliers for the current interviews.

As for the combination of history and current interviews, according to the Analysis of Variance and the Mann Whitney U-test, the following processes had statistically significant differences with respect to products (services and goods):

- Planning (F-Value=7.01; P-Value=0.0128)
- Process control (F-Value=6.82; P-Value=0.0140)
- Purchasing (F-Value=6.06; P-Value=0.0198)

The type of supplier also did not differ statistically significantly for the combination of history and current interviews. In all these processes there were statistically significant differences. For process planning the product “Goods” scored higher, thus is more at risk than the “Services” group. However, for process control and purchasing the product “Services” were statistically significantly at higher risk than “Goods”.

SAS computes a P-value (Probability value) that measures statistical significance that is derived from the test values like the chi-square, F-value and z-value. Results will be regarded as significant if the p-values are smaller than 0.05, because this value presents an acceptable level on a 95% confidence interval ( $p \leq 0.05$ ). The p-value is the probability of observing a sample value as extreme as, or more extreme than, the value actually observed, given that the null hypothesis is true. This area represents the probability of a Type 1 error that must be assumed if the null hypothesis is rejected (Cooper & Schindler, 2006:509).

The p-value is compared to the significance level ( $\alpha$ ) and on this basis the null hypothesis is either rejected or not rejected. If the p-value is less than the significance level, the null hypothesis is rejected (if  $p\text{-value} < \alpha$ , reject null). If the p-value is greater than or equal to the significance level, the null hypothesis is not rejected (if  $p\text{-value} \geq \alpha$ , don't reject null). Thus with  $\alpha=0.05$ , if the p-value is less than 0.05, the null hypothesis will be rejected. The p-value is determined by using the standard normal distribution. The small p-value represents the risk of rejecting the null hypothesis.

A difference has statistical significance if there is good reason to believe that the difference does not represent random sampling fluctuations only. Results will be regarded as significant if the p-values are smaller than 0.05, because this value is used as cut-off point in most behavioural science research.

The following graphs illustrate the statistically significantly differences between products with respect to the processes for the combination of the history and current interviews (Average).

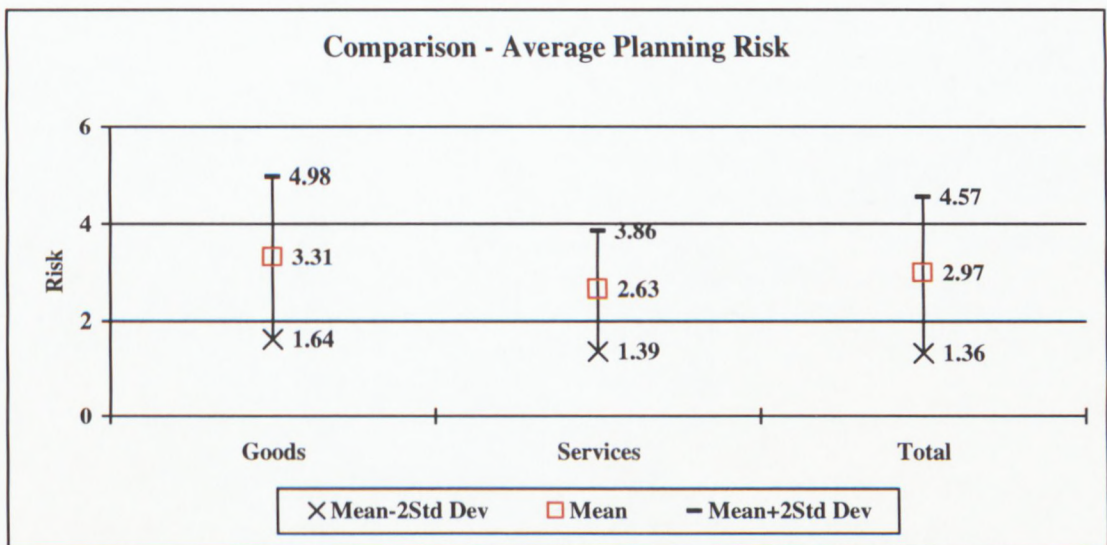


FIGURE 5. 8: Plot with planning risk comparison between products delivered

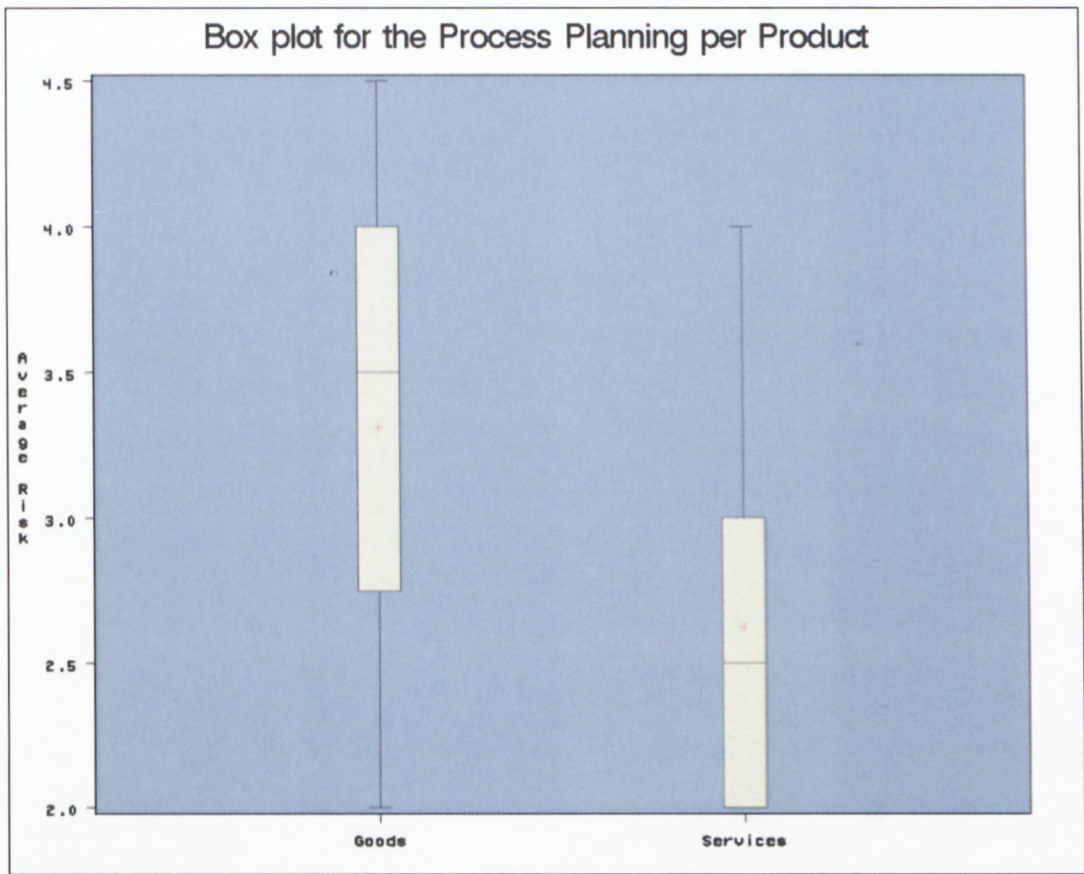


FIGURE 5. 9: Box plot with average risk of planning comparison

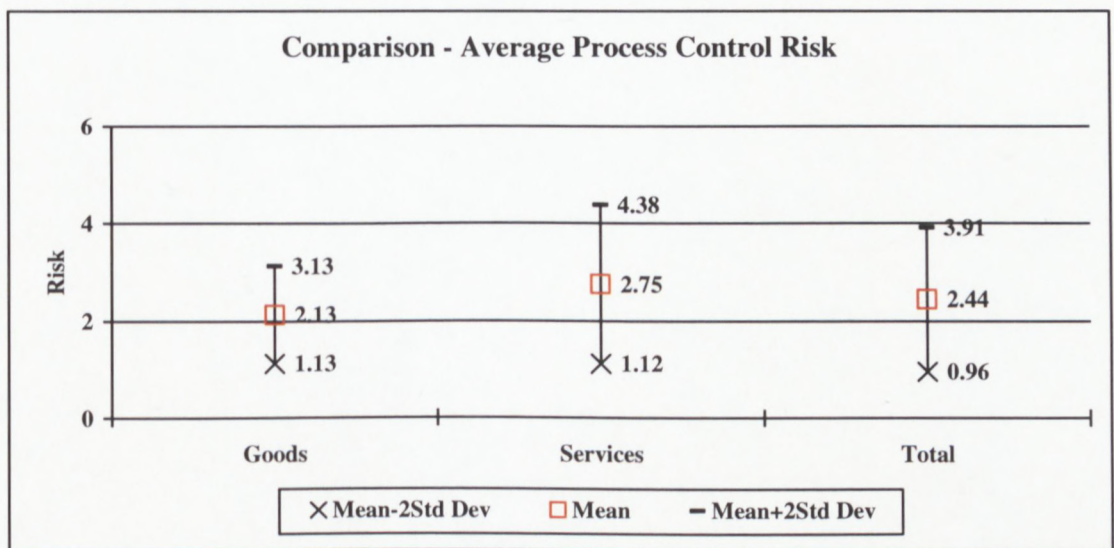


FIGURE 5. 10: Plot with contract review risk comparison between products delivered

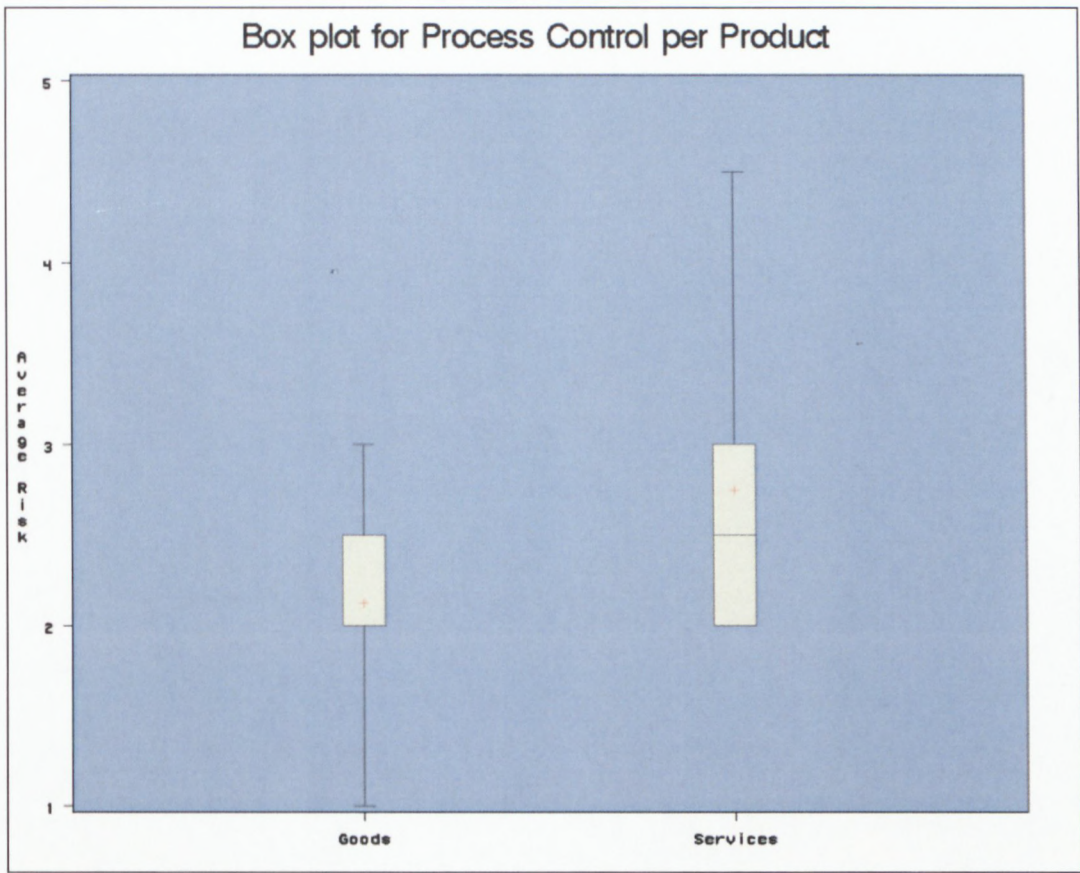


FIGURE 5. 11: Box plot with average risk of process control comparison

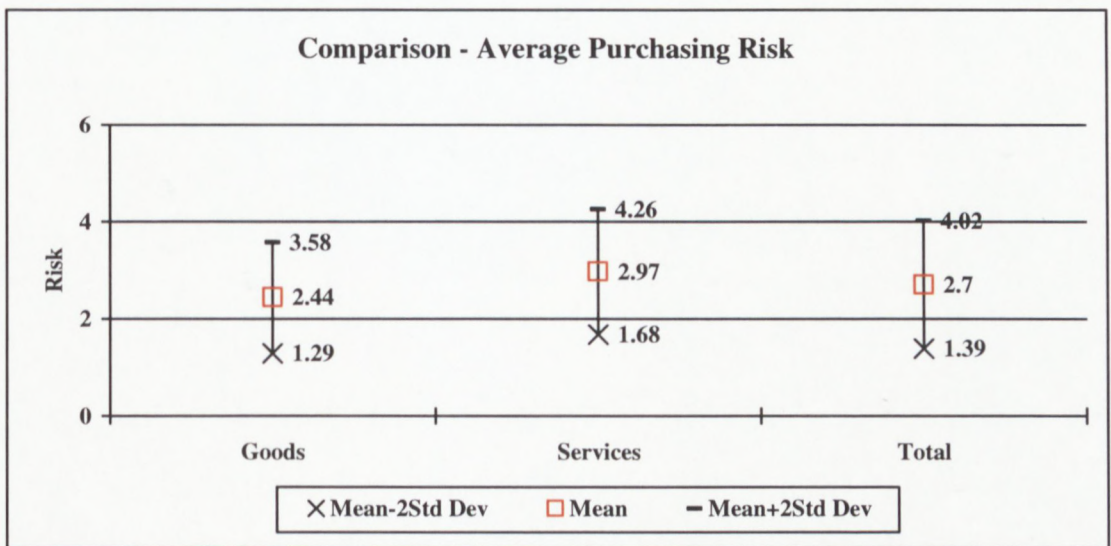
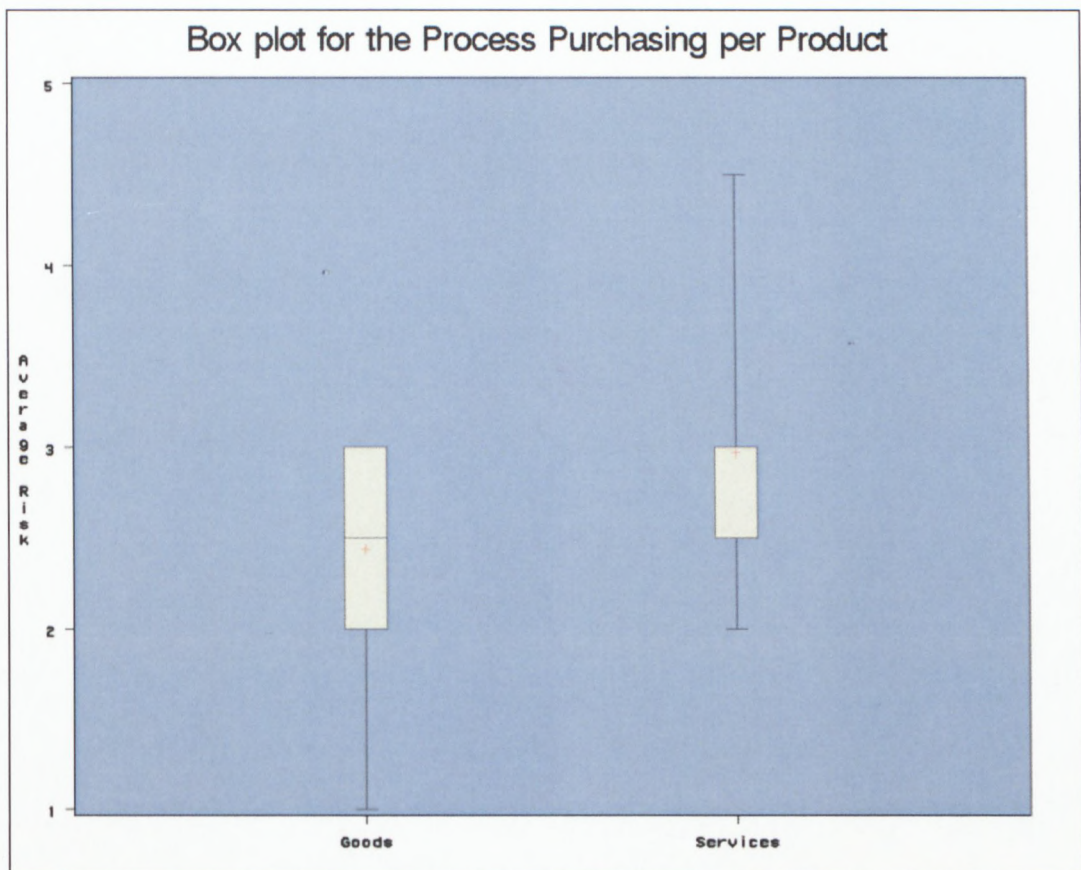


FIGURE 5. 12: Plot with purchasing risk comparison between products delivered



**FIGURE 5. 13:** Box plot with average risk of purchasing comparison

In the case of the questionnaire that indicates the opinion of suppliers with respect to Eskom Nuclear Generation; the average response for each category differed in the following cases between the categories:

- Attitude towards nuclear power generation is statistically significantly more positive than the communication with and access to the KNPS supply chain.
- Attitude towards nuclear power generation is statistically significantly more positive than the co-operation and partnering.
- Opinion regarding experience and skills in the KNPS supply chain is also statistically significantly more positive than the communication with and access to KNPS supply chain.

The next graph shows these differences with respect to the means of the different categories.

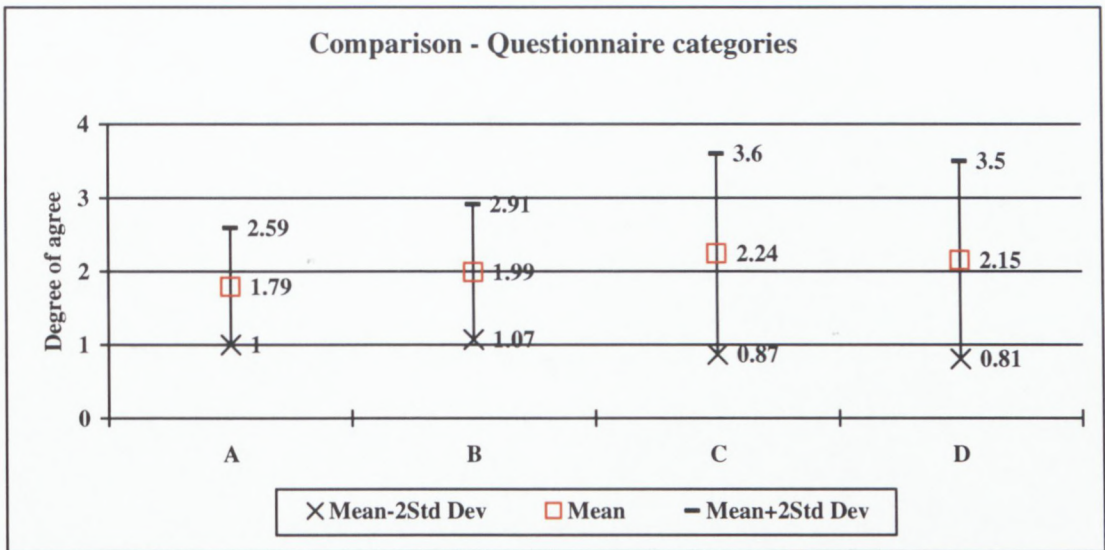


FIGURE 5. 14: Plot with comparison between questionnaire categories

#### 5.4 DISCUSSIONS AND CONCLUSIONS

An expanded rendition of the findings and conclusions gleaned from the research survey, is contained within the ambit of Addendum E. As for the results obtained through this survey the following summary of analogies can be drawn from the survey research:

- The process planning although not very high was at risk according to the information from history.
- Currently the process purchasing, is the process most at risk.
- The combination of the history and current risk analysis indicates that planning and then purchasing are most at risk.
- According to the results suppliers' communication with and access to KNPS supply chain is the most troubled area.

Note should be taken that currently the processes are more at risk than previously (history).

## **CHAPTER 6 : CONCLUSION**

### **6.1 INTRODUCTION**

The research thus far has investigated the risk that is posed to the Nuclear Generation supply chain by small suppliers that do not have a quality management system. In addition, the general attitude of small suppliers towards nuclear power generation and their perception of the skill levels within and ease of access to information in Koeberg Nuclear Power Station were investigated, and mapped to risk to the supply chain.

### **6.2 THE RESEARCH PROBLEM RE-VISITED**

The research problem that has been researched within the ambit of this dissertation reads as follows: *“Eskom Nuclear Generation has no strategy to reduce the risks that small suppliers introduced into their supply chain as a result of the inherent weaknesses commonly associated with small enterprises”*.

In this research the inherent weaknesses of small suppliers are identified both from the literature and from research. 32 of 62 local suppliers with a commercial history of more than four years were investigated and their performance measured. The research focussed on risk and quality in the supply chain of Eskom Nuclear Generation. In addition, seven of their critical processes were measured and the results mapped to the same risk. Finally, the target group was surveyed to determine their attitudes towards the Nuclear Generation supply chain.

From this a model will be formulated (Refer Paragraph 6.8) whereby the Nuclear Generation is able to formulate mitigating steps to be taken before engaging commercially with small suppliers. This model can also be applied to small suppliers already in the supply chain. This strategy will serve as a mechanism to lower the risk of utilising small suppliers.

### **6.3 THE RESEARCH QUESTION RE-VISITED**

The research question that has been researched within the ambit of this dissertation reads as follows: *“How can Eskom Nuclear Generation identify and mitigate supply chain risk by using small suppliers?”*

This research question was answered as a result of the research. Eskom Nuclear Generation will now have the capability to use the model (Refer Paragraph 6.8), which has been developed to identify the generic risks associated with small suppliers by order of priority. Thereafter the model will be able in terms of its application to provide directives to prescribe specific quality processes that will need to be developed in order to mitigate the customer risks within the internal supplier activities.

### **6.4 THE INVESTIGATIVE QUESTIONS RE-VISITED**

The investigative questions that have been researched in support of the research question reads as follows:

- *“Is there a generic supply fulfillment process, from customer request to delivery or service, within small organisations?”*

The research that has been conducted on four categories of suppliers, Agents and Stockists, Manufacturers, Repair Services and General and Special Skills confirms that the seven quality processes identified within this dissertation are consistently applied within each category. The descriptions of the seven quality processes are broad enough to be applicable to all organisations, irrespective of the type of product supplied. These quality processes are present in all organisations in one form or another and include:

- Contract Review,
- Planning,
- Process Control,
- Records and Traceability,
- Customer Focus and Non-conformance,
- Purchasing, and
- Preservation of customer property.

- *“What are the weaknesses in the supply processes of small organisations?”*  
Three processes have been identified that yielded results that are statistically significantly higher in risk that have been identified. These are Planning, Customer Focus and Purchasing.
- *“Are there factors at work in small businesses outside of the supply fulfillment process that pose risk to the supplied product?”*  
Some factors that do not form part of the supply process have been tested by way of an opinion survey. These factors are listed below.
  - Attitude towards nuclear power generation in general.
  - The suppliers’ impression of Nuclear Generations’ skill levels.
  - Ease of access to information within the customer organisation in order to fulfill the supply process.
  - Attitude towards partnering with the customer towards reaching ISO compliance and certification.

## **6.5 THE KEY RESEARCH OBJECTIVES RE-VISITED**

The key research objectives that were researched within the ambit of this dissertation are listed below.

- **To understand the risks inherent to small suppliers.** The history of small suppliers’ delivery of goods and services to Eskom Nuclear Generation was investigated. Failures were identified and mapped to risk. The risks were compared with literature and were found to be consistent. In addition, the critical processes of the small suppliers were measured and mapped to risk. These risks were also found to be consistent with the literature. Finally, small suppliers were surveyed with an opinion poll to understand possible risks associated with the attitudes of the suppliers towards the customer. An understanding of the risks was subsequently achieved through juxtaposed consideration of what the literature returned about small suppliers and the history of small suppliers with Eskom Nuclear Generation via existing records. In addition, the quality processes of small suppliers were measured

directly and a survey was performed to determine the attitude towards and opinion of suppliers of Eskom Nuclear Generation.

- **To understand how Nuclear Generation experience failures of small suppliers.** Records of the history of small suppliers and their transactions with Eskom Nuclear Generation were investigated, interrogating two databases. In addition, contract managers at Nuclear Generation were interviewed to gain understanding of how Nuclear Generation experienced failures. These failures were mapped to the seven generic quality processes identified under the first investigative question. This mapping facilitated a thorough understanding of how failures within the suppliers' own internal quality processes impacted on Eskom Nuclear Generation.
- **To understand how the failures of small suppliers can be classified to relate to the supply fulfillment process.** 32 suppliers were interviewed to determine whether a generic supply fulfillment process could be found. A generic model was formulated (See Paragraph 6.8) that was robust enough to be applicable to all suppliers. All the failures within two databases containing around 2000 records pertaining to the history of the 32 small suppliers were evaluated. In addition, interviews with contract managers also revealed failures by small suppliers. It was possible to classify all the failures into the seven processes. The relation between the supply fulfillment process and failures of small suppliers is therefore better understood.
- **To understand which elements of ISO are related to the failures.** The processes of the supply fulfillment processes were identified within ISO9001. Elements of the standard that are related to each of the seven generic processes are contained within the ambit of Addendum F for ease of reference.
- **To design a model that can be applied to reduce the risks that small suppliers have, by assisting small suppliers to incorporate specific elements of ISO into a practical quality management system.**  
A model was designed and constructed to address risks associated with the failures of quality processes in the purchase order or contract fulfillment

processes of suppliers. This model is suitable for all types of suppliers of goods and services. With this model, Eskom Nuclear Generation can identify which quality processes a small supplier would need to include into procedures as a minimum requirement. The model can be used as a basis for future development towards a full quality management system that would be conformant to ISO9001.

## **6.6 FINDINGS AND CONCLUSIONS FROM THE RESEARCH SURVEY**

An expanded rendition of the findings and conclusions gleaned from the research survey, is contained within the ambit of Addendum E.

## **6.7 RECOMMENDATIONS**

The following recommendations are made to mitigate the research problem.

- **The stabilisation of small suppliers through supply and service contracts.**  
The commercial competitive requirement would not be compromised if the tendering processes were open and fair. Yet the stability that a three-year contract would bring would in all probability mitigate the financial risk to a sustainable product. Partnerships with critical small suppliers through supply and service contracts will enable Nuclear Generation to assist small suppliers with the development of ISO9001-compliant quality management systems. Incentives built into the contracts to develop their systems can be funded and motivated by AsgiSA.
- **The incorporation of AsgiSA (Accelerated and Shared Growth Initiative – South Africa) principles into the supply and service contracts with small suppliers.** This Government initiative is aimed at developing the skill base in South Africa. Financial advantages offered to small suppliers within the initiative would enable small organisations to train staff, develop infrastructure and benefit from prolonged interaction with skills within Nuclear Generation.

- **Concession to small suppliers who are not ISO9001-compliant to utilise the risk model will enable them to compete for supply or service contracts despite their inability to meet the requirement for ISO9001.** This concession will enable small suppliers to access the Nuclear Generation supply chain for all quality level products and services, except where there is a requirement for compliance with a nuclear standard.
- **Establishment of controlled direct communication lines between technical staff at Nuclear Generation and identified skilled staff of small suppliers.** This step will promote skills transfer, improve product development and facilitate the resolution of non-compliance problems. Direct communication with suppliers should be restricted to qualified personnel who have undergone ethics and communications skills training. A code of conduct should be created and signed by approved staff.
- **Development of a clear policy by Eskom Nuclear Generation of positive involvement in the local economy around nuclear facilities.** This policy should be public knowledge and communicated to all local stakeholders. Regular supplier forums for local industry should be created and supported, with access for all suppliers to senior management.

## **6.8 RISK MITIGATION MODEL**

The model below takes into consideration the information gleaned from the literature review and research performed within the ambit of this dissertation. It provides Eskom Nuclear Generation with a step-by-step approach to develop the quality management systems of small enterprises, by addressing risks by order of priority. Once a small business has been identified as a valuable potential partner for addition onto the Approved Suppliers List, the steps in Phase 1 are implemented to build a simple quality management system. In Phase 2 an evaluation is performed by Nuclear Generation to verify that the required minimum processes are in place. The small enterprise is approved if the results of the evaluation is found to be satisfactory.

In Phase 3 formal communication lines are established to enable stakeholders efficient transfer of and access to information. At this phase commercial

transactions can commence. These transaction may be limited to purchase orders. However, should the small organisation be identified as a potentially viable partner, Eskom Nuclear Generation may pursue a contractual arrangement that could include the quality development of the supplier as tabulated in Table 6.1.

From Phase 4 onward Eskom Nuclear Generation will assist the small enterprise through coaching and providing the necessary resources as per contractual agreement to attain ISO9001 status.

**TABLE 6.1** Quality management development model

	<b>QMS DEVELOPMENT PHASES AND STEPS</b>	<b>Comments/ISO elements to be addressed</b>
<b>PHASE 1</b>	<b>High risk processes mapping: create procedures</b>	Gatekeeper process procedures to be created and implemented as prerequisite for work requiring ISO-compliance
<b>Step 1</b>	Purchasing	7.4.1
<b>Step 2</b>	Planning	6.2.1; 6.3; 6.4; 7.1
<b>Step 3</b>	Customer Focus & NCR	5.2; 7.2.3; 7.5.4; 8.2.1; 8.3; 8.5.2
<b>PHASE 2</b>	<b>2<sup>nd</sup> Party Assessment</b>	For inclusion onto Approved Supplier List
<b>PHASE 3</b>	<b>Establishment of communication lines between the two organisations</b>	These should as a minimum include individual contact details for the following disciplines: Commercial; Technical; Quality; Financial.
<b>PHASE 4</b>	<b>Appointment of Management Representative</b>	5.5.2 First step to initiating the Development Programme
<b>PHASE 5</b>	<b>Compile Company Vision</b>	Top-down inclusive process
<b>PHASE 6</b>	<b>Compile Quality Policy</b>	5.1b; 5.3
<b>PHASE 7</b>	<b>Compile Quality Objectives</b>	5.1c; 5.4.1
<b>PHASE 8</b>	<b>Quality Performance Indicators</b>	5.4.1; 8.1
<b>Step 1</b>	<b>Lower risk processes mapping: create procedures</b>	Process procedures to be created and implemented as part of ongoing development
<b>Step 2</b>	Process Control	7.5.1; 8.2.4
<b>Step 3</b>	Records & traceability	4.2.4; 6.2.2e; 7.2.2; 7.4.1; 7.5.3; 7.5.4; 8.3
<b>Step 4</b>	Contract Review	5.2; 7.2.1; 7.2.2; 7.2.3b
<b>PHASE 9</b>	Preservation	7.5.4; 7.5.5
<b>PHASE 10</b>	<b>Other processes: mapping</b>	Balance of processes as required.
<b>PHASE 11</b>	<b>ISO mandatory &amp; other procedures</b>	Balance of elements as required.
<b>PHASE 12</b>	<b>Compile Quality Manual</b>	4.2.2
<b>PHASE 13</b>	<b>Quality Tools and Training: Process measuring</b>	Internal auditing, quality principles, ISO
<b>PHASE 14</b>	<b>External 2<sup>nd</sup> or 3<sup>rd</sup> Party Audit for Compliance</b>	Preparation for certification audit.
<b>PHASE 15</b>	<b>Certification (Optional)</b>	

The model above can be used as a roadmap for the supplier towards ISO compliance or certification. Ideally the supplier should form a partnership with Nuclear Generation through a sole supply agreement, or a supply or service

contract. For the above targets to be reached a three-year contract would be advisable, with milestones built into the contract details. In addition, the extent and format of the guidance and resources to be supplied by Nuclear Generation would be negotiated and detailed in the contract.

It would also be beneficial for a supplier selection program to be compiled whereby critical small suppliers can be identified and engaged for development purposes. Criteria for supplier selection and the format for a business case for each new candidate should be detailed into a procedure and approved by Nuclear Generation. AsgiSA principles should be taken into account, as well as the needs of local industry.

## **6.9 FINAL CONCLUSION**

The research returned that the risks which are universally associated with small suppliers as well as particular to Nuclear Generation can be effectively mitigated. The quality management development model formulated within the ambit of this dissertation can be applied in phases and as resources allow. However, this quality management development model should not be applied in isolation. There are other factors exerting influence on the performance of the supply chain that should be addressed, as identified under the recommendations made in Paragraph 6.7.

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# ADDENDUM A

## Descriptive statistics for each variable

### History

	Q1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low		18	56.25	18	56.25
Low		4	12.50	22	68.75
Medium		5	15.63	27	84.38
Very high		5	15.63	32	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 16.7500  
 DF 3  
 Pr > ChiSq 0.0008  
 Sample Size = 32

	Q2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low		9	28.13	9	28.13
Low		8	25.00	17	53.13
Medium		5	15.63	22	68.75
High		4	12.50	26	81.25
Very high		6	18.75	32	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 2.6875  
 DF 4  
 Pr > ChiSq 0.6114  
 Sample Size = 32

	Q3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low		22	68.75	22	68.75
Low		6	18.75	28	87.50
Medium		2	6.25	30	93.75
Very high		2	6.25	32	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 34.0000  
 DF 3  
 Pr > ChiSq <.0001  
 Sample Size = 32

	Q4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low		28	87.50	28	87.50
Low		2	6.25	30	93.75
Medium		1	3.13	31	96.88
High		1	3.13	32	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 66.7500  
 DF 3  
 Pr > ChiSq <.0001  
 Sample Size = 32

	Q5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low		20	62.50	20	62.50
Low		7	21.88	27	84.38
Medium		5	15.63	32	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 12.4375  
 DF 2  
 Pr > ChiSq 0.0020  
 Sample Size = 32

	Q6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low		25	78.13	25	78.13
Low		5	15.63	30	93.75
Medium		1	3.13	31	96.88
High		1	3.13	32	100.00

Chi-Square Test  
for Equal Proportions

```

#####
Chi-Square  49.5000
DF          3
Pr > ChiSq  <.0001
Sample Size = 32

```

Q7	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low	31	96.88	31	96.88
Low	1	3.13	32	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square  28.1250
DF          1
Pr > ChiSq  <.0001
Sample Size = 32

```

Interviews

Q1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Low	2	6.25	2	6.25
Medium	21	65.63	23	71.88
High	9	28.13	32	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square  17.3125
DF          2
Pr > ChiSq  0.0002
Sample Size = 32

```

Q2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Low	1	3.13	1	3.13
Medium	22	68.75	23	71.88
High	9	28.13	32	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square  21.0625
DF          2
Pr > ChiSq  <.0001
Sample Size = 32

```

Q3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low	1	3.13	1	3.13
Low	2	6.25	3	9.38
Medium	16	50.00	19	59.38
High	12	37.50	31	96.88
Very high	1	3.13	32	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square  31.4375
DF          4
Pr > ChiSq  <.0001
Sample Size = 32

```

Q4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low	1	3.13	1	3.13
Low	6	18.75	7	21.88
Medium	14	43.75	21	65.63
High	10	31.25	31	96.88
Very high	1	3.13	32	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square  20.1875
DF          4
Pr > ChiSq  0.0005
Sample Size = 32

```

Q5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Low	3	9.38	3	9.38
Medium	10	31.25	13	40.63
High	14	43.75	27	84.38
Very high	5	15.63	32	100.00

```

Chi-Square Test
for Equal Proportions

```

```

#####
Chi-Square 9.2500
DF 3
Pr > ChiSq 0.0261
Sample Size = 32

```

Q6	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very low	1	3.13	1	3.13
Low	1	3.13	2	6.25
Medium	6	18.75	8	25.00
High	10	31.25	18	56.25
Very high	14	43.75	32	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square 20.1875
DF 4
Pr > ChiSq 0.0005
Sample Size = 32

```

Q7	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Low	4	12.50	4	12.50
Medium	22	68.75	26	81.25
High	5	15.63	31	96.88
Very high	1	3.13	32	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square 33.7500
DF 3
Pr > ChiSq <.0001
Sample Size = 32

```

Questionnaire to suppliers

A1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	13	61.90	13	61.90
Agree	8	38.10	21	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square 1.1905
DF 1
Pr > ChiSq 0.2752
Sample Size = 21

```

A2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	10	47.62	10	47.62
Agree	10	47.62	20	95.24
Undecided	1	4.76	21	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square 7.7143
DF 2
Pr > ChiSq 0.0211
Sample Size = 21

```

A3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	12	57.14	12	57.14
Agree	7	33.33	19	90.48
Undecided	1	4.76	20	95.24
Disagree	1	4.76	21	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square 16.1429
DF 3
Pr > ChiSq 0.0011
Sample Size = 21

```

A4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	4	19.05	4	19.05
Agree	12	57.14	16	76.19
Undecided	5	23.81	21	100.00

```

Chi-Square Test
for Equal Proportions
#####
Chi-Square 5.4286
DF 2
Pr > ChiSq 0.0663
Sample Size = 21

```

A5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	3	14.29	3	14.29
Agree	9	42.86	12	57.14
Undecided	8	38.10	20	95.24
Strongly disagree	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 8.5238  
 DF 3  
 Pr > ChiSq 0.0363  
 Sample Size = 21

B1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	5	23.81	5	23.81
Agree	15	71.43	20	95.24
Undecided	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 14.8571  
 DF 2  
 Pr > ChiSq 0.0006  
 Sample Size = 21

B2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	3	14.29	3	14.29
Agree	13	61.90	16	76.19
Undecided	5	23.81	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 8.0000  
 DF 2  
 Pr > ChiSq 0.0183  
 Sample Size = 21

B3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	5	23.81	5	23.81
Agree	13	61.90	18	85.71
Undecided	1	4.76	19	90.48
Disagree	1	4.76	20	95.24
Strongly disagree	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 25.9048  
 DF 4  
 Pr > ChiSq <.0001  
 WARNING: The table cells have expected counts less  
than 5. Chi-Square may not be a valid test.  
 Sample Size = 21

B4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	11	52.38	11	52.38
Agree	10	47.62	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 0.0476  
 DF 1  
 Pr > ChiSq 0.8273  
 Sample Size = 21

B5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	1	4.76	1	4.76
Agree	13	61.90	14	66.67
Undecided	3	14.29	17	80.95
Disagree	3	14.29	20	95.24
Strongly disagree	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 24.0000  
 DF 4  
 Pr > ChiSq <.0001  
 WARNING: The table cells have expected counts less  
than 5. Chi-Square may not be a valid test.  
 Sample Size = 21

C1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	4	19.05	4	19.05
Agree	12	57.14	16	76.19
Undecided	1	4.76	17	80.95
Disagree	4	19.05	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 12.7143  
 DF 3  
 Pr > ChiSq 0.0053  
 Sample Size = 21

C2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	3	14.29	3	14.29
Agree	9	42.86	12	57.14
Undecided	4	19.05	16	76.19
Disagree	5	23.81	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 3.9524  
 DF 3  
 Pr > ChiSq 0.2667  
 Sample Size = 21

C3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	3	14.29	3	14.29
Agree	15	71.43	18	85.71
Undecided	2	9.52	20	95.24
Disagree	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 24.5238  
 DF 3  
 Pr > ChiSq <.0001  
 Sample Size = 21

C4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	6	28.57	6	28.57
Agree	14	66.67	20	95.24
Undecided	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 12.2857  
 DF 2  
 Pr > ChiSq 0.0021  
 Sample Size = 21

C5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	2	9.52	2	9.52
Agree	10	47.62	12	57.14
Undecided	4	19.05	16	76.19
Disagree	4	19.05	20	95.24
Strongly disagree	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 11.6190  
 DF 4  
 Pr > ChiSq 0.0204

WARNING: The table cells have expected counts less than 5. Chi-Square may not be a valid test.  
Sample Size = 21

D1	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	1	4.76	1	4.76
Agree	12	57.14	13	61.90
Undecided	5	23.81	18	85.71
Disagree	3	14.29	21	100.00

Chi-Square Test  
for Equal Proportions  
 Chi-Square 13.0952  
 DF 3  
 Pr > ChiSq 0.0044  
 Sample Size = 21

D2	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	7	33.33	7	33.33
Agree	14	66.67	21	100.00

Chi-Square Test  
for Equal Proportions  
Chi-Square 2.3333  
DF 1  
Pr > ChiSq 0.1266  
Sample Size = 21

D3	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	7	33.33	7	33.33
Agree	8	38.10	15	71.43
Undecided	6	28.57	21	100.00

Chi-Square Test  
for Equal Proportions  
Chi-Square 0.2857  
DF 2  
Pr > ChiSq 0.8669  
Sample Size = 21

D4	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	6	28.57	6	28.57
Agree	6	28.57	12	57.14
Undecided	7	33.33	19	90.48
Disagree	2	9.52	21	100.00

Chi-Square Test  
for Equal Proportions  
Chi-Square 2.8095  
DF 3  
Pr > ChiSq 0.4219  
Sample Size = 21

D5	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	5	23.81	5	23.81
Agree	7	33.33	12	57.14
Undecided	5	23.81	17	80.95
Disagree	3	14.29	20	95.24
Strongly disagree	1	4.76	21	100.00

Chi-Square Test  
for Equal Proportions  
Chi-Square 4.9524  
DF 4  
Pr > ChiSq 0.2922

WARNING: The table cells have expected counts less than 5. Chi-Square may not be a valid test.  
Sample Size = 21

## ADDENDUM B

### History

Variable: Q1			
N	32	Sum Weights	32
Mean	2.0625	Sum Observations	66
Std Deviation	1.47970136	Variance	2.18951613
Skewness	1.16045515	Kurtosis	-0.0542254
Uncorrected SS	204	Corrected SS	67.875
Coeff Variation	71.7430965	Std Error Mean	0.26157672

Basic Statistical Measures			
Location		Variability	
Mean	2.062500	Std Deviation	1.47970
Median	1.000000	Variance	2.18952
Mode	1.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q2			
N	32	Sum Weights	32
Mean	2.6875	Sum Observations	86
Std Deviation	1.4905617	Variance	2.22177419
Skewness	0.39011347	Kurtosis	-1.2651778
Uncorrected SS	300	Corrected SS	68.875
Coeff Variation	55.4627611	Std Error Mean	0.26349657

Basic Statistical Measures			
Location		Variability	
Mean	2.687500	Std Deviation	1.49056
Median	2.000000	Variance	2.22177
Mode	1.000000	Range	4.00000
		Interquartile Range	3.00000

Variable: Q3			
N	32	Sum Weights	32
Mean	1.5625	Sum Observations	50
Std Deviation	1.0757593	Variance	1.15725806
Skewness	2.3151948	Kurtosis	5.17108906
Uncorrected SS	114	Corrected SS	35.875
Coeff Variation	68.848595	Std Error Mean	0.19016917

Basic Statistical Measures			
Location		Variability	
Mean	1.562500	Std Deviation	1.07576
Median	1.000000	Variance	1.15726
Mode	1.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q4			
N	32	Sum Weights	32
Mean	1.21875	Sum Observations	39
Std Deviation	0.65914779	Variance	0.43447581
Skewness	3.34327496	Kurtosis	11.3532918
Uncorrected SS	61	Corrected SS	13.46875
Coeff Variation	54.0839211	Std Error Mean	0.11652197

Basic Statistical Measures			
Location		Variability	
Mean	1.218750	Std Deviation	0.65915
Median	1.000000	Variance	0.43448
Mode	1.000000	Range	3.00000
		Interquartile Range	0

Variable: Q5			
N	32	Sum Weights	32
Mean	1.53125	Sum Observations	49
Std Deviation	0.76133902	Variance	0.5796371
Skewness	1.05763316	Kurtosis	-0.3771165
Uncorrected SS	93	Corrected SS	17.96875
Coeff Variation	49.720099	Std Error Mean	0.134587

Basic Statistical Measures			
Location		Variability	
Mean	1.531250	Std Deviation	0.76134
Median	1.000000	Variance	0.57964
Mode	1.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q6			
Moments			
N	32	Sum Weights	32
Mean	1.3125	Sum Observations	42
Std Deviation	0.69270391	Variance	0.47983871
Skewness	2.59608658	Kurtosis	7.1669824
Uncorrected SS	70	Corrected SS	14.875
Coeff Variation	52.7774409	Std Error Mean	0.12245391

Basic Statistical Measures

Location		Variability	
Mean	1.312500	Std Deviation	0.69270
Median	1.000000	Variance	0.47984
Mode	1.000000	Range	3.00000
		Interquartile Range	0

Variable: Q7			
N	32	Sum Weights	32
Mean	1.03125	Sum Observations	33
Std Deviation	0.1767767	Variance	0.03125
Skewness	5.65685425	Kurtosis	32
Uncorrected SS	35	Corrected SS	0.96875
Coeff Variation	17.1419826	Std Error Mean	0.03125

Basic Statistical Measures			
Location		Variability	
Mean	1.031250	Std Deviation	0.17678
Median	1.000000	Variance	0.03125
Mode	1.000000	Range	1.00000
		Interquartile Range	0

----- Product=Goods -----

Variable: Q1			
N	16	Sum Weights	16
Mean	2.3125	Sum Observations	37
Std Deviation	1.57982066	Variance	2.49583333
Skewness	0.80024902	Kurtosis	-0.8114572
Uncorrected SS	123	Corrected SS	37.4375
Coeff Variation	68.3165693	Std Error Mean	0.39495517

Basic Statistical Measures			
Location		Variability	
Mean	2.312500	Std Deviation	1.57982
Median	1.500000	Variance	2.49583
Mode	1.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q2			
N	16	Sum Weights	16
Mean	3.4375	Sum Observations	55
Std Deviation	1.54784797	Variance	2.39583333
Skewness	-0.4829787	Kurtosis	-1.1696928
Uncorrected SS	225	Corrected SS	35.9375
Coeff Variation	45.0283045	Std Error Mean	0.38696199

Basic Statistical Measures			
Location		Variability	
Mean	3.437500	Std Deviation	1.54785
Median	3.500000	Variance	2.39583
Mode	5.000000	Range	4.00000
		Interquartile Range	2.50000

Variable: Q3			
N	16	Sum Weights	16
Mean	1.125	Sum Observations	18
Std Deviation	0.34156503	Variance	0.11666667
Skewness	2.50945733	Kurtosis	4.89795918
Uncorrected SS	22	Corrected SS	1.75
Coeff Variation	30.3613356	Std Error Mean	0.08539126

Basic Statistical Measures			
Location		Variability	
Mean	1.125000	Std Deviation	0.34157
Median	1.000000	Variance	0.11667
Mode	1.000000	Range	1.00000
		Interquartile Range	0

Variable: Q4			
N	16	Sum Weights	16
Mean	1	Sum Observations	16
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	16	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures			
Location		Variability	
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

Variable: Q5			
N	16	Sum Weights	16
Mean	1.5	Sum Observations	24
Std Deviation	0.81649658	Variance	0.66666667
Skewness	1.25973758	Kurtosis	-0.121978
Uncorrected SS	46	Corrected SS	10
Coeff Variation	54.4331054	Std Error Mean	0.20412415

Basic Statistical Measures			
Location		Variability	

Mean	1.500000	Std Deviation	0.81650
Median	1.000000	Variance	0.66667
Mode	1.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q6

N	16	Sum Weights	16
Mean	1	Sum Observations	16
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	16	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

Location		Variability	
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

Variable: Q7

N	16	Sum Weights	16
Mean	1	Sum Observations	16
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	16	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

Location		Variability	
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

----- Product=Services -----

Variable: Q1

N	16	Sum Weights	16
Mean	1.8125	Sum Observations	29
Std Deviation	1.37689264	Variance	1.89583333
Skewness	1.78341646	Kurtosis	2.1904155
Uncorrected SS	81	Corrected SS	28.4375
Coeff Variation	75.9664903	Std Error Mean	0.34422316

Basic Statistical Measures

Location		Variability	
Mean	1.812500	Std Deviation	1.37689
Median	1.000000	Variance	1.89583
Mode	1.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q2

N	16	Sum Weights	16
Mean	1.9375	Sum Observations	31
Std Deviation	0.99791449	Variance	0.99583333
Skewness	1.05839378	Kurtosis	0.52104545
Uncorrected SS	75	Corrected SS	14.9375
Coeff Variation	51.5052641	Std Error Mean	0.24947862

Basic Statistical Measures

Location		Variability	
Mean	1.937500	Std Deviation	0.99791
Median	2.000000	Variance	0.99583
Mode	2.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q3

N	16	Sum Weights	16
Mean	2	Sum Observations	32
Std Deviation	1.3662601	Variance	1.86666667
Skewness	1.43397562	Kurtosis	1.20935187
Uncorrected SS	92	Corrected SS	28
Coeff Variation	68.3130051	Std Error Mean	0.34156503

Basic Statistical Measures

Location		Variability	
Mean	2.000000	Std Deviation	1.36626
Median	1.500000	Variance	1.86667
Mode	1.000000	Range	4.00000
		Interquartile Range	1.50000

Variable: Q4

N	16	Sum Weights	16
Mean	1.4375	Sum Observations	23
Std Deviation	0.89209491	Variance	0.79583333
Skewness	2.14549653	Kurtosis	4.11245233
Uncorrected SS	45	Corrected SS	11.9375
Coeff Variation	62.0587765	Std Error Mean	0.22302373

Basic Statistical Measures

Location		Variability	
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Mean	1.437500	Std Deviation	0.89209
Median	1.000000	Variance	0.79583
Mode	1.000000	Range	3.00000
		Interquartile Range	0.50000

Variable: Q5

N	16	Sum Weights	16
Mean	1.5625	Sum Observations	25
Std Deviation	0.72743843	Variance	0.52916667
Skewness	0.94171457	Kurtosis	-0.2843557
Uncorrected SS	47	Corrected SS	7.9375
Coeff Variation	46.5560594	Std Error Mean	0.18185961

Basic Statistical Measures

	Location		Variability
Mean	1.562500	Std Deviation	0.72744
Median	1.000000	Variance	0.52917
Mode	1.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q6

N	16	Sum Weights	16
Mean	1.625	Sum Observations	26
Std Deviation	0.8850612	Variance	0.7833333
Skewness	1.54540855	Kurtosis	2.27679971
Uncorrected SS	54	Corrected SS	11.75
Coeff Variation	54.4653048	Std Error Mean	0.2212653

Basic Statistical Measures

	Location		Variability
Mean	1.625000	Std Deviation	0.88506
Median	1.000000	Variance	0.78333
Mode	1.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q7

N	16	Sum Weights	16
Mean	1.0625	Sum Observations	17
Std Deviation	0.25	Variance	0.0625
Skewness	4	Kurtosis	16
Uncorrected SS	19	Corrected SS	0.9375
Coeff Variation	23.5294118	Std Error Mean	0.0625

Basic Statistical Measures

	Location		Variability
Mean	1.062500	Std Deviation	0.25000
Median	1.000000	Variance	0.06250
Mode	1.000000	Range	1.00000
		Interquartile Range	0

----- Type=Agents & Stockists -----

Variable: Q1

N	8	Sum Weights	8
Mean	1.75	Sum Observations	14
Std Deviation	1.48804762	Variance	2.21428571
Skewness	1.95103018	Kurtosis	3.2049948
Uncorrected SS	40	Corrected SS	15.5
Coeff Variation	85.0312925	Std Error Mean	0.52610428

Basic Statistical Measures

	Location		Variability
Mean	1.750000	Std Deviation	1.48805
Median	1.000000	Variance	2.21429
Mode	1.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q2

N	8	Sum Weights	8
Mean	3.125	Sum Observations	25
Std Deviation	1.64208056	Variance	2.69642857
Skewness	-0.2621452	Kurtosis	-1.6804175
Uncorrected SS	97	Corrected SS	18.875
Coeff Variation	52.546578	Std Error Mean	0.58056315

Basic Statistical Measures

	Location		Variability
Mean	3.125000	Std Deviation	1.64208
Median	3.500000	Variance	2.69643
Mode	1.000000	Range	4.00000
		Interquartile Range	3.00000

NOTE: The mode displayed is the smallest of 3 modes with a count of 2.

Variable: Q3

N	8	Sum Weights	8
Mean	1.125	Sum Observations	9
Std Deviation	0.35355339	Variance	0.125
Skewness	2.82842712	Kurtosis	8
Uncorrected SS	11	Corrected SS	0.875
Coeff Variation	31.4269681	Std Error Mean	0.125

Basic Statistical Measures

	Location		Variability
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Mean	1.125000	Std Deviation	0.35355
Median	1.000000	Variance	0.12500
Mode	1.000000	Range	1.00000
		Interquartile Range	0

Variable: Q4

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

	Location		Variability
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

Variable: Q5

N	8	Sum Weights	8
Mean	1.5	Sum Observations	12
Std Deviation	0.75592895	Variance	0.57142857
Skewness	1.32287566	Kurtosis	0.875
Uncorrected SS	22	Corrected SS	4
Coeff Variation	50.3952631	Std Error Mean	0.26726124

Basic Statistical Measures

	Location		Variability
Mean	1.500000	Std Deviation	0.75593
Median	1.000000	Variance	0.57143
Mode	1.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q6

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

	Location		Variability
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

Variable: Q7

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

	Location		Variability
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

----- Type=Manufacturers -----

Variable: Q1

N	8	Sum Weights	8
Mean	2.875	Sum Observations	23
Std Deviation	1.55264751	Variance	2.41071429
Skewness	0.27193695	Kurtosis	-1.0010864
Uncorrected SS	83	Corrected SS	16.875
Coeff Variation	54.0051307	Std Error Mean	0.54894379

Basic Statistical Measures

	Location		Variability
Mean	2.875000	Std Deviation	1.55265
Median	3.000000	Variance	2.41071
Mode	3.000000	Range	4.00000
		Interquartile Range	2.50000

Variable: Q2

N	8	Sum Weights	8
Mean	3.75	Sum Observations	30
Std Deviation	1.48804762	Variance	2.21428571
Skewness	-0.8237683	Kurtosis	-0.1515088
Uncorrected SS	128	Corrected SS	15.5
Coeff Variation	39.6812698	Std Error Mean	0.52610428

Basic Statistical Measures

	Location		Variability
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Mean	3.750000	Std Deviation	1.48805
Median	4.000000	Variance	2.21429
Mode	5.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q3

N	8	Sum Weights	8
Mean	1.125	Sum Observations	9
Std Deviation	0.35355339	Variance	0.125
Skewness	2.82842712	Kurtosis	8
Uncorrected SS	11	Corrected SS	0.875
Coeff Variation	31.4269681	Std Error Mean	0.125

Basic Statistical Measures

	Location		Variability
Mean	1.125000	Std Deviation	0.35355
Median	1.000000	Variance	0.12500
Mode	1.000000	Range	1.00000
		Interquartile Range	0

Variable: Q4

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

	Location		Variability
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

Variable: Q5

N	8	Sum Weights	8
Mean	1.5	Sum Observations	12
Std Deviation	0.9258201	Variance	0.85714286
Skewness	1.4401646	Kurtosis	6.9519E-16
Uncorrected SS	24	Corrected SS	6
Coeff Variation	61.72134	Std Error Mean	0.32732684

Basic Statistical Measures

	Location		Variability
Mean	1.500000	Std Deviation	0.92582
Median	1.000000	Variance	0.85714
Mode	1.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q6

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

	Location		Variability
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

Variable: Q7

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

	Location		Variability
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

----- Type=Repair services -----

Variable: Q1

N	8	Sum Weights	8
Mean	2.25	Sum Observations	18
Std Deviation	1.83225076	Variance	3.35714286
Skewness	0.99865546	Kurtosis	-1.0393843
Uncorrected SS	64	Corrected SS	23.5
Coeff Variation	81.4333672	Std Error Mean	0.64779847

Basic Statistical Measures

	Location		Variability
Mean	2.250000	Std Deviation	1.83225

Median	1.000000	Variance	3.35714
Mode	1.000000	Range	4.00000
		Interquartile Range	3.00000

Variable: Q2

N	8	Sum Weights	8
Mean	2	Sum Observations	16
Std Deviation	1.30930734	Variance	1.71428571
Skewness	1.01835015	Kurtosis	-0.973
Uncorrected SS	44	Corrected SS	12
Coeff Variation	65.4653671	Std Error Mean	0.46291005

Basic Statistical Measures

Location		Variability	
Mean	2.000000	Std Deviation	1.30931
Median	1.500000	Variance	1.71429
Mode	1.000000	Range	3.00000
		Interquartile Range	2.00000

Variable: Q3

N	8	Sum Weights	8
Mean	2.5	Sum Observations	20
Std Deviation	1.69030851	Variance	2.85714286
Skewness	0.82825117	Kurtosis	-0.973
Uncorrected SS	70	Corrected SS	20
Coeff Variation	67.6123404	Std Error Mean	0.5976143

Basic Statistical Measures

Location		Variability	
Mean	2.500000	Std Deviation	1.69031
Median	2.000000	Variance	2.85714
Mode	1.000000	Range	4.00000
		Interquartile Range	3.00000

Variable: Q4

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

Location		Variability	
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

Variable: Q5

N	8	Sum Weights	8
Mean	1.375	Sum Observations	11
Std Deviation	0.74402381	Variance	0.55357143
Skewness	1.95103018	Kurtosis	3.2049948
Uncorrected SS	19	Corrected SS	3.875
Coeff Variation	54.1108225	Std Error Mean	0.26305214

Basic Statistical Measures

Location		Variability	
Mean	1.375000	Std Deviation	0.74402
Median	1.000000	Variance	0.55357
Mode	1.000000	Range	2.00000
		Interquartile Range	0.50000

Variable: Q6

N	8	Sum Weights	8
Mean	1.125	Sum Observations	9
Std Deviation	0.35355339	Variance	0.125
Skewness	2.82842712	Kurtosis	8
Uncorrected SS	11	Corrected SS	0.875
Coeff Variation	31.4269681	Std Error Mean	0.125

Basic Statistical Measures

Location		Variability	
Mean	1.125000	Std Deviation	0.35355
Median	1.000000	Variance	0.12500
Mode	1.000000	Range	1.00000
		Interquartile Range	0

Variable: Q7

N	8	Sum Weights	8
Mean	1	Sum Observations	8
Std Deviation	0	Variance	0
Skewness	.	Kurtosis	.
Uncorrected SS	8	Corrected SS	0
Coeff Variation	0	Std Error Mean	0

Basic Statistical Measures

Location		Variability	
Mean	1.000000	Std Deviation	0
Median	1.000000	Variance	0
Mode	1.000000	Range	0
		Interquartile Range	0

----- Type=Skills & Labour -----

Variable: Q1  
 N 8 Sum Weights 8  
 Mean 1.375 Sum Observations 11  
 Std Deviation 0.51754917 Variance 0.26785714  
 Skewness 0.64406119 Kurtosis -2.24  
 Uncorrected SS 17 Corrected SS 1.875  
 Coeff Variation 37.6399396 Std Error Mean 0.18298126

Basic Statistical Measures  
 Location Variability  
 Mean 1.375000 Std Deviation 0.51755  
 Median 1.000000 Variance 0.26786  
 Mode 1.000000 Range 1.00000  
 Interquartile Range 1.00000

Variable: Q2  
 N 8 Sum Weights 8  
 Mean 1.875 Sum Observations 15  
 Std Deviation 0.64086994 Variance 0.41071429  
 Skewness 0.06784257 Kurtosis 0.74102079  
 Uncorrected SS 31 Corrected SS 2.875  
 Coeff Variation 34.1797304 Std Error Mean 0.22658174

Basic Statistical Measures  
 Location Variability  
 Mean 1.875000 Std Deviation 0.64087  
 Median 2.000000 Variance 0.41071  
 Mode 2.000000 Range 2.00000  
 Interquartile Range 0.50000

Variable: Q3  
 N 8 Sum Weights 8  
 Mean 1.5 Sum Observations 12  
 Std Deviation 0.75592895 Variance 0.57142857  
 Skewness 1.32287566 Kurtosis 0.875  
 Uncorrected SS 22 Corrected SS 4  
 Coeff Variation 50.3952631 Std Error Mean 0.26726124

Basic Statistical Measures  
 Location Variability  
 Mean 1.500000 Std Deviation 0.75593  
 Median 1.000000 Variance 0.57143  
 Mode 1.000000 Range 2.00000  
 Interquartile Range 1.00000

Variable: Q4  
 N 8 Sum Weights 8  
 Mean 1.875 Sum Observations 15  
 Std Deviation 1.12599163 Variance 1.26785714  
 Skewness 1.11325972 Kurtosis 0.29105336  
 Uncorrected SS 37 Corrected SS 8.875  
 Coeff Variation 60.0528867 Std Error Mean 0.39809816

Basic Statistical Measures  
 Location Variability  
 Mean 1.875000 Std Deviation 1.12599  
 Median 1.500000 Variance 1.26786  
 Mode 1.000000 Range 3.00000  
 Interquartile Range 1.50000

Variable: Q5  
 N 8 Sum Weights 8  
 Mean 1.75 Sum Observations 14  
 Std Deviation 0.70710678 Variance 0.5  
 Skewness 0.40406102 Kurtosis -0.2285714  
 Uncorrected SS 28 Corrected SS 3.5  
 Coeff Variation 40.4061018 Std Error Mean 0.25

Basic Statistical Measures  
 Location Variability  
 Mean 1.750000 Std Deviation 0.70711  
 Median 2.000000 Variance 0.50000  
 Mode 2.000000 Range 2.00000  
 Interquartile Range 1.00000

Variable: Q6  
 N 8 Sum Weights 8  
 Mean 2.125 Sum Observations 17  
 Std Deviation 0.99103121 Variance 0.98214286  
 Skewness 0.86227906 Kurtosis 0.84046281  
 Uncorrected SS 43 Corrected SS 6.875  
 Coeff Variation 46.6367628 Std Error Mean 0.35038244

Basic Statistical Measures  
 Location Variability  
 Mean 2.125000 Std Deviation 0.99103  
 Median 2.000000 Variance 0.98214  
 Mode 2.000000 Range 3.00000  
 Interquartile Range 1.00000

Variable: Q7

N	8	Sum Weights	8
Mean	1.125	Sum Observations	9
Std Deviation	0.35355339	Variance	0.125
Skewness	2.82842712	Kurtosis	8
Uncorrected SS	11	Corrected SS	0.875
Coeff Variation	31.4269681	Std Error Mean	0.125

Basic Statistical Measures

Location		Variability	
Mean	1.125000	Std Deviation	0.35355
Median	1.000000	Variance	0.12500
Mode	1.000000	Range	1.00000
		Interquartile Range	0

## Interviews

Variable: Q1

N	32	Sum Weights	32
Mean	3.21875	Sum Observations	103
Std Deviation	0.55266947	Variance	0.30544355
Skewness	0.09196289	Kurtosis	-0.0346506
Uncorrected SS	341	Corrected SS	9.46875
Coeff Variation	17.1703138	Std Error Mean	0.09769908

Basic Statistical Measures

Location		Variability	
Mean	3.218750	Std Deviation	0.55267
Median	3.000000	Variance	0.30544
Mode	3.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q2

N	32	Sum Weights	32
Mean	3.25	Sum Observations	104
Std Deviation	0.50800051	Variance	0.25806452
Skewness	0.39370039	Kurtosis	-0.1536638
Uncorrected SS	346	Corrected SS	8
Coeff Variation	15.6307849	Std Error Mean	0.08980265

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.50800
Median	3.000000	Variance	0.25806
Mode	3.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q3

N	32	Sum Weights	32
Mean	3.3125	Sum Observations	106
Std Deviation	0.78030184	Variance	0.60887097
Skewness	-0.628047	Kurtosis	1.48913493
Uncorrected SS	370	Corrected SS	18.875
Coeff Variation	23.5562821	Std Error Mean	0.13793918

Basic Statistical Measures

Location		Variability	
Mean	3.312500	Std Deviation	0.78030
Median	3.000000	Variance	0.60887
Mode	3.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q4

N	32	Sum Weights	32
Mean	3.125	Sum Observations	100
Std Deviation	0.870669	Variance	0.75806452
Skewness	-0.2541455	Kurtosis	-0.0278734
Uncorrected SS	336	Corrected SS	23.5
Coeff Variation	27.8614082	Std Error Mean	0.15391399

Basic Statistical Measures

Location		Variability	
Mean	3.125000	Std Deviation	0.87067
Median	3.000000	Variance	0.75806
Mode	3.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q5

N	32	Sum Weights	32
Mean	3.65625	Sum Observations	117
Std Deviation	0.8654432	Variance	0.74899194
Skewness	-0.1993704	Kurtosis	-0.4572536
Uncorrected SS	451	Corrected SS	23.21875
Coeff Variation	23.6702414	Std Error Mean	0.15299019

Basic Statistical Measures

Location		Variability	
Mean	3.656250	Std Deviation	0.86544
Median	4.000000	Variance	0.74899
Mode	4.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q6

N	32	Sum Weights	32
Mean	4.09375	Sum Observations	131
Std Deviation	1.02734782	Variance	1.05544355
Skewness	-1.1496484	Kurtosis	1.21543014
Uncorrected SS	569	Corrected SS	32.71875
Coeff Variation	25.0955193	Std Error Mean	0.18161115

Basic Statistical Measures

Location		Variability	
Mean	4.093750	Std Deviation	1.02735
Median	4.000000	Variance	1.05544
Mode	5.000000	Range	4.00000
		Interquartile Range	1.50000

Variable: Q7

N	32	Sum Weights	32
Mean	3.09375	Sum Observations	99
Std Deviation	0.64053279	Variance	0.41028226
Skewness	0.70656781	Kurtosis	1.87400821
Uncorrected SS	319	Corrected SS	12.71875
Coeff Variation	20.7040903	Std Error Mean	0.11323127

Basic Statistical Measures

Location		Variability	
Mean	3.093750	Std Deviation	0.64053
Median	3.000000	Variance	0.41028
Mode	3.000000	Range	3.00000
		Interquartile Range	0

----- Product=Goods -----

Variable: Q1

N	16	Sum Weights	16
Mean	3.1875	Sum Observations	51
Std Deviation	0.54390563	Variance	0.29583333
Skewness	0.18866452	Kurtosis	0.55509656
Uncorrected SS	167	Corrected SS	4.4375
Coeff Variation	17.063706	Std Error Mean	0.13597641

Basic Statistical Measures

Location		Variability	
Mean	3.187500	Std Deviation	0.54391
Median	3.000000	Variance	0.29583
Mode	3.000000	Range	2.00000
		Interquartile Range	0.50000

Variable: Q2

N	16	Sum Weights	16
Mean	3.1875	Sum Observations	51
Std Deviation	0.54390563	Variance	0.29583333
Skewness	0.18866452	Kurtosis	0.55509656
Uncorrected SS	167	Corrected SS	4.4375
Coeff Variation	17.063706	Std Error Mean	0.13597641

Basic Statistical Measures

Location		Variability	
Mean	3.187500	Std Deviation	0.54391
Median	3.000000	Variance	0.29583
Mode	3.000000	Range	2.00000
		Interquartile Range	0.50000

Variable: Q3

N	16	Sum Weights	16
Mean	3.125	Sum Observations	50
Std Deviation	0.95742711	Variance	0.91666667
Skewness	-0.2767157	Kurtosis	0.83262192
Uncorrected SS	170	Corrected SS	13.75
Coeff Variation	30.6376674	Std Error Mean	0.23935678

Basic Statistical Measures

Location		Variability	
Mean	3.125000	Std Deviation	0.95743
Median	3.000000	Variance	0.91667
Mode	3.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q4

N	16	Sum Weights	16
Mean	3	Sum Observations	48
Std Deviation	0.81649658	Variance	0.66666667
Skewness	-0.8398251	Kurtosis	1.22307692
Uncorrected SS	154	Corrected SS	10
Coeff Variation	27.2165527	Std Error Mean	0.20412415

Basic Statistical Measures

Location		Variability	
Mean	3.000000	Std Deviation	0.81650
Median	3.000000	Variance	0.66667
Mode	3.000000	Range	3.00000
		Interquartile Range	0.50000

Variable: Q5

N	16	Sum Weights	16
Mean	3.875	Sum Observations	62
Std Deviation	0.80622577	Variance	0.65
Skewness	-0.6269888	Kurtosis	0.75427531
Uncorrected SS	250	Corrected SS	9.75
Coeff Variation	20.8058264	Std Error Mean	0.20155644

Basic Statistical Measures

Location		Variability	
Mean	3.875000	Std Deviation	0.80623
Median	4.000000	Variance	0.65000
Mode	4.000000	Range	3.00000
		Interquartile Range	0.50000

Variable: Q6

N	16	Sum Weights	16
Mean	3.875	Sum Observations	62
Std Deviation	1.14746097	Variance	1.31666667
Skewness	-0.9361025	Kurtosis	0.93856472
Uncorrected SS	260	Corrected SS	19.75
Coeff Variation	29.6118959	Std Error Mean	0.28686524

Basic Statistical Measures

Location		Variability	
Mean	3.875000	Std Deviation	1.14746
Median	4.000000	Variance	1.31667
Mode	5.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q7

N	16	Sum Weights	16
Mean	2.9375	Sum Observations	47
Std Deviation	0.77190241	Variance	0.59583333
Skewness	1.10654642	Kurtosis	2.5945437
Uncorrected SS	147	Corrected SS	8.9375
Coeff Variation	26.2775289	Std Error Mean	0.1929756

Basic Statistical Measures

Location		Variability	
Mean	2.937500	Std Deviation	0.77190
Median	3.000000	Variance	0.59583
Mode	3.000000	Range	3.00000
		Interquartile Range	0.50000

----- Product=Services -----

Variable: Q1

N	16	Sum Weights	16
Mean	3.25	Sum Observations	52
Std Deviation	0.57735027	Variance	0.33333333
Skewness	0	Kurtosis	-0.0659341
Uncorrected SS	174	Corrected SS	5
Coeff Variation	17.7646237	Std Error Mean	0.14433757

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.57735
Median	3.000000	Variance	0.33333
Mode	3.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q2

N	16	Sum Weights	16
Mean	3.3125	Sum Observations	53
Std Deviation	0.47871355	Variance	0.22916667
Skewness	0.89525652	Kurtosis	-1.3906094
Uncorrected SS	179	Corrected SS	3.4375
Coeff Variation	14.4517299	Std Error Mean	0.11967839

Basic Statistical Measures

Location		Variability	
Mean	3.312500	Std Deviation	0.47871
Median	3.000000	Variance	0.22917
Mode	3.000000	Range	1.00000
		Interquartile Range	1.00000

Variable: Q3

N	16	Sum Weights	16
Mean	3.5	Sum Observations	56
Std Deviation	0.51639778	Variance	0.26666667
Skewness	0	Kurtosis	-2.3076923
Uncorrected SS	200	Corrected SS	4
Coeff Variation	14.7542223	Std Error Mean	0.12909944

Basic Statistical Measures

Location		Variability	
Mean	3.500000	Std Deviation	0.51640
Median	3.500000	Variance	0.26667
Mode	3.000000	Range	1.00000
		Interquartile Range	1.00000

NOTE: The mode displayed is the smallest of 2 modes with a count of 8.

Variable: Q4

N	16	Sum Weights	16
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Mean	3.25	Sum Observations	52
Std Deviation	0.93094934	Variance	0.8666667
Skewness	0	Kurtosis	-0.9148839
Uncorrected SS	182	Corrected SS	13
Coeff Variation	28.644595	Std Error Mean	0.2327373

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.93095
Median	3.000000	Variance	0.86667
Mode	4.000000	Range	3.00000
		Interquartile Range	1.50000

Variable: Q5

N	16	Sum Weights	16
Mean	3.4375	Sum Observations	55
Std Deviation	0.89209491	Variance	0.79583333
Skewness	0.21379508	Kurtosis	-0.3709412
Uncorrected SS	201	Corrected SS	11.9375
Coeff Variation	25.951852	Std Error Mean	0.22302373

Basic Statistical Measures

Location		Variability	
Mean	3.437500	Std Deviation	0.89209
Median	3.000000	Variance	0.79583
Mode	3.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q6

N	16	Sum Weights	16
Mean	4.3125	Sum Observations	69
Std Deviation	0.87321246	Variance	0.7625
Skewness	-1.3973009	Kurtosis	2.01647318
Uncorrected SS	309	Corrected SS	11.4375
Coeff Variation	20.2484049	Std Error Mean	0.21830311

Basic Statistical Measures

Location		Variability	
Mean	4.312500	Std Deviation	0.87321
Median	4.500000	Variance	0.76250
Mode	5.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q7

N	16	Sum Weights	16
Mean	3.25	Sum Observations	52
Std Deviation	0.4472136	Variance	0.2
Skewness	1.27775313	Kurtosis	-0.4395604
Uncorrected SS	172	Corrected SS	3
Coeff Variation	13.7604183	Std Error Mean	0.1118034

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.44721
Median	3.000000	Variance	0.20000
Mode	3.000000	Range	1.00000
		Interquartile Range	0.50000

----- Type=Agents & Stockists -----

Variable: Q1

N	8	Sum Weights	8
Mean	3.125	Sum Observations	25
Std Deviation	0.64086994	Variance	0.41071429
Skewness	-0.0678426	Kurtosis	0.74102079
Uncorrected SS	81	Corrected SS	2.875
Coeff Variation	20.5078382	Std Error Mean	0.22658174

Basic Statistical Measures

Location		Variability	
Mean	3.125000	Std Deviation	0.64087
Median	3.000000	Variance	0.41071
Mode	3.000000	Range	2.00000
		Interquartile Range	0.50000

Variable: Q2

N	8	Sum Weights	8
Mean	3	Sum Observations	24
Std Deviation	0.53452248	Variance	0.28571429
Skewness	0	Kurtosis	3.5
Uncorrected SS	74	Corrected SS	2
Coeff Variation	17.8174161	Std Error Mean	0.18898224

Basic Statistical Measures

Location		Variability	
Mean	3.000000	Std Deviation	0.53452
Median	3.000000	Variance	0.28571
Mode	3.000000	Range	2.00000
		Interquartile Range	0

Variable: Q3

N	8	Sum Weights	8
Mean	3	Sum Observations	24

Std Deviation	1.06904497	Variance	1.14285714
Skewness	-0.9354143	Kurtosis	0.35
Uncorrected SS	80	Corrected SS	8
Coeff Variation	35.6348323	Std Error Mean	0.37796447

Basic Statistical Measures			
Location		Variability	
Mean	3.000000	Std Deviation	1.06904
Median	3.000000	Variance	1.14286
Mode	3.000000	Range	3.00000
		Interquartile Range	1.50000

NOTE: The mode displayed is the smallest of 2 modes with a count of 3.

Variable: Q4			
N	8	Sum Weights	8
Mean	2.75	Sum Observations	22
Std Deviation	0.88640526	Variance	0.78571429
Skewness	-1.0255929	Kurtosis	1.85123967
Uncorrected SS	66	Corrected SS	5.5
Coeff Variation	32.2329186	Std Error Mean	0.31339159

Basic Statistical Measures			
Location		Variability	
Mean	2.750000	Std Deviation	0.88641
Median	3.000000	Variance	0.78571
Mode	3.000000	Range	3.00000
		Interquartile Range	0.50000

Variable: Q5			
N	8	Sum Weights	8
Mean	3.5	Sum Observations	28
Std Deviation	0.75592895	Variance	0.57142857
Skewness	-1.3228757	Kurtosis	0.875
Uncorrected SS	102	Corrected SS	4
Coeff Variation	21.5979699	Std Error Mean	0.26726124

Basic Statistical Measures			
Location		Variability	
Mean	3.500000	Std Deviation	0.75593
Median	4.000000	Variance	0.57143
Mode	4.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q6			
N	8	Sum Weights	8
Mean	3.75	Sum Observations	30
Std Deviation	1.38873015	Variance	1.92857143
Skewness	-1.120128	Kurtosis	1.10617284
Uncorrected SS	126	Corrected SS	13.5
Coeff Variation	37.032804	Std Error Mean	0.49099025

Basic Statistical Measures			
Location		Variability	
Mean	3.750000	Std Deviation	1.38873
Median	4.000000	Variance	1.92857
Mode	5.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q7			
N	8	Sum Weights	8
Mean	2.625	Sum Observations	21
Std Deviation	0.51754917	Variance	0.26785714
Skewness	-0.6440612	Kurtosis	-2.24
Uncorrected SS	57	Corrected SS	1.875
Coeff Variation	19.7161588	Std Error Mean	0.18298126

Basic Statistical Measures			
Location		Variability	
Mean	2.625000	Std Deviation	0.51755
Median	3.000000	Variance	0.26786
Mode	3.000000	Range	1.00000
		Interquartile Range	1.00000

----- Type=Manufacturers -----

Variable: Q1			
N	8	Sum Weights	8
Mean	3.25	Sum Observations	26
Std Deviation	0.46291005	Variance	0.21428571
Skewness	1.4401646	Kurtosis	6.9519E-16
Uncorrected SS	86	Corrected SS	1.5
Coeff Variation	14.2433862	Std Error Mean	0.16366342

Basic Statistical Measures			
Location		Variability	
Mean	3.250000	Std Deviation	0.46291
Median	3.000000	Variance	0.21429
Mode	3.000000	Range	1.00000
		Interquartile Range	0.50000

Variable: Q2			
N	8	Sum Weights	8
Mean	3.375	Sum Observations	27

Std Deviation	0.51754917	Variance	0.26785714
Skewness	0.64406119	Kurtosis	-2.24
Uncorrected SS	93	Corrected SS	1.875
Coeff Variation	15.3347902	Std Error Mean	0.18298126

Basic Statistical Measures

Location		Variability	
Mean	3.375000	Std Deviation	0.51755
Median	3.000000	Variance	0.26786
Mode	3.000000	Range	1.00000
		Interquartile Range	1.00000

Variable: Q3

N	8	Sum Weights	8
Mean	3.25	Sum Observations	26
Std Deviation	0.88640526	Variance	0.78571429
Skewness	1.02559286	Kurtosis	1.85123967
Uncorrected SS	90	Corrected SS	5.5
Coeff Variation	27.274008	Std Error Mean	0.31339159

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.88641
Median	3.000000	Variance	0.78571
Mode	3.000000	Range	3.00000
		Interquartile Range	0.50000

Variable: Q4

N	8	Sum Weights	8
Mean	3.25	Sum Observations	26
Std Deviation	0.70710678	Variance	0.5
Skewness	-0.404061	Kurtosis	-0.2285714
Uncorrected SS	88	Corrected SS	3.5
Coeff Variation	21.7571317	Std Error Mean	0.25

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.70711
Median	3.000000	Variance	0.50000
Mode	3.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q5

N	8	Sum Weights	8
Mean	4.25	Sum Observations	34
Std Deviation	0.70710678	Variance	0.5
Skewness	-0.404061	Kurtosis	-0.2285714
Uncorrected SS	148	Corrected SS	3.5
Coeff Variation	16.6378066	Std Error Mean	0.25

Basic Statistical Measures

Location		Variability	
Mean	4.250000	Std Deviation	0.70711
Median	4.000000	Variance	0.50000
Mode	4.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q6

N	8	Sum Weights	8
Mean	4	Sum Observations	32
Std Deviation	0.9258201	Variance	0.85714286
Skewness	0	Kurtosis	-2.1
Uncorrected SS	134	Corrected SS	6
Coeff Variation	23.1455025	Std Error Mean	0.32732684

Basic Statistical Measures

Location		Variability	
Mean	4.000000	Std Deviation	0.92582
Median	4.000000	Variance	0.85714
Mode	3.000000	Range	2.00000
		Interquartile Range	2.00000

NOTE: The mode displayed is the smallest of 2 modes with a count of 3.

Variable: Q7

Moments			
N	8	Sum Weights	8
Mean	3.25	Sum Observations	26
Std Deviation	0.88640526	Variance	0.78571429
Skewness	1.02559286	Kurtosis	1.85123967
Uncorrected SS	90	Corrected SS	5.5
Coeff Variation	27.274008	Std Error Mean	0.31339159

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.88641
Median	3.000000	Variance	0.78571
Mode	3.000000	Range	3.00000
		Interquartile Range	0.50000

----- Type=Repair services -----

Variable: Q1

N	8	Sum Weights	8
Mean	3.25	Sum Observations	26
Std Deviation	0.46291005	Variance	0.21428571

Skewness	1.4401646	Kurtosis	6.9519E-16
Uncorrected SS	86	Corrected SS	1.5
Coeff Variation	14.2433862	Std Error Mean	0.16366342

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.46291
Median	3.000000	Variance	0.21429
Mode	3.000000	Range	1.00000
		Interquartile Range	0.50000

Variable: Q2

N	8	Sum Weights	8
Mean	3.25	Sum Observations	26
Std Deviation	0.46291005	Variance	0.21428571
Skewness	1.4401646	Kurtosis	6.9519E-16
Uncorrected SS	86	Corrected SS	1.5
Coeff Variation	14.2433862	Std Error Mean	0.16366342

Basic Statistical Measures

Location		Variability	
Mean	3.250000	Std Deviation	0.46291
Median	3.000000	Variance	0.21429
Mode	3.000000	Range	1.00000
		Interquartile Range	0.50000

Variable: Q3

N	8	Sum Weights	8
Mean	3.375	Sum Observations	27
Std Deviation	0.51754917	Variance	0.26785714
Skewness	0.64406119	Kurtosis	-2.24
Uncorrected SS	93	Corrected SS	1.875
Coeff Variation	15.3347902	Std Error Mean	0.18298126

Basic Statistical Measures

Location		Variability	
Mean	3.375000	Std Deviation	0.51755
Median	3.000000	Variance	0.26786
Mode	3.000000	Range	1.00000
		Interquartile Range	1.00000

Variable: Q4

N	8	Sum Weights	8
Mean	3.625	Sum Observations	29
Std Deviation	0.91612538	Variance	0.83928571
Skewness	-0.4877155	Kurtosis	0.4208239
Uncorrected SS	111	Corrected SS	5.875
Coeff Variation	25.2724243	Std Error Mean	0.32389923

Basic Statistical Measures

Location		Variability	
Mean	3.625000	Std Deviation	0.91613
Median	4.000000	Variance	0.83929
Mode	4.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q5

N	8	Sum Weights	8
Mean	3.75	Sum Observations	30
Std Deviation	1.03509834	Variance	1.07142857
Skewness	-0.3864367	Kurtosis	-0.448
Uncorrected SS	120	Corrected SS	7.5
Coeff Variation	27.6026224	Std Error Mean	0.36596253

Basic Statistical Measures

Location		Variability	
Mean	3.750000	Std Deviation	1.03510
Median	4.000000	Variance	1.07143
Mode	4.000000	Range	3.00000
		Interquartile Range	1.50000

Variable: Q6

N	8	Sum Weights	8
Mean	4.375	Sum Observations	35
Std Deviation	0.74402381	Variance	0.55357143
Skewness	-0.8237683	Kurtosis	-0.1515088
Uncorrected SS	157	Corrected SS	3.875
Coeff Variation	17.0062585	Std Error Mean	0.26305214

Basic Statistical Measures

Location		Variability	
Mean	4.375000	Std Deviation	0.74402
Median	4.500000	Variance	0.55357
Mode	5.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q7

N	8	Sum Weights	8
Mean	3.375	Sum Observations	27
Std Deviation	0.51754917	Variance	0.26785714
Skewness	0.64406119	Kurtosis	-2.24
Uncorrected SS	93	Corrected SS	1.875
Coeff Variation	15.3347902	Std Error Mean	0.18298126

Basic Statistical Measures			
Location		Variability	
Mean	3.375000	Std Deviation	0.51755
Median	3.000000	Variance	0.26786
Mode	3.000000	Range	1.00000
		Interquartile Range	1.00000

----- Type=Skills & labour -----

Variable: Q1			
N	8	Sum Weights	8
Mean	3.25	Sum Observations	26
Std Deviation	0.70710678	Variance	0.5
Skewness	-0.404061	Kurtosis	-0.2285714
Uncorrected SS	88	Corrected SS	3.5
Coeff Variation	21.7571317	Std Error Mean	0.25

Basic Statistical Measures			
Location		Variability	
Mean	3.250000	Std Deviation	0.70711
Median	3.000000	Variance	0.50000
Mode	3.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q2			
N	8	Sum Weights	8
Mean	3.375	Sum Observations	27
Std Deviation	0.51754917	Variance	0.26785714
Skewness	0.64406119	Kurtosis	-2.24
Uncorrected SS	93	Corrected SS	1.875
Coeff Variation	15.3347902	Std Error Mean	0.18298126

Basic Statistical Measures			
Location		Variability	
Mean	3.375000	Std Deviation	0.51755
Median	3.000000	Variance	0.26786
Mode	3.000000	Range	1.00000
		Interquartile Range	1.00000

Variable: Q3			
N	8	Sum Weights	8
Mean	3.625	Sum Observations	29
Std Deviation	0.51754917	Variance	0.26785714
Skewness	-0.6440612	Kurtosis	-2.24
Uncorrected SS	107	Corrected SS	1.875
Coeff Variation	14.2772185	Std Error Mean	0.18298126

Basic Statistical Measures			
Location		Variability	
Mean	3.625000	Std Deviation	0.51755
Median	4.000000	Variance	0.26786
Mode	4.000000	Range	1.00000
		Interquartile Range	1.00000

Variable: Q4			
N	8	Sum Weights	8
Mean	2.875	Sum Observations	23
Std Deviation	0.83452296	Variance	0.69642857
Skewness	0.27652832	Kurtosis	-1.391716
Uncorrected SS	71	Corrected SS	4.875
Coeff Variation	29.0268856	Std Error Mean	0.29504842

Basic Statistical Measures			
Location		Variability	
Mean	2.875000	Std Deviation	0.83452
Median	3.000000	Variance	0.69643
Mode	2.000000	Range	2.00000
		Interquartile Range	1.50000

NOTE: The mode displayed is the smallest of 2 modes with a count of 3.

Variable: Q5			
N	8	Sum Weights	8
Mean	3.125	Sum Observations	25
Std Deviation	0.64086994	Variance	0.41071429
Skewness	-0.0678426	Kurtosis	0.74102079
Uncorrected SS	81	Corrected SS	2.875
Coeff Variation	20.5078382	Std Error Mean	0.22658174

Basic Statistical Measures			
Location		Variability	
Mean	3.125000	Std Deviation	0.64087
Median	3.000000	Variance	0.41071
Mode	3.000000	Range	2.00000
		Interquartile Range	0.50000

Variable: Q6			
N	8	Sum Weights	8
Mean	4.25	Sum Observations	34
Std Deviation	1.03509834	Variance	1.07142857
Skewness	-1.6745591	Kurtosis	3.136
Uncorrected SS	152	Corrected SS	7.5
Coeff Variation	24.355255	Std Error Mean	0.36596253

Basic Statistical Measures			
Location		Variability	
Mean	4.250000	Std Deviation	1.03510
Median	4.500000	Variance	1.07143
Mode	5.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q7			
N	8	Sum Weights	8
Mean	3.125	Sum Observations	25
Std Deviation	0.35355339	Variance	0.125
Skewness	2.82842712	Kurtosis	8
Uncorrected SS	79	Corrected SS	0.875
Coeff Variation	11.3137085	Std Error Mean	0.125

Basic Statistical Measures			
Location		Variability	
Mean	3.125000	Std Deviation	0.35355
Median	3.000000	Variance	0.12500
Mode	3.000000	Range	1.00000
		Interquartile Range	0

Average of history and current

Variable: M1			
N	32	Sum Weights	32
Mean	2.640625	Sum Observations	84.5
Std Deviation	0.84466423	Variance	0.71345766
Skewness	0.89672974	Kurtosis	-0.1818285
Uncorrected SS	245.25	Corrected SS	22.1171875
Coeff Variation	31.9872844	Std Error Mean	0.14931695

Basic Statistical Measures			
Location		Variability	
Mean	2.640625	Std Deviation	0.84466
Median	2.500000	Variance	0.71346
Mode	2.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: M2			
N	32	Sum Weights	32
Mean	2.96875	Sum Observations	95
Std Deviation	0.80259157	Variance	0.64415323
Skewness	0.25777216	Kurtosis	-1.3211075
Uncorrected SS	302	Corrected SS	19.96875
Coeff Variation	27.0346634	Std Error Mean	0.14187949

Basic Statistical Measures			
Location		Variability	
Mean	2.968750	Std Deviation	0.80259
Median	3.000000	Variance	0.64415
Mode	2.000000	Range	2.50000
		Interquartile Range	1.50000

Variable: M3			
N	32	Sum Weights	32
Mean	2.4375	Sum Observations	78
Std Deviation	0.73780407	Variance	0.54435484
Skewness	1.19272859	Kurtosis	2.51132113
Uncorrected SS	207	Corrected SS	16.875
Coeff Variation	30.2688847	Std Error Mean	0.13042656

Basic Statistical Measures			
Location		Variability	
Mean	2.437500	Std Deviation	0.73780
Median	2.500000	Variance	0.54435
Mode	2.000000	Range	3.50000
		Interquartile Range	0.50000

NOTE: The mode displayed is the smallest of 2 modes with a count of 11.

Variable: M4			
N	32	Sum Weights	32
Mean	2.171875	Sum Observations	69.5
Std Deviation	0.54786058	Variance	0.30015121
Skewness	0.19141705	Kurtosis	0.05725421
Uncorrected SS	160.25	Corrected SS	9.3046875
Coeff Variation	25.2252351	Std Error Mean	0.09684898

Basic Statistical Measures			
Location		Variability	
Mean	2.171875	Std Deviation	0.54786
Median	2.000000	Variance	0.30015
Mode	2.000000	Range	2.50000
		Interquartile Range	0.50000

Variable: M5			
N	32	Sum Weights	32
Mean	2.59375	Sum Observations	83
Std Deviation	0.55991791	Variance	0.31350806
Skewness	-0.0999228	Kurtosis	-0.6542187
Uncorrected SS	225	Corrected SS	9.71875
Coeff Variation	21.5871965	Std Error Mean	0.09898044

Basic Statistical Measures

Location		Variability	
Mean	2.593750	Std Deviation	0.55992
Median	2.500000	Variance	0.31351
Mode	2.500000	Range	2.00000
		Interquartile Range	1.00000

Variable: M6			
N	32	Sum Weights	32
Mean	2.703125	Sum Observations	86.5
Std Deviation	0.65819125	Variance	0.43321573
Skewness	0.17172947	Kurtosis	1.6728817
Uncorrected SS	247.25	Corrected SS	13.4296875
Coeff Variation	24.3492718	Std Error Mean	0.11635287

Location		Variability	
Mean	2.703125	Std Deviation	0.65819
Median	3.000000	Variance	0.43322
Mode	3.000000	Range	3.50000
		Interquartile Range	0.75000

Variable: M7			
N	32	Sum Weights	32
Mean	2.0625	Sum Observations	66
Std Deviation	0.32995601	Variance	0.10887097
Skewness	0.58369173	Kurtosis	1.28803746
Uncorrected SS	139.5	Corrected SS	3.375
Coeff Variation	15.9978671	Std Error Mean	0.05832853

Location		Variability	
Mean	2.062500	Std Deviation	0.32996
Median	2.000000	Variance	0.10887
Mode	2.000000	Range	1.50000
		Interquartile Range	0

----- Product=Goods -----

Variable: M1			
N	16	Sum Weights	16
Mean	2.75	Sum Observations	44
Std Deviation	0.9486833	Variance	0.9
Skewness	0.76965488	Kurtosis	-0.526048
Uncorrected SS	134.5	Corrected SS	13.5
Coeff Variation	34.4975745	Std Error Mean	0.23717082

Location		Variability	
Mean	2.750000	Std Deviation	0.94868
Median	2.500000	Variance	0.90000
Mode	2.000000	Range	3.00000
		Interquartile Range	1.25000

Variable: M2			
N	16	Sum Weights	16
Mean	3.3125	Sum Observations	53
Std Deviation	0.83416625	Variance	0.69583333
Skewness	-0.4953133	Kurtosis	-1.095741
Uncorrected SS	186	Corrected SS	10.4375
Coeff Variation	25.1823774	Std Error Mean	0.20854156

Location		Variability	
Mean	3.312500	Std Deviation	0.83417
Median	3.500000	Variance	0.69583
Mode	4.000000	Range	2.50000
		Interquartile Range	1.25000

Variable: M3			
N	16	Sum Weights	16
Mean	2.125	Sum Observations	34
Std Deviation	0.5	Variance	0.25
Skewness	-0.5714286	Kurtosis	0.45714286
Uncorrected SS	76	Corrected SS	3.75
Coeff Variation	23.5294118	Std Error Mean	0.125

Location		Variability	
Mean	2.125000	Std Deviation	0.50000
Median	2.000000	Variance	0.25000
Mode	2.000000	Range	2.00000
		Interquartile Range	0.50000

NOTE: The mode displayed is the smallest of 2 modes with a count of 6.

Variable: M4			
N	16	Sum Weights	16
Mean	2	Sum Observations	32
Std Deviation	0.40824829	Variance	0.16666667
Skewness	-0.8398251	Kurtosis	1.22307692
Uncorrected SS	66.5	Corrected SS	2.5
Coeff Variation	20.4124145	Std Error Mean	0.10206207

Basic Statistical Measures

Location		Variability	
Mean	2.000000	Std Deviation	0.40825
Median	2.000000	Variance	0.16667
Mode	2.000000	Range	1.50000
		Interquartile Range	0.25000

Variable: M5			
N	16	Sum Weights	16
Mean	2.6875	Sum Observations	43
Std Deviation	0.57373048	Variance	0.32916667
Skewness	-0.2553007	Kurtosis	-0.2252386
Uncorrected SS	120.5	Corrected SS	4.9375
Coeff Variation	21.348111	Std Error Mean	0.14343262

Location		Variability	
Mean	2.687500	Std Deviation	0.57373
Median	2.500000	Variance	0.32917
Mode	2.500000	Range	2.00000
		Interquartile Range	0.50000

Variable: M6			
N	16	Sum Weights	16
Mean	2.4375	Sum Observations	39
Std Deviation	0.57373048	Variance	0.32916667
Skewness	-0.9361025	Kurtosis	0.93856472
Uncorrected SS	100	Corrected SS	4.9375
Coeff Variation	23.5376608	Std Error Mean	0.14343262

Location		Variability	
Mean	2.437500	Std Deviation	0.57373
Median	2.500000	Variance	0.32917
Mode	3.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: M7			
N	16	Sum Weights	16
Mean	1.96875	Sum Observations	31.5
Std Deviation	0.38595121	Variance	0.14895833
Skewness	1.10654642	Kurtosis	2.5945437
Uncorrected SS	64.25	Corrected SS	2.234375
Coeff Variation	19.6038708	Std Error Mean	0.0964878

Location		Variability	
Mean	1.968750	Std Deviation	0.38595
Median	2.000000	Variance	0.14896
Mode	2.000000	Range	1.50000
		Interquartile Range	0.25000

----- Product=Services -----

Variable: M1			
N	16	Sum Weights	16
Mean	2.53125	Sum Observations	40.5
Std Deviation	0.74091722	Variance	0.54895833
Skewness	1.00265485	Kurtosis	0.2074439
Uncorrected SS	110.75	Corrected SS	8.234375
Coeff Variation	29.2708039	Std Error Mean	0.18522931

Location		Variability	
Mean	2.531250	Std Deviation	0.74092
Median	2.500000	Variance	0.54896
Mode	2.000000	Range	2.50000
		Interquartile Range	0.75000

Variable: M2			
N	16	Sum Weights	16
Mean	2.625	Sum Observations	42
Std Deviation	0.61913919	Variance	0.38333333
Skewness	0.90287648	Kurtosis	0.05484119
Uncorrected SS	116	Corrected SS	5.75
Coeff Variation	23.5862548	Std Error Mean	0.1547848

Location		Variability	
Mean	2.625000	Std Deviation	0.61914
Median	2.500000	Variance	0.38333
Mode	2.500000	Range	2.00000
		Interquartile Range	1.00000

Variable: M3			
N	16	Sum Weights	16
Mean	2.75	Sum Observations	44
Std Deviation	0.81649658	Variance	0.66666667
Skewness	1.25973758	Kurtosis	0.92884615
Uncorrected SS	131	Corrected SS	10
Coeff Variation	29.6907848	Std Error Mean	0.20412415

Location		Variability	
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Mean	2.750000	Std Deviation	0.81650
Median	2.500000	Variance	0.66667
Mode	2.000000	Range	2.50000
		Interquartile Range	1.00000

NOTE: The mode displayed is the smallest of 2 modes with a count of 5.

Variable: M4			
N	16	Sum Weights	16
Mean	2.34375	Sum Observations	37.5
Std Deviation	0.625	Variance	0.390625
Skewness	-0.0210286	Kurtosis	-0.8341099
Uncorrected SS	93.75	Corrected SS	5.859375
Coeff Variation	26.666667	Std Error Mean	0.15625

Basic Statistical Measures			
Location		Variability	
Mean	2.343750	Std Deviation	0.62500
Median	2.500000	Variance	0.39063
Mode	2.500000	Range	2.00000
		Interquartile Range	1.00000

Variable: M5			
N	16	Sum Weights	16
Mean	2.5	Sum Observations	40
Std Deviation	0.54772256	Variance	0.3
Skewness	0	Kurtosis	-0.8028083
Uncorrected SS	104.5	Corrected SS	4.5
Coeff Variation	21.9089023	Std Error Mean	0.13693064

Basic Statistical Measures			
Location		Variability	
Mean	2.500000	Std Deviation	0.54772
Median	2.500000	Variance	0.30000
Mode	2.000000	Range	2.00000
		Interquartile Range	1.00000

NOTE: The mode displayed is the smallest of 2 modes with a count of 5.

Variable: M6			
N	16	Sum Weights	16
Mean	2.96875	Sum Observations	47.5
Std Deviation	0.64468985	Variance	0.415625
Skewness	0.77056845	Kurtosis	1.25991257
Uncorrected SS	147.25	Corrected SS	6.234375
Coeff Variation	21.7158686	Std Error Mean	0.16117246

Basic Statistical Measures			
Location		Variability	
Mean	2.968750	Std Deviation	0.64469
Median	3.000000	Variance	0.41563
Mode	3.000000	Range	2.50000
		Interquartile Range	0.50000

Tests for Location:  $\mu_0=0$

Variable: M7			
N	16	Sum Weights	16
Mean	2.15625	Sum Observations	34.5
Std Deviation	0.23935678	Variance	0.05729167
Skewness	0.89525652	Kurtosis	-1.3906094
Uncorrected SS	75.25	Corrected SS	0.859375
Coeff Variation	11.1006041	Std Error Mean	0.05983919

Basic Statistical Measures			
Location		Variability	
Mean	2.156250	Std Deviation	0.23936
Median	2.000000	Variance	0.05729
Mode	2.000000	Range	0.50000
		Interquartile Range	0.50000

----- Type=Agents & Stockists -----

Variable: M1			
N	8	Sum Weights	8
Mean	2.4375	Sum Observations	19.5
Std Deviation	0.94254594	Variance	0.88839286
Skewness	1.77270326	Kurtosis	3.40375243
Uncorrected SS	53.75	Corrected SS	6.21875
Coeff Variation	38.6685516	Std Error Mean	0.33324031

Basic Statistical Measures			
Location		Variability	
Mean	2.437500	Std Deviation	0.94255
Median	2.000000	Variance	0.88839
Mode	2.000000	Range	3.00000
		Interquartile Range	0.75000

Variable: M2			
N	8	Sum Weights	8
Mean	3.0625	Sum Observations	24.5
Std Deviation	0.8634441	Variance	0.74553571
Skewness	-0.0312077	Kurtosis	-1.8364803
Uncorrected SS	80.25	Corrected SS	5.21875
Coeff Variation	28.1940931	Std Error Mean	0.30527359

Basic Statistical Measures			
Location		Variability	
Mean	3.062500	Std Deviation	0.86344
Median	3.000000	Variance	0.74554
Mode	4.000000	Range	2.00000
		Interquartile Range	1.75000

Variable: M3			
N	8	Sum Weights	8
Mean	2.0625	Sum Observations	16.5
Std Deviation	0.56299581	Variance	0.31696429
Skewness	-1.1132597	Kurtosis	0.29105336
Uncorrected SS	36.25	Corrected SS	2.21875
Coeff Variation	27.2967667	Std Error Mean	0.19904908

Basic Statistical Measures			
Location		Variability	
Mean	2.062500	Std Deviation	0.56300
Median	2.250000	Variance	0.31696
Mode	2.500000	Range	1.50000
		Interquartile Range	0.75000

Variable: M4			
N	8	Sum Weights	8
Mean	1.875	Sum Observations	15
Std Deviation	0.44320263	Variance	0.19642857
Skewness	-1.0255929	Kurtosis	1.85123967
Uncorrected SS	29.5	Corrected SS	1.375
Coeff Variation	23.6374736	Std Error Mean	0.15669579

Basic Statistical Measures			
Location		Variability	
Mean	1.875000	Std Deviation	0.44320
Median	2.000000	Variance	0.19643
Mode	2.000000	Range	1.50000
		Interquartile Range	0.25000

Variable: M5			
N	8	Sum Weights	8
Mean	2.5	Sum Observations	20
Std Deviation	0.5976143	Variance	0.35714286
Skewness	0	Kurtosis	0.812
Uncorrected SS	52.5	Corrected SS	2.5
Coeff Variation	23.9045722	Std Error Mean	0.21128856

Basic Statistical Measures			
Location		Variability	
Mean	2.500000	Std Deviation	0.59761
Median	2.500000	Variance	0.35714
Mode	2.500000	Range	2.00000
		Interquartile Range	0.50000

Variable: M6			
N	8	Sum Weights	8
Mean	2.375	Sum Observations	19
Std Deviation	0.69436507	Variance	0.48214286
Skewness	-1.120128	Kurtosis	1.10617284
Uncorrected SS	48.5	Corrected SS	3.375
Coeff Variation	29.2364242	Std Error Mean	0.24549513

Basic Statistical Measures			
Location		Variability	
Mean	2.375000	Std Deviation	0.69437
Median	2.500000	Variance	0.48214
Mode	3.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: M7			
N	8	Sum Weights	8
Mean	1.8125	Sum Observations	14.5
Std Deviation	0.25877458	Variance	0.06696429
Skewness	-0.6440612	Kurtosis	-2.24
Uncorrected SS	26.75	Corrected SS	0.46875
Coeff Variation	14.2772185	Std Error Mean	0.09149063

Basic Statistical Measures			
Location		Variability	
Mean	1.812500	Std Deviation	0.25877
Median	2.000000	Variance	0.06696
Mode	2.000000	Range	0.50000
		Interquartile Range	0.50000

----- Type=Manufacturers -----

Variable: M1			
N	8	Sum Weights	8
Mean	3.0625	Sum Observations	24.5
Std Deviation	0.90386077	Variance	0.81696429
Skewness	0.33553695	Kurtosis	-0.9300726
Uncorrected SS	80.75	Corrected SS	5.71875
Coeff Variation	29.513821	Std Error Mean	0.31956304

Basic Statistical Measures

Location		Variability	
Mean	3.062500	Std Deviation	0.90386
Median	3.000000	Variance	0.81696
Mode	2.000000	Range	2.50000
		Interquartile Range	1.50000

NOTE: The mode displayed is the smallest of 2 modes with a count of 2.

Variable: M2

N	8	Sum Weights	8
Mean	3.5625	Sum Observations	28.5
Std Deviation	0.77632375	Variance	0.60267857
Skewness	-1.1879351	Kurtosis	1.6537284
Uncorrected SS	105.75	Corrected SS	4.21875
Coeff Variation	21.791544	Std Error Mean	0.2744719

Basic Statistical Measures

Location		Variability	
Mean	3.562500	Std Deviation	0.77632
Median	3.750000	Variance	0.60268
Mode	4.000000	Range	2.50000
		Interquartile Range	0.75000

Variable: M3

N	8	Sum Weights	8
Mean	2.1875	Sum Observations	17.5
Std Deviation	0.45806269	Variance	0.20982143
Skewness	0.48771546	Kurtosis	0.4208239
Uncorrected SS	39.75	Corrected SS	1.46875
Coeff Variation	20.9400087	Std Error Mean	0.16194962

Basic Statistical Measures

Location		Variability	
Mean	2.187500	Std Deviation	0.45806
Median	2.000000	Variance	0.20982
Mode	2.000000	Range	1.50000
		Interquartile Range	0.50000

Variable: M4

N	8	Sum Weights	8
Mean	2.125	Sum Observations	17
Std Deviation	0.35355339	Variance	0.125
Skewness	-0.404061	Kurtosis	-0.2285714
Uncorrected SS	37	Corrected SS	0.875
Coeff Variation	16.6378066	Std Error Mean	0.125

Basic Statistical Measures

Location		Variability	
Mean	2.125000	Std Deviation	0.35355
Median	2.000000	Variance	0.12500
Mode	2.000000	Range	1.00000
		Interquartile Range	0.50000

Variable: M5

N	8	Sum Weights	8
Mean	2.875	Sum Observations	23
Std Deviation	0.51754917	Variance	0.26785714
Skewness	-0.3864367	Kurtosis	-0.448
Uncorrected SS	68	Corrected SS	1.875
Coeff Variation	18.0017102	Std Error Mean	0.18298126

Basic Statistical Measures

Location		Variability	
Mean	2.875000	Std Deviation	0.51755
Median	3.000000	Variance	0.26786
Mode	3.000000	Range	1.50000
		Interquartile Range	0.75000

Variable: M6

N	8	Sum Weights	8
Mean	2.5	Sum Observations	20
Std Deviation	0.46291005	Variance	0.21428571
Skewness	0	Kurtosis	-2.1
Uncorrected SS	51.5	Corrected SS	1.5
Coeff Variation	18.516402	Std Error Mean	0.16366342

Basic Statistical Measures

Location		Variability	
Mean	2.500000	Std Deviation	0.46291
Median	2.500000	Variance	0.21429
Mode	2.000000	Range	1.00000
		Interquartile Range	1.00000

NOTE: The mode displayed is the smallest of 2 modes with a count of 3.

Variable: M7

N	8	Sum Weights	8
Mean	2.125	Sum Observations	17
Std Deviation	0.44320263	Variance	0.19642857
Skewness	1.02559286	Kurtosis	1.85123967
Uncorrected SS	37.5	Corrected SS	1.375
Coeff Variation	20.8565944	Std Error Mean	0.15669579

Basic Statistical Measures			
Location		Variability	
Mean	2.125000	Std Deviation	0.44320
Median	2.000000	Variance	0.19643
Mode	2.000000	Range	1.50000
		Interquartile Range	0.25000

----- Type=Repair services -----

Variable: M1			
N	8	Sum Weights	8
Mean	2.75	Sum Observations	22
Std Deviation	0.9258201	Variance	0.85714286
Skewness	0.63007201	Kurtosis	-1.88125
Uncorrected SS	66.5	Corrected SS	6
Coeff Variation	33.6661854	Std Error Mean	0.32732684

Basic Statistical Measures			
Location		Variability	
Mean	2.750000	Std Deviation	0.92582
Median	2.250000	Variance	0.85714
Mode	2.000000	Range	2.00000
		Interquartile Range	1.75000

Variable: M2			
N	8	Sum Weights	8
Mean	2.625	Sum Observations	21
Std Deviation	0.79056942	Variance	0.625
Skewness	0.9035079	Kurtosis	-0.6948571
Uncorrected SS	59.5	Corrected SS	4.375
Coeff Variation	30.1169301	Std Error Mean	0.2795085

Basic Statistical Measures			
Location		Variability	
Mean	2.625000	Std Deviation	0.79057
Median	2.250000	Variance	0.62500
Mode	2.000000	Range	2.00000
		Interquartile Range	1.25000

Variable: M3			
N	8	Sum Weights	8
Mean	2.9375	Sum Observations	23.5
Std Deviation	1.0155048	Variance	1.03125
Skewness	1.0422812	Kurtosis	-0.5232586
Uncorrected SS	76.25	Corrected SS	7.21875
Coeff Variation	34.5703762	Std Error Mean	0.35903517

Basic Statistical Measures			
Location		Variability	
Mean	2.937500	Std Deviation	1.01550
Median	2.500000	Variance	1.03125
Mode	2.500000	Range	2.50000
		Interquartile Range	1.50000

Variable: M4			
N	8	Sum Weights	8
Mean	2.3125	Sum Observations	18.5
Std Deviation	0.45806269	Variance	0.20982143
Skewness	-0.4877155	Kurtosis	0.4208239
Uncorrected SS	44.25	Corrected SS	1.46875
Coeff Variation	19.8081164	Std Error Mean	0.16194962

Basic Statistical Measures			
Location		Variability	
Mean	2.312500	Std Deviation	0.45806
Median	2.500000	Variance	0.20982
Mode	2.500000	Range	1.50000
		Interquartile Range	0.50000

Variable: M5			
N	8	Sum Weights	8
Mean	2.5625	Sum Observations	20.5
Std Deviation	0.56299581	Variance	0.31696429
Skewness	0.48783291	Kurtosis	-0.9886927
Uncorrected SS	54.75	Corrected SS	2.21875
Coeff Variation	21.9705683	Std Error Mean	0.19904908

Basic Statistical Measures			
Location		Variability	
Mean	2.562500	Std Deviation	0.56300
Median	2.500000	Variance	0.31696
Mode	2.000000	Range	1.50000
		Interquartile Range	1.00000

Variable: M6			
N	8	Sum Weights	8
Mean	2.75	Sum Observations	22
Std Deviation	0.37796447	Variance	0.14285714
Skewness	-1.3228757	Kurtosis	0.875
Uncorrected SS	61.5	Corrected SS	1
Coeff Variation	13.7441627	Std Error Mean	0.13363062

Basic Statistical Measures			
Location		Variability	

Mean	2.750000	Std Deviation	0.37796
Median	3.000000	Variance	0.14286
Mode	3.000000	Range	1.00000
		Interquartile Range	0.50000

Variable: M7

N	8	Sum Weights	8
Mean	2.1875	Sum Observations	17.5
Std Deviation	0.25877458	Variance	0.06696429
Skewness	0.64406119	Kurtosis	-2.24
Uncorrected SS	38.75	Corrected SS	0.46875
Coeff Variation	11.8296953	Std Error Mean	0.09149063

Basic Statistical Measures

Location		Variability	
Mean	2.187500	Std Deviation	0.25877
Median	2.000000	Variance	0.06696
Mode	2.000000	Range	0.50000
		Interquartile Range	0.50000

----- Type=Skills & labour -----

Variable: M1

N	8	Sum Weights	8
Mean	2.3125	Sum Observations	18.5
Std Deviation	0.45806269	Variance	0.20982143
Skewness	-0.4877155	Kurtosis	0.4208239
Uncorrected SS	44.25	Corrected SS	1.46875
Coeff Variation	19.8081164	Std Error Mean	0.16194962

Basic Statistical Measures

Location		Variability	
Mean	2.312500	Std Deviation	0.45806
Median	2.500000	Variance	0.20982
Mode	2.500000	Range	1.50000
		Interquartile Range	0.50000

Variable: M2

N	8	Sum Weights	8
Mean	2.625	Sum Observations	21
Std Deviation	0.44320263	Variance	0.19642857
Skewness	1.02559286	Kurtosis	1.85123967
Uncorrected SS	56.5	Corrected SS	1.375
Coeff Variation	16.8839097	Std Error Mean	0.15669579

Basic Statistical Measures

Location		Variability	
Mean	2.625000	Std Deviation	0.44320
Median	2.500000	Variance	0.19643
Mode	2.500000	Range	1.50000
		Interquartile Range	0.25000

Variable: M3

N	8	Sum Weights	8
Mean	2.5625	Sum Observations	20.5
Std Deviation	0.56299581	Variance	0.31696429
Skewness	0.48783291	Kurtosis	-0.9886927
Uncorrected SS	54.75	Corrected SS	2.21875
Coeff Variation	21.9705683	Std Error Mean	0.19904908

Basic Statistical Measures

Location		Variability	
Mean	2.562500	Std Deviation	0.56300
Median	2.500000	Variance	0.31696
Mode	2.000000	Range	1.50000
		Interquartile Range	1.00000

Variable: M4

N	8	Sum Weights	8
Mean	2.375	Sum Observations	19
Std Deviation	0.79056942	Variance	0.625
Skewness	-0.0361403	Kurtosis	-1.6822857
Uncorrected SS	49.5	Corrected SS	4.375
Coeff Variation	33.2871333	Std Error Mean	0.2795085

Basic Statistical Measures

Location		Variability	
Mean	2.375000	Std Deviation	0.79057
Median	2.500000	Variance	0.62500
Mode	1.500000	Range	2.00000
		Interquartile Range	1.50000

Variable: M5

N	8	Sum Weights	8
Mean	2.4375	Sum Observations	19.5
Std Deviation	0.56299581	Variance	0.31696429
Skewness	-0.4878329	Kurtosis	-0.9886927
Uncorrected SS	49.75	Corrected SS	2.21875
Coeff Variation	23.0972641	Std Error Mean	0.19904908

Basic Statistical Measures

Location		Variability	
Mean	2.437500	Std Deviation	0.56300

Median	2.500000	Variance	0.31696
Mode	3.000000	Range	1.50000
		Interquartile Range	1.00000

Variable: M6

N	8	Sum Weights	8
Mean	3.1875	Sum Observations	25.5
Std Deviation	0.7989949	Variance	0.63839286
Skewness	0.30195279	Kurtosis	-0.1648589
Uncorrected SS	85.75	Corrected SS	4.46875
Coeff Variation	25.0665068	Std Error Mean	0.28248736

Basic Statistical Measures

Location		Variability	
Mean	3.187500	Std Deviation	0.79899
Median	3.000000	Variance	0.63839
Mode	3.000000	Range	2.50000
		Interquartile Range	1.00000

Variable: M7

N	8	Sum Weights	8
Mean	2.125	Sum Observations	17
Std Deviation	0.23145502	Variance	0.05357143
Skewness	1.4401646	Kurtosis	6.9519E-16
Uncorrected SS	36.5	Corrected SS	0.375
Coeff Variation	10.8920012	Std Error Mean	0.08183171

Basic Statistical Measures

Location		Variability	
Mean	2.125000	Std Deviation	0.23146
Median	2.000000	Variance	0.05357
Mode	2.000000	Range	0.50000
		Interquartile Range	0.25000

# ADDENDUM C

Variable	N	Mean	Simple Statistics			Minimum	Maximum	Label
			Std Dev	Sum				
A1	21	1.38095	0.49761	29.00000	1.00000	2.00000	A1	
A2	21	1.57143	0.59761	33.00000	1.00000	3.00000	A2	
A3	21	1.57143	0.81064	33.00000	1.00000	4.00000	A3	
A4	21	2.04762	0.66904	43.00000	1.00000	3.00000	A4	
A5	21	2.38095	0.92066	50.00000	1.00000	5.00000	A5	
B1	21	1.80952	0.51177	38.00000	1.00000	3.00000	B1	
B2	21	2.09524	0.62488	44.00000	1.00000	3.00000	B2	
B3	21	2.04762	0.97346	43.00000	1.00000	5.00000	B3	
B4	21	1.47619	0.51177	31.00000	1.00000	2.00000	B4	
B5	21	2.52381	0.98077	53.00000	1.00000	5.00000	B5	
C1	21	2.23810	0.99523	47.00000	1.00000	4.00000	C1	
C2	21	2.52381	1.03049	53.00000	1.00000	4.00000	C2	
C3	21	2.04762	0.66904	43.00000	1.00000	4.00000	C3	
C4	21	1.76190	0.53896	37.00000	1.00000	3.00000	C4	
C5	21	2.61905	1.07127	55.00000	1.00000	5.00000	C5	
D1	21	2.47619	0.81358	52.00000	1.00000	4.00000	D1	
D2	21	1.66667	0.48305	35.00000	1.00000	2.00000	D2	
D3	21	1.95238	0.80475	41.00000	1.00000	3.00000	D3	
D4	21	2.23810	0.99523	47.00000	1.00000	4.00000	D4	
D5	21	2.42857	1.16496	51.00000	1.00000	5.00000	D5	

Cronbach Coefficient Alpha  
 Variables Alpha  
 Raw 0.850023  
 Standardized 0.827205

Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
A1	0.026659	0.854827	0.063634	0.835587	A1
A2	0.056647	0.855208	0.135940	0.832253	A2
A3	0.385170	0.845290	0.383899	0.820435	A3
A4	0.204191	0.851333	0.176337	0.830369	A4
A5	0.452333	0.842557	0.474169	0.815981	A5
B1	0.073481	0.853823	0.142921	0.831929	B1
B2	0.435217	0.843768	0.463202	0.816527	B2
B3	0.597618	0.835292	0.541021	0.812630	B3
B4	0.121320	0.852624	0.141766	0.831982	B4
B5	0.725196	0.828482	0.649309	0.807105	B5
C1	0.625273	0.833743	0.555216	0.811913	C1
C2	0.704926	0.829143	0.655710	0.806775	C2
C3	0.176185	0.852258	0.221892	0.828224	C3
C4	0.564402	0.840771	0.582465	0.810530	C4
C5	0.751274	0.826111	0.709870	0.803962	C5
D1	0.527637	0.839307	0.443762	0.817490	D1
D2	0.323115	0.847589	0.331395	0.822988	D2
D3	0.254184	0.850583	0.284119	0.825263	D3
D4	0.568668	0.836753	0.536704	0.812848	D4
D5	0.586573	0.835902	0.546214	0.812368	D5

# ADDENDUM D

**HISTORY**  
Product comparison

The NPAR1WAY Procedure  
Wilcoxon Scores (Rank Sums) for Variable Q1  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	286.50	264.0	23.927309	17.906250
Services	16	241.50	264.0	23.927309	15.093750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 286.5000  
Normal Approximation  
Z 0.9195  
One-Sided Pr > Z 0.1789  
Two-Sided Pr > |Z| 0.3579  
t Approximation  
One-Sided Pr > Z 0.1825  
Two-Sided Pr > |Z| 0.3650

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 0.8843  
DF 1  
Pr > Chi-Square 0.3470

Wilcoxon Scores (Rank Sums) for Variable Q2  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	334.50	264.0	25.870646	20.906250
Services	16	193.50	264.0	25.870646	12.093750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 334.5000  
Normal Approximation  
Z 2.7058  
One-Sided Pr > Z 0.0034  
Two-Sided Pr > |Z| 0.0068  
t Approximation  
One-Sided Pr > Z 0.0055  
Two-Sided Pr > |Z| 0.0110

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 7.4261  
DF 1  
Pr > Chi-Square 0.0064

Wilcoxon Scores (Rank Sums) for Variable Q3  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	212.0	264.0	21.695845	13.250
Services	16	316.0	264.0	21.695845	19.750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 212.0000  
Normal Approximation  
Z -2.3737  
One-Sided Pr < Z 0.0088  
Two-Sided Pr > |Z| 0.0176  
t Approximation  
One-Sided Pr < Z 0.0120  
Two-Sided Pr > |Z| 0.0240

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 5.7445  
DF 1  
Pr > Chi-Square 0.0165

Wilcoxon Scores (Rank Sums) for Variable Q4  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	232.0	264.0	15.244248	14.50
Services	16	296.0	264.0	15.244248	18.50

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 232.0000  
Normal Approximation  
Z -2.0664

One-Sided Pr < Z 0.0194  
 Two-Sided Pr > |Z| 0.0388  
 t Approximation  
 One-Sided Pr < Z 0.0236  
 Two-Sided Pr > |Z| 0.0472

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
 Chi-Square 4.4064  
 DF 1  
 Pr > Chi-Square 0.0358

Wilcoxon Scores (Rank Sums) for Variable Q5

Classified by Variable Product					
Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	253.50	264.0	22.860023	15.843750
Services	16	274.50	264.0	22.860023	17.156250

Average scores were used for ties.

Wilcoxon Two-Sample Test  
 Statistic 253.5000  
 Normal Approximation  
 Z -0.4374  
 One-Sided Pr < Z 0.3309  
 Two-Sided Pr > |Z| 0.6618  
 t Approximation  
 One-Sided Pr < Z 0.3324  
 Two-Sided Pr > |Z| 0.6648

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
 Chi-Square 0.2110  
 DF 1  
 Pr > Chi-Square 0.6460

Wilcoxon Scores (Rank Sums) for Variable Q6

Classified by Variable Product					
Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	208.0	264.0	19.129440	13.0
Services	16	320.0	264.0	19.129440	20.0

Average scores were used for ties.

Wilcoxon Two-Sample Test  
 Statistic 208.0000  
 Normal Approximation  
 Z -2.9013  
 One-Sided Pr < Z 0.0019  
 Two-Sided Pr > |Z| 0.0037  
 t Approximation  
 One-Sided Pr < Z 0.0034  
 Two-Sided Pr > |Z| 0.0068

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
 Chi-Square 8.5698  
 DF 1  
 Pr > Chi-Square 0.0034

Wilcoxon Scores (Rank Sums) for Variable Q7

Classified by Variable Product					
Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	256.0	264.0	8.0	16.0
Services	16	272.0	264.0	8.0	17.0

Average scores were used for ties.

Wilcoxon Two-Sample Test  
 Statistic 256.0000  
 Normal Approximation  
 Z -0.9375  
 One-Sided Pr < Z 0.1743  
 Two-Sided Pr > |Z| 0.3485  
 t Approximation  
 One-Sided Pr < Z 0.1779  
 Two-Sided Pr > |Z| 0.3557

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
 Chi-Square 1.0000  
 DF 1  
 Pr > Chi-Square 0.3173

Type of supplier comparison

Wilcoxon Scores (Rank Sums) for Variable Q1  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	112.00	132.0	20.721658	14.00000

Manufacturers	8	174.50	132.0	20.721658	21.81250
Repair services	8	132.50	132.0	20.721658	16.56250
Skills & labour	8	109.00	132.0	20.721658	13.62500

Average scores were used for ties.

Kruskal-Wallis Test  
Chi-Square 4.7780  
DF 3  
Pr > Chi-Square 0.1888

Wilcoxon Scores (Rank Sums) for Variable Q2

Classified by Variable Type					
Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	151.50	132.0	22.404637	18.93750
Manufacturers	8	183.00	132.0	22.404637	22.87500
Repair services	8	96.00	132.0	22.404637	12.00000
Skills & labour	8	97.50	132.0	22.404637	12.18750

Average scores were used for ties.

Kruskal-Wallis Test  
Chi-Square 8.1691  
DF 3  
Pr > Chi-Square 0.0426

Wilcoxon Scores (Rank Sums) for Variable Q3

Classified by Variable Type					
Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	106.0	132.0	18.789153	13.250
Manufacturers	8	106.0	132.0	18.789153	13.250
Repair services	8	178.0	132.0	18.789153	22.250
Skills & labour	8	138.0	132.0	18.789153	17.250

Average scores were used for ties.

Kruskal-Wallis Test  
Chi-Square 7.4441  
DF 3  
Pr > Chi-Square 0.0590

Wilcoxon Scores (Rank Sums) for Variable Q4

Classified by Variable Type					
Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	116.0	132.0	13.201906	14.50
Manufacturers	8	116.0	132.0	13.201906	14.50
Repair services	8	116.0	132.0	13.201906	14.50
Skills & labour	8	180.0	132.0	13.201906	22.50

Average scores were used for ties.

Kruskal-Wallis Test  
Chi-Square 13.2193  
DF 3  
Pr > Chi-Square 0.0042

Wilcoxon Scores (Rank Sums) for Variable Q5

Classified by Variable Type					
Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	130.50	132.0	19.797361	16.31250
Manufacturers	8	123.00	132.0	19.797361	15.37500
Repair services	8	117.00	132.0	19.797361	14.62500
Skills & labour	8	157.50	132.0	19.797361	19.68750

Average scores were used for ties.

Kruskal-Wallis Test  
Chi-Square 1.8342  
DF 3  
Pr > Chi-Square 0.6075

Wilcoxon Scores (Rank Sums) for Variable Q6

Classified by Variable Type					
Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	104.0	132.0	16.566581	13.0000
Manufacturers	8	104.0	132.0	16.566581	13.0000
Repair services	8	119.0	132.0	16.566581	14.8750
Skills & labour	8	201.0	132.0	16.566581	25.1250

Average scores were used for ties.

Kruskal-Wallis Test  
Chi-Square 17.7572  
DF 3  
Pr > Chi-Square 0.0005

Wilcoxon Scores (Rank Sums) for Variable Q7

Classified by Variable Type					
Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	128.0	132.0	6.928203	16.0
Manufacturers	8	128.0	132.0	6.928203	16.0
Repair services	8	128.0	132.0	6.928203	16.0
Skills & labour	8	144.0	132.0	6.928203	18.0

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 3.0000  
 DF 3  
 Pr > Chi-Square 0.3916

**Product comparison  
 Analysis of Variance**

Dependent Variable: Q1

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2.0000000	2.0000000	0.91	0.3475
Error	30	65.8750000	2.1958333		
Corrected Total	31	67.8750000			

R-Square 0.029466    Coeff Var 71.84652    Root MSE 1.481834    Q1 Mean 2.062500

Dependent Variable: Q2

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	2.0000000	2.0000000	0.91	0.3475

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	18.0000000	18.0000000	10.61	0.0028
Error	30	50.8750000	1.6958333		
Corrected Total	31	68.8750000			

R-Square 0.261343    Coeff Var 48.45550    Root MSE 1.302242    Q2 Mean 2.687500

Dependent Variable: Q3

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	18.0000000	18.0000000	10.61	0.0028

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	6.1250000	6.1250000	6.18	0.0187
Error	30	29.7500000	0.9916667		
Corrected Total	31	35.8750000			

R-Square 0.170732    Coeff Var 63.73278    Root MSE 0.995825    Q3 Mean 1.562500

Dependent Variable: Q4

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	6.1250000	6.1250000	6.18	0.0187

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.5312500	1.5312500	3.85	0.0591
Error	30	11.9375000	0.3979167		
Corrected Total	31	13.4687500			

R-Square 0.113689    Coeff Var 51.75847    Root MSE 0.630806    Q4 Mean 1.218750

Dependent Variable: Q5

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	1.5312500	1.5312500	3.85	0.0591

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.0312500	0.0312500	0.05	0.8207
Error	30	17.9375000	0.5979167		
Corrected Total	31	17.9687500			

R-Square 0.001739    Coeff Var 50.49801    Root MSE 0.773251    Q5 Mean 1.531250

Dependent Variable: Q6

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.0312500	0.0312500	0.05	0.8207

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	3.1250000	3.1250000	7.98	0.0083
Error	30	11.7500000	0.3916667		
Corrected Total	31	14.8750000			

R-Square 0.210084    Coeff Var 47.68250    Root MSE 0.625833    Q6 Mean 1.312500

Dependent Variable: Q7

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	3.1250000	3.1250000	7.98	0.0083

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.0312500	0.0312500	1.00	0.3253
Error	30	0.9375000	0.0312500		
Corrected Total	31	0.9687500			

R-Square 0.032258    Coeff Var 17.14198    Root MSE 0.176777    Q7 Mean 1.031250

Product 1 0.03125000 0.03125000 1.00 0.3253

Tukey's Studentized Range (HSD) Test for Q1

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 2.195833  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 1.07

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.3125	16	Goods
A	1.8125	16	Services

Tukey's Studentized Range (HSD) Test for Q2

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 1.695833  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.9403

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.4375	16	Goods
B	1.9375	16	Services

Tukey's Studentized Range (HSD) Test for Q3

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.991667  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.719

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.0000	16	Services
B	1.1250	16	Goods

Tukey's Studentized Range (HSD) Test for Q4

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.397917  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.4555

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	1.4375	16	Services
A	1.0000	16	Goods

Tukey's Studentized Range (HSD) Test for Q5

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.597917  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.5583

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	1.5625	16	Services
A	1.5000	16	Goods

Tukey's Studentized Range (HSD) Test for Q6

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.391667  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.4519

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	1.6250	16	Services
B	1.0000	16	Goods

Tukey's Studentized Range (HSD) Test for Q7

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.03125  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.1276

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	1.06250	16	Services
A			
A	1.00000	16	Goods

Type of supplier comparison  
 Analysis of variance

Dependent Variable: Q1

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	10.12500000	3.37500000	1.64	0.2034
Error	28	57.75000000	2.06250000		
Corrected Total	31	67.87500000			

R-Square Coeff Var Root MSE Q1 Mean



Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 1.758929  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.8105

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	3.7500	8	Manufacturers
B A	3.1250	8	Agents & Stockists
B A	2.0000	8	Repair services
B	1.8750	8	Skills & labour

Tukey's Studentized Range (HSD) Test for Q3  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.919643  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.3092

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	2.5000	8	Repair services
B A	1.5000	8	Skills & labour
B	1.1250	8	Agents & Stockists
B	1.1250	8	Manufacturers

Tukey's Studentized Range (HSD) Test for Q4  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.316964  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.7686

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	1.8750	8	Skills & labour
B	1.0000	8	Agents & Stockists
B	1.0000	8	Repair services
B	1.0000	8	Manufacturers

Tukey's Studentized Range (HSD) Test for Q5  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.620536  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.0754

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	1.7500	8	Skills & labour
A	1.5000	8	Agents & Stockists
A	1.5000	8	Manufacturers
A	1.3750	8	Repair services

Tukey's Studentized Range (HSD) Test for Q6  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.276786  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.7182

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	2.1250	8	Skills & labour
B	1.1250	8	Repair services
B	1.0000	8	Agents & Stockists
B	1.0000	8	Manufacturers

Tukey's Studentized Range (HSD) Test for Q7  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.03125  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.2413

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	1.12500	8	Skills & labour
A	1.00000	8	Agents & Stockists
A	1.00000	8	Repair services
A	1.00000	8	Manufacturers

Current interviews  
Product comparison

Wilcoxon Scores (Rank Sums) for Variable Q1  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	256.50	264.0	22.128656	16.031250
Services	16	271.50	264.0	22.128656	16.968750

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	256.5000
Normal Approximation	
Z	-0.3163
One-Sided Pr < Z	0.3759
Two-Sided Pr >  Z	0.7518
t Approximation	
One-Sided Pr < Z	0.3769
Two-Sided Pr >  Z	0.7539

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.1149
DF	1
Pr > Chi-Square	0.7347

Wilcoxon Scores (Rank Sums) for Variable Q2  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	250.50	264.0	21.447611	15.656250
Services	16	277.50	264.0	21.447611	17.343750

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	250.5000
Normal Approximation	
Z	-0.6061
One-Sided Pr < Z	0.2722
Two-Sided Pr >  Z	0.5444
t Approximation	
One-Sided Pr < Z	0.2744
Two-Sided Pr >  Z	0.5488

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.3962
DF	1
Pr > Chi-Square	0.5291

Wilcoxon Scores (Rank Sums) for Variable Q3  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	232.0	264.0	24.067110	14.50
Services	16	296.0	264.0	24.067110	18.50

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	232.0000
Normal Approximation	
Z	-1.3088
One-Sided Pr < Z	0.0953
Two-Sided Pr >  Z	0.1906
t Approximation	
One-Sided Pr < Z	0.1001
Two-Sided Pr >  Z	0.2002

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.7679
DF	1
Pr > Chi-Square	0.1836

Wilcoxon Scores (Rank Sums) for Variable Q4  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	246.50	264.0	24.889433	15.406250
Services	16	281.50	264.0	24.889433	17.593750

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	246.5000
Normal Approximation	
Z	-0.6830
One-Sided Pr < Z	0.2473
Two-Sided Pr >  Z	0.4946
t Approximation	
One-Sided Pr < Z	0.2498
Two-Sided Pr >  Z	0.4997

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 0.4944  
DF 1  
Pr > Chi-Square 0.4820

Wilcoxon Scores (Rank Sums) for Variable Q5  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	302.0	264.0	24.917930	18.8750
Services	16	226.0	264.0	24.917930	14.1250

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 302.0000  
Normal Approximation  
Z 1.5049  
One-Sided Pr > Z 0.0662  
Two-Sided Pr > |Z| 0.1323  
t Approximation  
One-Sided Pr > Z 0.0712  
Two-Sided Pr > |Z| 0.1425

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 2.3256  
DF 1  
Pr > Chi-Square 0.1273

Wilcoxon Scores (Rank Sums) for Variable Q6  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	235.50	264.0	24.889433	14.718750
Services	16	292.50	264.0	24.889433	18.281250

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 235.5000  
Normal Approximation  
Z -1.1250  
One-Sided Pr < Z 0.1303  
Two-Sided Pr > |Z| 0.2606  
t Approximation  
One-Sided Pr < Z 0.1346  
Two-Sided Pr > |Z| 0.2692

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 1.3112  
DF 1  
Pr > Chi-Square 0.2522

Wilcoxon Scores (Rank Sums) for Variable Q7  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	226.0	264.0	21.716650	14.1250
Services	16	302.0	264.0	21.716650	18.8750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 226.0000  
Normal Approximation  
Z -1.7268  
One-Sided Pr < Z 0.0421  
Two-Sided Pr > |Z| 0.0842  
t Approximation  
One-Sided Pr < Z 0.0471  
Two-Sided Pr > |Z| 0.0942

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 3.0618  
DF 1  
Pr > Chi-Square 0.0802

Wilcoxon Scores (Rank Sums) for Variable Q1  
Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	122.50	132.0	19.163978	15.31250
Manufacturers	8	134.00	132.0	19.163978	16.75000
Repair services	8	134.00	132.0	19.163978	16.75000
Skills & labour	8	137.50	132.0	19.163978	17.18750

Average scores were used for ties.

Kruskal-Wallis Test  
Chi-Square 0.2624  
DF 3

## Type of supplier comparison

## Wilcoxon Scores (Rank Sums) for Variable Q2

## Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	104.00	132.0	18.574176	13.00000
Manufacturers	8	146.50	132.0	18.574176	18.31250
Repair services	8	131.00	132.0	18.574176	16.37500
Skills & labour	8	146.50	132.0	18.574176	18.31250

Average scores were used for ties.

## Kruskal-Wallis Test

Chi-Square	2.6207
DF	3
Pr > Chi-Square	0.4539

## Wilcoxon Scores (Rank Sums) for Variable Q3

## Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	114.50	132.0	20.842729	14.31250
Manufacturers	8	117.50	132.0	20.842729	14.68750
Repair services	8	134.00	132.0	20.842729	16.75000
Skills & labour	8	162.00	132.0	20.842729	20.25000

Average scores were used for ties.

## Kruskal-Wallis Test

Chi-Square	2.4524
DF	3
Pr > Chi-Square	0.4840

## Wilcoxon Scores (Rank Sums) for Variable Q4

## Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	104.50	132.0	21.554881	13.06250
Manufacturers	8	142.00	132.0	21.554881	17.75000
Repair services	8	171.50	132.0	21.554881	21.43750
Skills & labour	8	110.00	132.0	21.554881	13.75000

Average scores were used for ties.

## Kruskal-Wallis Test

Chi-Square	4.6821
DF	3
Pr > Chi-Square	0.1966

## Wilcoxon Scores (Rank Sums) for Variable Q5

## Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	121.50	132.0	21.579560	15.18750
Manufacturers	8	180.50	132.0	21.579560	22.56250
Repair services	8	140.50	132.0	21.579560	17.56250
Skills & labour	8	85.50	132.0	21.579560	10.68750

Average scores were used for ties.

## Kruskal-Wallis Test

Chi-Square	7.5648
DF	3
Pr > Chi-Square	0.0559

## Wilcoxon Scores (Rank Sums) for Variable Q6

## Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	115.50	132.0	21.554881	14.43750
Manufacturers	8	120.00	132.0	21.554881	15.00000
Repair services	8	148.00	132.0	21.554881	18.50000
Skills & labour	8	144.50	132.0	21.554881	18.06250

Average scores were used for ties.

## Kruskal-Wallis Test

Chi-Square	1.3374
DF	3
Pr > Chi-Square	0.7203

## Wilcoxon Scores (Rank Sums) for Variable Q7

## Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	85.00	132.0	18.807171	10.62500
Manufacturers	8	141.00	132.0	18.807171	17.62500
Repair services	8	164.50	132.0	18.807171	20.56250
Skills & labour	8	137.50	132.0	18.807171	17.18750

Average scores were used for ties.

## Kruskal-Wallis Test

Chi-Square	7.1595
DF	3

### Product comparison Analysis of variance

Dependent Variable: Q1

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.03125000	0.03125000	0.10	0.7548
Error	30	9.43750000	0.31458333		
Corrected Total	31	9.46875000			
	R-Square	Coeff Var	Root MSE	Q1 Mean	
	0.003300	17.42531	0.560877	3.218750	

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.03125000	0.03125000	0.10	0.7548

Dependent Variable: Q2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.12500000	0.12500000	0.48	0.4955
Error	30	7.87500000	0.26250000		
Corrected Total	31	8.00000000			
	R-Square	Coeff Var	Root MSE	Q2 Mean	
	0.015625	15.76454	0.512348	3.250000	

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.12500000	0.12500000	0.48	0.4955

Dependent Variable: Q3

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.12500000	1.12500000	1.90	0.1781
Error	30	17.75000000	0.59166667		
Corrected Total	31	18.87500000			
	R-Square	Coeff Var	Root MSE	Q3 Mean	
	0.059603	23.22109	0.769199	3.312500	

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	1.12500000	1.12500000	1.90	0.1781

Dependent Variable: Q4

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.50000000	0.50000000	0.65	0.4257
Error	30	23.00000000	0.76666667		
Corrected Total	31	23.50000000			
	R-Square	Coeff Var	Root MSE	Q4 Mean	
	0.021277	28.01904	0.875595	3.125000	

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.50000000	0.50000000	0.65	0.4257

Dependent Variable: Q5

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.53125000	1.53125000	2.12	0.1559
Error	30	21.68750000	0.72291667		
Corrected Total	31	23.21875000			
	R-Square	Coeff Var	Root MSE	Q5 Mean	
	0.065949	23.25457	0.850245	3.656250	

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	1.53125000	1.53125000	2.12	0.1559

Dependent Variable: Q6

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.53125000	1.53125000	1.47	0.2344
Error	30	31.18750000	1.03958333		
Corrected Total	31	32.71875000			
	R-Square	Coeff Var	Root MSE	Q6 Mean	
	0.046800	24.90625	1.019600	4.093750	

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	1.53125000	1.53125000	1.47	0.2344

Dependent Variable: Q7

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.78125000	0.78125000	1.96	0.1714
Error	30	11.93750000	0.39791667		
Corrected Total	31	12.71875000			
	R-Square	Coeff Var	Root MSE	Q7 Mean	
	0.061425	20.38970	0.630806	3.093750	

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.78125000	0.78125000	1.96	0.1714

Tukey's Studentized Range (HSD) Test for Q1  
 NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.314583  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.405

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.2500	16	Services
A	3.1875	16	Goods

Tukey's Studentized Range (HSD) Test for Q2  
 Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.2625  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.3699

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.3125	16	Services
A	3.1875	16	Goods

Tukey's Studentized Range (HSD) Test for Q3  
 Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.591667  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.5554

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.5000	16	Services
A	3.1250	16	Goods

Tukey's Studentized Range (HSD) Test for Q4  
 Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.766667  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.6322

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.2500	16	Services
A	3.0000	16	Goods

Tukey's Studentized Range (HSD) Test for Q5  
 Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.722917  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.6139

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.8750	16	Goods
A	3.4375	16	Services

Tukey's Studentized Range (HSD) Test for Q6  
 Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 1.039583  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.7362

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	4.3125	16	Services
A	3.8750	16	Goods

Tukey's Studentized Range (HSD) Test for Q7  
 Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.397917  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.4555

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.2500	16	Services
A	2.9375	16	Goods

### Type of supplier comparison Analysis of variance

Dependent Variable: Q1

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.09375000	0.03125000	0.09	0.9631
Error	28	9.37500000	0.33482143		
Corrected Total	31	9.46875000			

R-Square	Coeff Var	Root MSE	Q1 Mean
0.009901	17.97709	0.578638	3.218750

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	0.09375000	0.03125000	0.09	0.9631

Dependent Variable: Q2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.75000000	0.25000000	0.97	0.4228
Error	28	7.25000000	0.25892857		
Corrected Total	31	8.00000000			

R-Square 0.093750    Coeff Var 15.65693    Root MSE 0.508850    Q2 Mean 3.250000

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	0.75000000	0.25000000	0.97	0.4228

Dependent Variable: Q3

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1.62500000	0.54166667	0.88	0.4637
Error	28	17.25000000	0.61607143		
Corrected Total	31	18.87500000			

R-Square 0.086093    Coeff Var 23.69516    Root MSE 0.784902    Q3 Mean 3.312500

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	1.62500000	0.54166667	0.88	0.4637

Dependent Variable: Q4

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	3.75000000	1.25000000	1.77	0.1753
Error	28	19.75000000	0.70535714		
Corrected Total	31	23.50000000			

R-Square 0.159574    Coeff Var 26.87537    Root MSE 0.839855    Q4 Mean 3.125000

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	3.75000000	1.25000000	1.77	0.1753

Dependent Variable: Q5

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	5.34375000	1.78125000	2.79	0.0589
Error	28	17.87500000	0.63839286		
Corrected Total	31	23.21875000			

R-Square 0.230148    Coeff Var 21.85285    Root MSE 0.798995    Q5 Mean 3.656250

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	5.34375000	1.78125000	2.79	0.0589

Dependent Variable: Q6

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1.84375000	0.61458333	0.56	0.6475
Error	28	30.87500000	1.10267857		
Corrected Total	31	32.71875000			

R-Square 0.056351    Coeff Var 25.65093    Root MSE 1.050085    Q6 Mean 4.093750

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	1.84375000	0.61458333	0.56	0.6475

Dependent Variable: Q7

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	2.59375000	0.86458333	2.39	0.0898
Error	28	10.12500000	0.36160714		
Corrected Total	31	12.71875000			

R-Square 0.203931    Coeff Var 19.43718    Root MSE 0.601338    Q7 Mean 3.093750

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	2.59375000	0.86458333	2.39	0.0898

Tukey's Studentized Range (HSD) Test for Q1

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.334821  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.7899

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	3.2500	8	Repair services
A	3.2500	8	Manufacturers
A	3.2500	8	Skills & labour
A	3.1250	8	Agents & Stockists

Tukey's Studentized Range (HSD) Test for Q2

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.258929  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.6947

Means with the same letter are not significantly different.  
 Tukey Grouping Mean N Type

A 3.3750 8 Manufacturers  
 A 3.3750 8 Skills & labour  
 A 3.2500 8 Repair services  
 A 3.0000 8 Agents & Stockists

Tukey's Studentized Range (HSD) Test for Q3  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.616071  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.0715

Means with the same letter are not significantly different.  
 Tukey Grouping Mean N Type

A 3.6250 8 Skills & labour  
 A 3.3750 8 Repair services  
 A 3.2500 8 Manufacturers  
 A 3.0000 8 Agents & Stockists

Tukey's Studentized Range (HSD) Test for Q4  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.705357  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.1465

Means with the same letter are not significantly different.  
 Tukey Grouping Mean N Type

A 3.6250 8 Repair services  
 A 3.2500 8 Manufacturers  
 A 2.8750 8 Skills & labour  
 A 2.7500 8 Agents & Stockists

Tukey's Studentized Range (HSD) Test for Q5  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.638393  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.0908

Means with the same letter are not significantly different.

Tukey Grouping Mean N Type  
 A 4.2500 8 Manufacturers  
 B A 3.7500 8 Repair services  
 B A 3.5000 8 Agents & Stockists  
 B 3.1250 8 Skills & labour

Tukey's Studentized Range (HSD) Test for Q6  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 1.102679  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.4335

Means with the same letter are not significantly different.

Tukey Grouping Mean N Type  
 A 4.3750 8 Repair services  
 A 4.2500 8 Skills & labour  
 A 4.0000 8 Manufacturers  
 A 3.7500 8 Agents & Stockists

Tukey's Studentized Range (HSD) Test for Q7  
 Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.361607  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.8209

Means with the same letter are not significantly different.

Tukey Grouping Mean N Type  
 A 3.3750 8 Repair services  
 A 3.2500 8 Manufacturers  
 A 3.1250 8 Skills & labour  
 A 2.6250 8 Agents & Stockists

Average of history and current interviews  
Product comparisons

Wilcoxon Scores (Rank Sums) for Variable M1  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	277.50	264.0	25.645222	17.343750
Services	16	250.50	264.0	25.645222	15.656250

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 277.5000  
Normal Approximation  
Z .5069  
One-Sided Pr > Z 0.3061  
Two-Sided Pr > |Z| 0.6122  
t Approximation  
One-Sided Pr > Z 0.3079  
Two-Sided Pr > |Z| 0.6158  
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 0.2771  
DF 1  
Pr > Chi-Square 0.5986

Wilcoxon Scores (Rank Sums) for Variable M2  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	324.50	264.0	25.977658	20.281250
Services	16	203.50	264.0	25.977658	12.718750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 324.5000  
Normal Approximation  
Z 2.3097  
One-Sided Pr > Z 0.0105  
Two-Sided Pr > |Z| 0.0209  
t Approximation  
One-Sided Pr > Z 0.0139  
Two-Sided Pr > |Z| 0.0277  
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 5.4239  
DF 1  
Pr > Chi-Square 0.0199

Wilcoxon Scores (Rank Sums) for Variable M3  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	207.50	264.0	25.410183	12.968750
Services	16	320.50	264.0	25.410183	20.031250

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 207.5000  
Normal Approximation  
Z -2.2038  
One-Sided Pr < Z 0.0138  
Two-Sided Pr > |Z| 0.0275  
t Approximation  
One-Sided Pr < Z 0.0175  
Two-Sided Pr > |Z| 0.0351  
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 4.9440  
DF 1  
Pr > Chi-Square 0.0262

Wilcoxon Scores (Rank Sums) for Variable M4  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	221.0	264.0	25.481176	13.81250
Services	16	307.0	264.0	25.481176	19.18750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 221.0000  
Normal Approximation  
Z -1.6679  
One-Sided Pr < Z 0.0477  
Two-Sided Pr > |Z| 0.0953  
t Approximation  
One-Sided Pr < Z 0.0527  
Two-Sided Pr > |Z| 0.1054  
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test  
Chi-Square 2.8477

DF 1  
Pr > Chi-Square 0.0915

Wilcoxon Scores (Rank Sums) for Variable M5  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	288.0	264.0	25.662826	18.0
Services	16	240.0	264.0	25.662826	15.0

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 288.0000

Normal Approximation  
Z 0.9157  
One-Sided Pr > Z 0.1799  
Two-Sided Pr > |Z| 0.3598  
t Approximation  
One-Sided Pr > Z 0.1834  
Two-Sided Pr > |Z| 0.3669

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square 0.8746  
DF 1  
Pr > Chi-Square 0.3497

Wilcoxon Scores (Rank Sums) for Variable M6  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	209.0	264.0	25.116503	13.06250
Services	16	319.0	264.0	25.116503	19.93750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 209.0000

Normal Approximation  
Z -2.1699  
One-Sided Pr < Z 0.0150  
Two-Sided Pr > |Z| 0.0300  
t Approximation  
One-Sided Pr < Z 0.0189  
Two-Sided Pr > |Z| 0.0378

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square 4.7952  
DF 1  
Pr > Chi-Square 0.0285

Wilcoxon Scores (Rank Sums) for Variable M7  
Classified by Variable Product

Product	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Goods	16	220.50	264.0	22.349136	13.781250
Services	16	307.50	264.0	22.349136	19.218750

Average scores were used for ties.

Wilcoxon Two-Sample Test  
Statistic 220.5000

Normal Approximation  
Z -1.9240  
One-Sided Pr < Z 0.0272  
Two-Sided Pr > |Z| 0.0544  
t Approximation  
One-Sided Pr < Z 0.0318  
Two-Sided Pr > |Z| 0.0636

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square 3.7884  
DF 1  
Pr > Chi-Square 0.0516

The ANOVA Procedure

Dependent Variable: M1

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.38281250	0.38281250	0.53	0.4729
Error	30	21.73437500	0.72447917		
Corrected Total	31	22.11718750			

R-Square 0.017308  
Coeff Var 32.23341  
Root MSE 0.851163  
M1 Mean 2.640625

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.38281250	0.38281250	0.53	0.4729

Dependent Variable: M2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	3.78125000	3.78125000	7.01	0.0128
Error	30	16.18750000	0.53958333		

Corrected Total 31 19.96875000

R-Square 0.189358  
 Coeff Var 24.74319  
 Root MSE 0.734563  
 M2 Mean 2.968750

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	3.78125000	3.78125000	7.01	0.0128

Dependent Variable: M3

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	3.12500000	3.12500000	6.82	0.0140
Error	30	13.75000000	0.45833333		
Corrected Total	31	16.87500000			

R-Square 0.185185  
 Coeff Var 27.77449  
 Root MSE 0.677003  
 M3 Mean 2.437500

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	3.12500000	3.12500000	6.82	0.0140

Dependent Variable: M4

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.94531250	0.94531250	3.39	0.0754
Error	30	8.35937500	0.27864583		
Corrected Total	31	9.30468750			

R-Square 0.101595  
 Coeff Var 24.30477  
 Root MSE 0.527869  
 M4 Mean 2.171875

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.94531250	0.94531250	3.39	0.0754

Dependent Variable: M5

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.28125000	0.28125000	0.89	0.3519
Error	30	9.43750000	0.31458333		
Corrected Total	31	9.71875000			

R-Square 0.028939  
 Coeff Var 21.62418  
 Root MSE 0.560877  
 M5 Mean 2.593750

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.28125000	0.28125000	0.89	0.3519

Dependent Variable: M6

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2.25781250	2.25781250	6.06	0.0198
Error	30	11.17187500	0.37239583		
Corrected Total	31	13.42968750			

R-Square 0.168121  
 Coeff Var 22.57544  
 Root MSE 0.610242  
 M6 Mean 2.703125

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	2.25781250	2.25781250	6.06	0.0198

Dependent Variable: M7

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.28125000	0.28125000	2.73	0.1091
Error	30	3.09375000	0.10312500		
Corrected Total	31	3.37500000			

R-Square 0.083333  
 Coeff Var 15.56998  
 Root MSE 0.321131  
 M7 Mean 2.062500

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Product	1	0.28125000	0.28125000	2.73	0.1091

Tukey's Studentized Range (HSD) Test for M1

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	30
Error Mean Square	0.724479
Critical Value of Studentized Range	2.88822
Minimum Significant Difference	0.6146

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.7500	16	Goods
A	2.5313	16	Services

Tukey's Studentized Range (HSD) Test for M2

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	30
Error Mean Square	0.539583
Critical Value of Studentized Range	2.88822
Minimum Significant Difference	0.5304

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	3.3125	16	Goods

B 2.6250 16 Services

Tukey's Studentized Range (HSD) Test for M3

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.458333  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.4888

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.7500	16	Services
B	2.1250	16	Goods

Tukey's Studentized Range (HSD) Test for M4

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.278646  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.3812

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.3438	16	Services
A	2.0000	16	Goods

Tukey's Studentized Range (HSD) Test for M5

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.314583  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.405

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.6875	16	Goods
A	2.5000	16	Services

Tukey's Studentized Range (HSD) Test for M6

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.372396  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.4406

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.9688	16	Services
B	2.4375	16	Goods

Tukey's Studentized Range (HSD) Test for M7

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 30  
 Error Mean Square 0.103125  
 Critical Value of Studentized Range 2.88822  
 Minimum Significant Difference 0.2319

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Product
A	2.1563	16	Services
A	1.9688	16	Goods

Type of supplier comparison

Wilcoxon Scores (Rank Sums) for Variable M1  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	108.50	132.0	22.209414	13.56250
Manufacturers	8	169.00	132.0	22.209414	21.12500
Repair services	8	136.50	132.0	22.209414	17.06250
Skills & labour	8	114.00	132.0	22.209414	14.25000

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 3.4447  
 DF 3  
 Pr > Chi-Square 0.3280

Wilcoxon Scores (Rank Sums) for Variable M2  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	141.00	132.0	22.497312	17.62500
Manufacturers	8	183.50	132.0	22.497312	22.93750
Repair services	8	98.50	132.0	22.497312	12.31250
Skills & labour	8	105.00	132.0	22.497312	13.12500

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 6.7935  
 DF 3  
 Pr > Chi-Square 0.0788

Wilcoxon Scores (Rank Sums) for Variable M3  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	101.50	132.0	22.005864	12.68750
Manufacturers	8	106.00	132.0	22.005864	13.25000
Repair services	8	168.50	132.0	22.005864	21.06250
Skills & labour	8	152.00	132.0	22.005864	19.00000

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 5.1705  
 DF 3  
 Pr > Chi-Square 0.1597

Wilcoxon Scores (Rank Sums) for Variable M4  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	94.00	132.0	22.067346	11.75000
Manufacturers	8	127.00	132.0	22.067346	15.87500
Repair services	8	154.50	132.0	22.067346	19.31250
Skills & labour	8	152.50	132.0	22.067346	19.06250

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 3.6894  
 DF 3  
 Pr > Chi-Square 0.2970

Wilcoxon Scores (Rank Sums) for Variable M5  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	120.00	132.0	22.224659	15.00000
Manufacturers	8	168.00	132.0	22.224659	21.00000
Repair services	8	125.50	132.0	22.224659	15.68750
Skills & labour	8	114.50	132.0	22.224659	14.31250

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 2.7157  
 DF 3  
 Pr > Chi-Square 0.4376

Wilcoxon Scores (Rank Sums) for Variable M6  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	102.50	132.0	21.751529	12.81250
Manufacturers	8	106.50	132.0	21.751529	13.31250
Repair services	8	141.50	132.0	21.751529	17.68750
Skills & labour	8	177.50	132.0	21.751529	22.18750

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 5.8351  
 DF 3  
 Pr > Chi-Square 0.1199

Wilcoxon Scores (Rank Sums) for Variable M7  
 Classified by Variable Type

Type	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Agents & Stockists	8	82.50	132.0	19.354919	10.31250
Manufacturers	8	138.00	132.0	19.354919	17.25000
Repair services	8	160.50	132.0	19.354919	20.06250
Skills & labour	8	147.00	132.0	19.354919	18.37500

Average scores were used for ties.

Kruskal-Wallis Test  
 Chi-Square 7.0543

DF 3  
Pr > Chi-Square 0.0702

The ANOVA Procedure

Dependent Variable: M1

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	2.71093750	0.90364583	1.30	0.2927
Error	28	19.40625000	0.69308036		
Corrected Total	31	22.11718750			

	R-Square	Coeff Var	Root MSE	M1 Mean
	0.122572	31.52718	0.832514	2.640625

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	2.71093750	0.90364583	1.30	0.2927

Dependent Variable: M2

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	4.78125000	1.59375000	2.94	0.0504
Error	28	15.18750000	0.54241071		
Corrected Total	31	19.96875000			

	R-Square	Coeff Var	Root MSE	M2 Mean
	0.239437	24.80793	0.736485	2.968750

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	4.78125000	1.59375000	2.94	0.0504

Dependent Variable: M3

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	3.75000000	1.25000000	2.67	0.0670
Error	28	13.12500000	0.46875000		
Corrected Total	31	16.87500000			

	R-Square	Coeff Var	Root MSE	M3 Mean
	0.222222	28.08834	0.684653	2.437500

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	3.75000000	1.25000000	2.67	0.0670

Dependent Variable: M4

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1.21093750	0.40364583	1.40	0.2645
Error	28	8.09375000	0.28906250		
Corrected Total	31	9.30468750			

	R-Square	Coeff Var	Root MSE	M4 Mean
	0.130143	24.75489	0.537645	2.171875

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	1.21093750	0.40364583	1.40	0.2645

Dependent Variable: M5

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.90625000	0.30208333	0.96	0.4254
Error	28	8.81250000	0.31473214		
Corrected Total	31	9.71875000			

	R-Square	Coeff Var	Root MSE	M5 Mean
	0.093248	21.62930	0.561010	2.593750

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	0.90625000	0.30208333	0.96	0.4254

Dependent Variable: M6

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	3.08593750	1.02864583	2.78	0.0592
Error	28	10.34375000	0.36941964		
Corrected Total	31	13.42968750			

	R-Square	Coeff Var	Root MSE	M6 Mean
	0.229785	22.48505	0.607799	2.703125

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	3.08593750	1.02864583	2.78	0.0592

Dependent Variable: M7

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	0.68750000	0.22916667	2.39	0.0901
Error	28	2.68750000	0.09598214		
Corrected Total	31	3.37500000			

	R-Square	Coeff Var	Root MSE	M7 Mean
	0.203704	15.02108	0.309810	2.062500

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Type	3	0.68750000	0.22916667	2.39	0.0901

Tukey's Studentized Range (HSD) Test for M1

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.69308  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.1365

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	3.0625	8	Manufacturers
A	2.7500	8	Repair services
A	2.4375	8	Agents & Stockists
A	2.3125	8	Skills & labour

Tukey's Studentized Range (HSD) Test for M2

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.542411  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 1.0054

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	3.5625	8	Manufacturers
A	3.0625	8	Agents & Stockists
A	2.6250	8	Repair services
A	2.6250	8	Skills & labour

Tukey's Studentized Range (HSD) Test for M3

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.46875  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.9347

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	2.9375	8	Repair services
A	2.5625	8	Skills & labour
A	2.1875	8	Manufacturers
A	2.0625	8	Agents & Stockists

Tukey's Studentized Range (HSD) Test for M4

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.289063  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.734

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	2.3750	8	Skills & labour
A	2.3125	8	Repair services
A	2.1250	8	Manufacturers
A	1.8750	8	Agents & Stockists

Tukey's Studentized Range (HSD) Test for M5

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.314732  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.7659

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	2.8750	8	Manufacturers
A	2.5625	8	Repair services
A	2.5000	8	Agents & Stockists
A	2.4375	8	Skills & labour

Tukey's Studentized Range (HSD) Test for M6

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.36942  
 Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.8297

Means with the same letter are not significantly different.

Tukey Grouping	Mean	N	Type
A	3.1875	8	Skills & labour
A	2.7500	8	Repair services
A	2.5000	8	Manufacturers
A	2.3750	8	Agents & Stockists

Tukey's Studentized Range (HSD) Test for M7

NOTE: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha 0.05  
 Error Degrees of Freedom 28  
 Error Mean Square 0.095982

Critical Value of Studentized Range 3.86125  
 Minimum Significant Difference 0.4229

Means with the same letter are not significantly different.  
 Tukey Grouping      Mean      N      Type  
 A      2.1875      8      Repair services  
 A      2.1250      8      Manufacturers  
 A      2.1250      8      Skills & labour  
 A      1.8125      8      Agents & Stockists

**Table 5.2** Descriptive statistics for variables with respect to the history of risk

Variables	Categories	Frequency	Percentage out of total
1. Contract review.	Very low	18	56.2%
	Low	4	12.5%
	Medium	5	15.6%
	High	0	0.0%
	Very high	5	15.6%
2. Planning.	Very low	9	28.1%
	Low	8	25.0%
	Medium	5	15.6%
	High	4	12.5%
	Very high	5	18.8%
3. Process control.	Very low	22	68.8%
	Low	6	18.8%
	Medium	2	6.2%
	High	0	0.0%
	Very high	2	6.2%
4. Records traceability	Very low	28	87.5%
	Low	2	6.2%
	Medium	1	3.1%
	High	1	3.1%
	Very high	0	0.0%
5. Customer focus NCR.	Very low	20	62.5%
	Low	7	21.9%
	Medium	5	15.6%
	High	0	0.0%
	Very high	0	0.0%
6. Purchasing.	Very low	25	78.1%
	Low	5	15.6%
	Medium	1	3.1%

Variables	Categories	Frequency	Percentage out of total
	High	1	3.1%
	Very high	0	0.0%
7. Preservation.	Very low	31	96.9%
	Low	1	3.1%
	Medium	0	0.0%
	High	0	0.0%
	Very high	0	0.0%

**Table 5.3** Descriptive statistics for the variables with respect to the current interviews of risk

Variables	Categories	Frequency	Percentage out of total
1. Contract review.	Very low	0	0.0%
	Low	2	6.2%
	Medium	21	65.6%
	High	9	28.1%
	Very high	0	0.0%
2. Planning.	Very low	0	0.0%
	Low	1	3.1%
	Medium	22	68.8%
	High	9	28.1%
	Very high	0	0.0%
3. Process control.	Very low	1	3.1%
	Low	2	6.2%
	Medium	16	50.0%
	High	12	37.5%
	Very high	1	3.1%
4. Records traceability	Very low	1	3.1%
	Low	6	18.8%
	Medium	14	43.8%
	High	10	31.2%
	Very high	1	3.1%
5. Customer focus NCR.	Very low	0	0.0%
	Low	3	9.4%
	Medium	10	31.2%
	High	14	43.8%

Variables	Categories	Frequency	Percentage out of total
	Very high	5	15.6%
6. Purchasing.	Very low	1	3.1%
	Low	1	3.1%
	Medium	6	18.8%
	High	10	31.2%
	Very high	14	43.8%
7. Preservation.	Very low	0	0.0%
	Low	4	12.5%
	Medium	22	68.8%
	High	5	15.6%
	Very high	1	3.1%

**Table 5.4** Descriptive statistics for the variables with respect to the survey under the suppliers

Variables	Categories	Frequency	Percentage out of total
A1. Nuclear power generation has an important role to play in SA.	Strongly agree	13	61.9%
	Agree	8	38.1%
	Undecided	0	0.0%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
A2. It is a good idea to build more nuclear power stations in SA.	Strongly agree	10	47.6%
	Agree	1	4.8%
	Undecided	1	4.8%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
A3. Koeberg Nuclear Power Station (KNPS) is a positive contributor to Commerce in the Western Cape.	Strongly agree	12	57.1%
	Agree	7	33.3%
	Undecided	1	4.8%
	Disagree	1	4.8%
	Strongly disagree	0	0.0%
A4. KNPS should do more to develop suppliers in the Western Cape.	Strongly agree	4	19.1%
	Agree	12	57.1%
	Undecided	5	23.8%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%

Variables	Categories	Frequency	Percentage out of total
A5. KNPS has the community of the Western Cape at heart.	Strongly agree	3	14.3%
	Agree	9	42.9%
	Undecided	8	38.1%
	Disagree	0	0.0%
	Strongly disagree	1	4.8%
B1. KNPS buyers are skilled and professional.	Strongly agree	5	23.8%
	Agree	15	71.4%
	Undecided	1	4.8%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
B2. Financial staff are skilled and professional.	Strongly agree	3	14.3%
	Agree	13	61.9%
	Undecided	5	23.8%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
B3. Engineering staff at KNPS are skilled and professional.	Strongly agree	5	23.8%
	Agree	13	61.9%
	Undecided	1	4.8%
	Disagree	1	4.8%
	Strongly disagree	1	4.8%
B4. Quality staff are skilled and professional.	Strongly agree	11	52.4%
	Agree	10	47.6%
	Undecided	0	0.0%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
B5. End users are skilled and professional.	Strongly agree	1	4.8%
	Agree	13	61.9%
	Undecided	3	14.3%
	Disagree	3	14.3%
	Strongly disagree	1	4.8%
C1. Technical information received from KNPS is generally adequate.	Strongly agree	4	19.0%
	Agree	12	57.1%
	Undecided	1	4.8%
	Disagree	4	19.0%

Variables	Categories	Frequency	Percentage out of total
	Strongly disagree	0	0.0%
C2. Technical information to fulfil KNPS requirements is easy to obtain.	Strongly agree	3	14.3%
	Agree	9	42.9%
	Undecided	4	19.0%
	Disagree	5	23.8%
	Strongly disagree	0	0.0%
C3. We are satisfied in the manner in which the buyers engage us.	Strongly agree	3	14.3%
	Agree	15	71.4%
	Undecided	2	9.5%
	Disagree	1	4.8%
	Strongly disagree	0	0.0%
C4. We are satisfied with the manner in which Finance engage us.	Strongly agree	6	28.6%
	Agree	14	66.7%
	Undecided	1	4.8%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
C5. We are satisfied with the manner in which end users engage us.	Strongly agree	2	9.5%
	Agree	10	47.6%
	Undecided	4	19.0%
	Disagree	4	19.0%
	Strongly disagree	1	4.8%
D1. For the current volume of sales it is worth it to adapt our processes if requested to do so by KNPS.	Strongly agree	1	4.8%
	Agree	12	57.1%
	Undecided	5	23.8%
	Disagree	3	14.3%
	Strongly disagree	0	0.0%
D2. We will consider developing certain written procedures to describe our processes if requested to do so by KNPS.	Strongly agree	7	33.3%
	Agree	14	66.7%
	Undecided	0	0.0%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
D3. We want to be fully ISO-compliant.	Strongly agree	7	33.3%
	Agree	8	38.1%
	Undecided	6	28.6%

Variables	Categories	Frequency	Percentage out of total
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
D4. We want to be ISO-certified.	Strongly agree	6	28.6%
	Agree	6	28.6%
	Undecided	7	33.3%
	Disagree	2	9.5%
	Strongly disagree	0	0.0%
D5. We can afford to become ISO-certified and maintain our certification.	Strongly agree	5	23.8%
	Agree	7	33.3%
	Undecided	5	23.8%
	Disagree	3	14.3%
	Strongly disagree	1	4.8%

**Table 5.5** Descriptive statistics for the statements

Variable	N	Mean	Median	Standard Deviation	Range
<b>HISTORY – RISK</b>					
<b>TOTAL</b>					
1. Contract review – history.	32	2.06	1.0	1.4797	4.0
2. Planning – history.	32	2.69	2.0	1.4906	4.0
3. Process control – history.	32	1.56	1.0	1.0758	4.0
4. Records traceability – history.	32	1.22	1.0	0.6591	3.0
5. Customer focus, NCR – history.	32	1.53	1.0	0.7613	2.0
6. Purchasing – history.	32	1.31	1.0	0.6927	3.0
7. Preservation – history.	32	1.03	1.0	0.1768	1.0
<b>SUBGROUP – Goods</b>					
1. Contract review – history.	16	2.31	1.5	1.5798	4.0
2. Planning – history.	16	3.44	3.5	1.5478	4.0
3. Process control – history.	16	1.12	1.0	0.3416	1.0
4. Records traceability – history.	16	1.00	1.00	0.0000	0.0
5. Customer focus, NCR – history.	16	1.50	1.00	0.8165	2.0
6. Purchasing – history.	16	1.00	1.00	0.0000	0.0
7. Preservation – history.	16	1.00	1.00	0.0000	0.0
<b>SUBGROUP – Services</b>					

1. Contract review – history.	16	1.81	1.00	1.3769	4.0
2. Planning – history.	16	1.94	2.00	0.9979	3.0
3. Process control – history.	16	2.00	1.50	1.3663	4.0
4. Records traceability – history.	16	1.44	1.00	0.8921	3.0
5. Customer focus, NCR – history.	16	1.56	1.00	0.7274	2.0
6. Purchasing – history.	16	1.62	1.00	0.8851	3.0
7. Preservation – history.	16	1.06	1.00	0.2500	1.0
<b>SUBGROUP – Agents and Stockists</b>					
1. Contract review – history.	8	1.75	1.00	1.4880	4.0
2. Planning – history.	8	3.12	3.50	1.6421	4.0
3. Process control – history.	8	1.12	1.00	0.3536	1.0
4. Records traceability – history.	8	1.00	1.00	0.0000	0.0
5. Customer focus, NCR – history.	8	1.50	1.00	0.7559	2.0
6. Purchasing – history.	8	1.00	1.00	0.0000	0.0
7. Preservation – history.	8	1.00	1.00	0.0000	0.0
<b>SUBGROUP – Manufacturers</b>					
1. Contract review – history.	8	2.88	3.00	1.5526	4.0
2. Planning – history.	8	3.75	4.00	1.4880	4.0
3. Process control – history.	8	1.12	1.00	0.3536	1.0
4. Records traceability – history.	8	1.00	1.00	0.0000	0.0
5. Customer focus, NCR – history.	8	1.50	1.00	0.9258	2.0
6. Purchasing – history.	8	1.00	1.00	0.0000	0.0
7. Preservation – history.	8	1.00	1.00	0.0000	0.0
<b>SUBGROUP – Repair Services</b>					
1. Contract review – history.	8	2.25	1.00	1.8322	4.0
2. Planning – history.	8	2.00	1.50	1.3093	3.0
3. Process control – history.	8	2.50	2.00	1.6903	4.0
4. Records traceability – history.	8	1.00	1.00	0.0000	0.0
5. Customer focus, NCR – history.	8	1.38	1.00	0.7440	2.0
6. Purchasing – history.	8	1.12	1.00	0.3536	1.0
7. Preservation – history.	8	1.00	1.00	0.0000	0.0
<b>SUBGROUP – Skills and Labour</b>					
1. Contract review – history.	8	1.38	1.00	0.5175	1.0
2. Planning – history.	8	1.88	2.00	0.6409	2.0
3. Process control – history.	8	1.50	1.00	0.7559	2.0

4. Records traceability – history.	8	1.88	1.50	1.1260	3.0
5. Customer focus, NCR – history.	8	1.75	2.00	0.7071	2.0
6. Purchasing – history.	8	2.12	2.00	0.9910	3.0
7. Preservation – history.	8	1.12	1.00	0.3536	1.0
<b>CURRENT – RISK</b>					
<b>TOTAL</b>					
1. Contract review – current.	32	3.22	3.0	0.5527	2.0
2. Planning – current.	32	3.25	3.0	0.5080	2.0
3. Process control – current.	32	3.31	3.0	0.7803	4.0
4. Records traceability – current.	32	3.12	3.0	0.8707	4.0
5. Customer focus, NCR – current.	32	3.66	4.0	0.8654	3.0
6. Purchasing – current.	32	4.09	4.0	1.0273	4.0
7. Preservation – current.	32	3.09	3.0	0.6405	3.0
<b>SUBGROUP – Goods</b>					
1. Contract review – current.	16	3.19	3.00	0.5439	2.0
2. Planning – current.	16	3.19	3.00	0.5439	2.0
3. Process control – current.	16	3.12	3.00	0.9574	4.0
4. Records traceability – current.	16	3.00	3.00	0.8165	3.0
5. Customer focus, NCR – current.	16	3.88	4.00	0.8062	3.0
6. Purchasing – current.	16	3.88	4.00	1.1475	4.0
7. Preservation – current.	16	2.94	3.00	0.7719	3.0
<b>SUBGROUP – Services</b>					
1. Contract review – current.	16	3.25	3.00	0.5774	2.0
2. Planning – current.	16	3.31	3.00	0.4787	1.0
3. Process control – current.	16	3.50	3.50	0.5164	1.0
4. Records traceability – current.	16	3.25	3.00	0.9309	3.0
5. Customer focus, NCR – current.	16	3.44	3.00	0.8921	3.0
6. Purchasing – current.	16	4.31	4.50	0.8732	3.0
7. Preservation – current.	16	3.25	3.00	0.4472	1.0
<b>SUBGROUP – Agents and Stockists</b>					
1. Contract review – current.	8	3.12	3.00	0.6409	2.0
2. Planning – current.	8	3.00	3.00	0.5345	2.0
3. Process control – current.	8	3.00	3.00	1.0690	3.0
4. Records traceability – current.	8	2.75	3.00	0.8864	3.0
5. Customer focus, NCR – current.	8	3.50	4.00	0.7559	2.0

6. Purchasing – current.	8	3.75	4.00	1.3887	4.0
7. Preservation – current.	8	2.62	3.00	0.5175	1.0
<b>SUBGROUP – Manufacturers</b>					
1. Contract review – current.	8	3.25	3.00	0.4629	1.0
2. Planning – current.	8	3.38	3.00	0.5175	1.0
3. Process control – current.	8	3.25	3.00	0.8864	3.0
4. Records traceability – current.	8	3.25	3.00	0.7071	2.0
5. Customer focus, NCR – current.	8	4.25	4.00	0.7071	2.0
6. Purchasing – current.	8	4.00	4.00	0.9258	2.0
7. Preservation – current.	8	3.25	3.00	0.8864	3.0
<b>SUBGROUP – Repair Services</b>					
1. Contract review – current.	8	3.25	3.00	0.4629	1.0
2. Planning – current.	8	3.25	3.00	0.4629	1.0
3. Process control – current.	8	3.38	3.00	0.5175	1.0
4. Records traceability – current.	8	3.62	4.00	0.9161	3.0
5. Customer focus, NCR – current.	8	3.75	4.00	1.0351	3.0
6. Purchasing – current.	8	4.38	4.50	0.7440	2.0
7. Preservation – current.	8	3.38	3.00	0.5175	1.0
<b>SUBGROUP – Skills and Labour</b>					
1. Contract review – current.	8	3.25	3.00	0.7071	2.0
2. Planning – current.	8	3.38	3.00	0.5175	1.0
3. Process control – current.	8	3.62	4.00	0.5175	1.0
4. Records traceability – current.	8	2.88	3.00	0.8345	2.0
5. Customer focus, NCR – current.	8	3.12	3.00	0.6409	2.0
6. Purchasing – current.	8	4.25	4.50	1.0351	3.0
7. Preservation – current.	8	3.12	3.00	0.3536	1.0
<b>AVERAGE – RISK</b>					
<b>TOTAL</b>					
1. Contract review – average.	32	2.64	2.5	0.8447	3.0
2. Planning – average.	32	2.97	3.0	0.8026	2.5
3. Process control – average.	32	2.43	2.5	0.7378	3.5
4. Records traceability – average.	32	2.17	2.0	0.5479	2.5
5. Customer focus, NCR – average.	32	2.59	2.5	0.5599	2.0
6. Purchasing – average.	32	2.70	3.0	0.6582	3.5
7. Preservation – average.	32	2.06	2.0	0.3300	1.5
<b>SUBGROUP – Goods</b>					

1. Contract review – average.	16	2.75	2.50	0.9487	3.0
2. Planning – average.	16	3.31	3.50	0.8342	2.5
3. Process control – average.	16	2.12	2.00	0.5000	2.0
4. Records traceability – average.	16	2.00	2.00	0.4082	1.5
5. Customer focus, NCR – average.	16	2.69	2.50	0.5737	2.0
6. Purchasing – average.	16	2.44	2.50	0.5737	2.0
7. Preservation – average.	16	1.97	2.00	0.3860	1.5
<b>SUBGROUP – Services</b>					
1. Contract review – average.	16	2.53	2.50	0.7409	2.5
2. Planning – average.	16	2.62	2.50	0.6191	2.0
3. Process control – average.	16	2.75	2.50	0.8165	2.5
4. Records traceability – average.	16	2.34	2.5	0.6250	2.0
5. Customer focus, NCR – average.	16	2.50	2.50	0.5477	2.0
6. Purchasing – average.	16	2.97	3.00	0.6447	2.5
7. Preservation – average.	16	2.16	2.00	0.2394	0.5
<b>SUBGROUP – Agents and Stockists</b>					
1. Contract review – average.	8	2.44	2.00	0.9425	3.0
2. Planning – average.	8	3.06	3.00	0.8634	2.0
3. Process control – average.	8	2.06	2.25	0.5630	1.5
4. Records traceability – average.	8	1.88	2.00	0.4432	1.5
5. Customer focus, NCR – average.	8	2.50	2.50	0.5976	2.0
6. Purchasing – average.	8	2.38	2.50	0.6944	2.0
7. Preservation – average.	8	1.81	2.00	0.2588	0.5
<b>SUBGROUP – Manufacturers</b>					
1. Contract review – average.	8	3.06	3.00	0.9039	2.5
2. Planning – average.	8	3.56	3.75	0.7763	2.5
3. Process control – average.	8	2.19	2.00	0.4581	1.5
4. Records traceability – average.	8	2.12	2.00	0.3536	1.0
5. Customer focus, NCR – average.	8	2.88	3.00	0.5175	1.5
6. Purchasing – average.	8	2.50	2.50	0.4629	1.0
7. Preservation – average.	8	2.12	2.00	0.4432	1.5
<b>SUBGROUP – Repair Services</b>					
1. Contract review – average.	8	2.75	2.25	0.9258	2.0
2. Planning – average.	8	2.62	2.25	0.7906	2.0
3. Process control – average.	8	2.94	2.50	1.0155	2.5

4. Records traceability – average.	8	2.31	2.50	0.4581	1.5
5. Customer focus, NCR – average.	8	2.56	2.50	0.5630	1.5
6. Purchasing – average.	8	2.75	3.00	0.3780	1.0
7. Preservation – average.	8	2.19	2.00	0.2588	0.5
<b>SUBGROUP – Skills and Labour</b>					
1. Contract review – average.	8	2.31	2.50	0.4581	1.5
2. Planning – average.	8	2.62	2.50	0.4432	1.5
3. Process control – average.	8	2.56	2.50	0.5630	1.5
4. Records traceability – average.	8	2.38	2.50	0.7906	2.0
5. Customer focus, NCR – average.	8	2.44	2.50	0.5630	1.5
6. Purchasing – average.	8	3.19	3.00	0.7990	2.5
7. Preservation – average.	8	2.12	2.00	0.2315	0.5
<b>Questionnaire</b>					
<b>A. Attitude towards nuclear power generation</b>	21	1.79	1.8	0.3974	1.6
A1. Nuclear power generation has an important role to play in SA.	21	1.38	1.0	0.4976	1.0
A2. It is a good idea to build more nuclear power stations in SA.	21	1.57	2.0	0.5976	2.0
A3. Koeberg Nuclear Power Station (KNPS) is a positive contributor to Commerce in the Western ape.	21	1.57	1.0	0.8106	3.0
A4. KNPS should do more to develop suppliers in the Western Cape.	21	2.05	2.0	0.6690	2.0
A5. KNPS has the community of the Western Cape at heart.	21	2.38	2.0	0.9207	4.0
<b>B. Experience and skills in the KNPS supply chain</b>	21	1.99	2.0	0.4582	2.0
B1. KNPS buyers are skilled and professional.	21	1.81	2.0	0.5118	2.0
B2. Financial staff is skilled and professional.	21	2.10	2.0	0.6249	2.0
B3. Engineering staff at KNPS are skilled and professional.	21	2.05	2.0	0.9735	4.0
B4. Quality staff is skilled and professional.	21	1.48	1.0	0.5118	1.0
B5. End users are skilled and professional.	21	2.52	2.0	0.9808	4.0
<b>C. Communication with and access to KNPS supply chain</b>	21	2.24	2.0	0.6830	2.4
C1. Technical information received from KNPS is generally adequate.	21	2.24	2.0	0.9952	3.0
C2. Technical information to fulfil KNPS requirements	21	2.52	2.0	1.0305	3.0

is easy to obtain.					
C3. We are satisfied in the manner in which the buyers engage us.	21	2.05	2.0	0.6690	3.0
C4. We are satisfied with the manner in which Finance engage us.	21	1.76	2.0	0.5390	2.0
C5. We are satisfied with the manner in which end users engage us.	21	2.62	2.0	1.0713	4.0
<b>D. Co-operation and partnering</b>	21	2.15	2.0	0.6720	2.2
D1. For the current volume of sales it is worth it to adapt our processes if requested to do so by KNPS.	21	2.48	2.0	0.8136	3.0
D2. We will consider developing certain written procedures to describe our processes if requested to do so by KNPS.	21	1.67	2.0	0.4830	1.0
D3. We want to be fully ISO-compliant.	21	1.95	2.0	0.8047	2.0
D4. We want to be ISO-certified.	21	2.24	2.0	0.9952	3.0
D5. We can afford to become ISO-certified and maintain our certification.	21	2.43	2.0	1.1650	4.0

## ADDENDUM E

The results from the statistical analyses provided valuable insights into the nature of the risks inherent in engaging with small suppliers. The results returned that there is no significant difference in risk between the four identified categories. Agents/stockists, manufacturers, repair services and skilled labour fared the same in the risk evaluation for the seven processes.

The results furthermore reflected that for small suppliers there are no significant variation in management styles and basic practices, as most of them are subjected to the same resource restrictions. Small suppliers all multi-skill and perform cross-functional tasks. 'Soft' skills such as quality assurance and control, public relations, human resources and even commercial training are lower in priority than having financial acumen and technical know-how.

There were however significant differences in the risk evaluation between the seven processes. In addition, there was a significant difference in the risk between the combined categories of Services and Goods as far as some processes are concerned. However, the significant differences were restricted to only a few processes.

### **E.1 Processes at risk for all types of suppliers**

From the historical data it was evident that Planning has the highest risk. In contrast, for current risk evaluation, the results show that Purchasing and Customer Focus are the processes with the highest risk. As a result, from a combination of history and current evaluation, the following three processes are at most risk for all small suppliers.

- **Planning.** The history of deliveries of goods returned that late delivery is a significant problem. Forecasting dates of delivery reflects on the ability of the supplier to plan ahead. The supplier has to be able to obtain accurate information from sub-suppliers, understand its own limitations and

capabilities, and apply the correct planning skills and knowledge to set accurate delivery dates.

- **Purchasing.** The evaluation of current abilities returned that most suppliers either do not understand the risk of counterfeiting in the market, or are unable to react to this international threat. Traceability to reputable sources is critical for the nuclear industry. Yet, very few of the small suppliers were able to prove that effective steps were being taken to evaluate their suppliers for acceptable capability, or to ensure that procured goods, such as components and sub-components, were authentic products obtained from the original equipment manufacturers.
- **Customer Focus.** The processes to ensure that customer focus was effective, were generally poorly outlined. The key to success for these processes appeared to be determined by personality, and not by clearly understood principles. Only a few suppliers were able to demonstrate fundamental knowledge about the non-conformance processes, from official acknowledgement, to the tracking of problems and actions until final resolution and closeout with full customer acceptance.

## **E.2 Processes at risk for different types of suppliers**

Although there was no statistically significant difference between the four types of suppliers for the combination of history and current interviews, there were process differences between the two main categories of Goods and Services. Due to the fact that there were few processes between the two categories with significant risk, a generic model that is applicable to all small suppliers could be applied. There were statistically significant differences between the processes themselves within the separate sources of historical and current data. These differences were not taken into account where the model is concerned, and all the processes at risk whether from historical or current measurement, were included into the first implementation phase of the model.

Goods suppliers have a higher score for Planning, thus are more at risk than “Services” suppliers. However, “Services” suppliers were statistically

significantly at higher risk than “Goods” suppliers for Process Control and Purchasing.

- **Goods.** The suppliers of goods are probably at higher risk with Planning, as they are generally more dependent on external suppliers of raw material, or imports. In contrast, service suppliers seem to be better able to plan their labour resources. The fact that service contracts could be in place would further enhance the predictability of workload and ultimately the capability of the service provider to plan accurately. As a result, as far as planning capability is concerned, goods suppliers seem to be at a disadvantage.
- **Services.** Where Purchasing is concerned, the research focussed on the ability of the service providers to procure the necessary skills and knowledge to perform the scope of work required by the customer. Unsatisfactory responses with regard to the verification of qualifications and experience of personnel were a common occurrence. Service providers often demonstrated inadequate ability to access accurate information on the availability of resources. Very often databases were out of date. In addition, few suppliers had the capability to verify the performance history of their contracted personnel, and almost all the suppliers had to rely exclusively on Nuclear Generation to do background checks.

Process Control is viewed as the ability of the service provider to adhere to the controls placed on activities, such as witness and hold points, individually and by Nuclear Generation. A possible explanation why service providers are faring worse than goods suppliers, could point to the fact that manufacturing processes are often more clear and easier to control due to production processes’ lay-out and flow. Service activities such as design, faultfinding, testing and problem solving are often difficult to plan ahead in fine detail.

### **E.3 Risks originating from the opinion survey**

In the case of the questionnaire which called for an opinion of suppliers with respect to Eskom Nuclear Generation, the average response for each category differed in the following instances between the categories:

- Attitude towards nuclear power generation is statistically significantly more positive than the communication with and access to KNPS supply chain.
  - Attitude towards nuclear power generation is statistically significantly more positive than the co-operation and partnering.
  - Experience and skills in the KNPS supply chain is also statistically significantly more positive than the communication with and access to KNPS supply chain.
- **KNPS has the Western Cape community at heart.** Although most of the respondents agree that KNPS has the community of the Western Cape at heart, there is still a large percentage (38.1%) who was undecided. This could point to a lack of a clearly communicated policy by Nuclear Generation that it has the commercial well being of the Western Cape at heart, and that the health of local industry enjoys a high priority.
- **End user skills and professionalism.** Nearly a fifth of the respondents (19.1%) did not believe that end users are skilled and professional. This is a common theme among small suppliers. There are almost no controls to restrict the communication of suppliers to skilled and professional end users on site. External auditors, public relations personnel and buyers from Nuclear Generation are expected to undergo ethics, negotiation skills, and communication skills training and to be professionally registered. However, end users of differing skill levels, training and experience interact with suppliers. They visit suppliers' premises, communicate their expectancies, complain about unsatisfactory goods and services and often subject the supplier to unprofessional behaviour. In turn, suppliers often subject them to doubtful marketing practices.
- **End user attitude towards suppliers.** Nearly a quarter of the respondents (23.8%) is not satisfied with the manner in which end users engage them. It is not uncommon for suppliers to complain that end users display discourteous behaviour. Suppliers are reluctant to disclose these incidents, as they perceive the end users to have considerable ability to influence procurement decisions.

Furthermore, small suppliers report that end users sometimes place high demands on them, such as deadlines which are not viable.

- **Cost of ISO.** Nearly a fifth of the respondents (19.1%) did not believe that they could afford to become ISO-certified and maintain their certification. This result is consistent with that of the literature. Where high-level skills such as nuclear-related design engineering suppliers and consultancy firms are concerned where services of a high Quality Level are delivered, the requirement of ISO certification would effectively curtail the access of Nuclear Generation to such skills.

Although the opinion of the suppliers is mostly positive with respect to the different categories regarding KNPS, the following aspects should be evaluated:

- Satisfaction of suppliers regarding their engagement with end users.
- Whether end users at KNPS engaging with suppliers are skilled and professional.
- Quality and availability of technical information to fulfil KNPS requirements.

As for the results obtained through this survey, the following analogies can be drawn from this research:

- The process Planning, although not very high, was at risk according to the information from history;
- Currently the process Purchasing is the process most at risk;
- The combination of the history and current risk analysis indicates that the process Planning and then Purchasing are most at risk.
- According to the result suppliers' communication with and access to KNPS supply chain is the most troubled area.

It is of importance to note that the current evaluation shows that the processes are more at risk than previously (history). However, this can be explained. Risk evaluation based on history show actual problems that have been encountered. In contrast, the evaluation based on current capabilities points towards potential problems. The potential for problems would naturally tend to be larger than actual problems encountered. By understanding the history of problems both

from an empirical perspective and the databases, and the potential for problems through evaluation of the seven processes of each supplier, as well as the influence that the type of supplier has on process risk, a comprehensive risk mitigation strategy could be developed.

## ADDENDUM F

- **Contract Review.** The ISO9001:2000 elements related to this process are listed below.
  - 5.2 Customer focus.

*'Top management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction.'*
  - 7.2.1 Determination of requirements related to the product.
  - 7.2.2 Review of requirements related to the product.
  - 7.2.3.b Customer communication.

*'The organization shall determine and implement effective arrangements for communicating with customers in relation to a) product information, b) enquiries, contracts or order handling, including amendments...'*
- **Planning.** The ISO9001 elements related to this process are listed below.
  - 6.2.1 General.

*'Personnel performing work affecting product quality shall be competent on the basis of appropriate education, training, skills and experience.'*
  - 6.3 Infrastructure.

*'The organization shall determine, provide and maintain the infrastructure needed to achieve conformity to product requirements.'*
  - 6.4 Work environment.

*'The organization shall determine and manage the work environment needed to achieve conformity to product requirements.'*
  - 7.1 Planning of product realization.

*'The organization shall plan and develop the processes needed for product realization.'*
- **Process control.** The ISO9001 elements related to this process are listed below.
  - 7.5.1 Control of production and service provision.

*'The organization shall plan and carry out production and service provision under controlled conditions.'*

➤ 8.2.4 Monitoring and measurement of product.

*'The organization shall monitor and measure the characteristics of the product to verify that product requirements have been met. This shall be carried out at appropriate stages of the product realization process in accordance with the planned arrangements. Evidence of conformity with the acceptance criteria shall be maintained. Records shall indicate the person(s) authorizing release of product. Product release and service delivery shall not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority and, where applicable, by the customer.'*

➤ **Records and traceability.** The ISO9001 elements related to this process are listed below.

➤ 4.2.4 Control of records.

*'Records shall be established and maintained to provide evidence of conformity to requirements and of the effective operation of the quality management system. Records shall remain legible, readily identifiable and retrievable. A documented procedure shall be established to define the controls needed for the identification, storage, protection, retrieval, retention time and disposition of records'.*

➤ 6.2.2.e Competence, awareness and training.

*'The organization shall maintain appropriate records of education, training, skills and experience'.*

➤ 7.2.2 Review of requirements related to the product.

*'The organization shall review the requirements related to the product'. 'Records of the results of the review and actions arising from the review shall be maintained'.*

➤ 7.4.1 Purchasing process.

*'The organization shall evaluate and select suppliers based on their ability to supply product in accordance with the organization's requirements. Criteria for selection, evaluation and re-evaluation shall be established. Records of the results of evaluations and any necessary actions arising from the evaluation shall be maintained'.*

➤ 7.5.3 Identification and traceability.

*'Where traceability is a requirement, the organization shall control and record the unique identification of the product'.*

➤ 7.5.4 Customer property.

*'The organization shall exercise care with customer property while it is under the organization's control or being used by the organization. ... If any customer property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the customer and records maintained'.*

➤ 8.3 Control of nonconforming product.

*'...Records of the nature of nonconformities and any subsequent actions taken, including concessions obtained, shall be maintained'.*

➤ **Customer focus and non-conformance.** The ISO9001 elements related to this process are listed below.

➤ 5.2 Customer focus.

*'Top management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction'.*

➤ 7.2.3 Customer communication.

*'The organization shall determine and implement effective arrangements for communicating with customers in relation to a) product information, b) enquiries, contracts or order handling, including amendments, and c) customer feedback, including customer complaints'.*

➤ 7.5.4 Customer property.

*'The organization shall exercise care with customer property while it is under the organization's control or being used by the organization. ... If any customer property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the customer and records maintained'.*

➤ 8.2.1 Customer satisfaction.

*'As one of the measurements of the performance of the quality management system, the organization shall monitor information relating to customer perception as to whether the organization has met*

*customer requirements. The methods for obtaining and using this information shall be determined'.*

➤ 8.3 Control of nonconforming product.

*'The organization shall ensure that product which does not conform to product requirements is identified and controlled to prevent its unintended use or delivery. The controls and related responsibilities and authorities for dealing with nonconforming product shall be defined in a documented procedure'.*

➤ 8.5.2 Corrective action.

*'The organization shall take action to eliminate the cause of nonconformities in order to prevent recurrence. Corrective actions shall be appropriate to the effects of the nonconformities encountered'.*

➤ **Purchasing.** The ISO9001 element related to this process is stated below.

➤ 7.4.1 Purchasing process.

*'The organization shall ensure that purchased product conforms to specified purchase requirements. The type and extent of control applied to the supplier and the purchased product shall be dependent upon the effect of the purchased product on subsequent product realization or the final product. The organization shall evaluate and select suppliers based on their ability to supply product in accordance with the organization's requirements. Criteria for selection, evaluation and re-evaluation shall be established. Records of the results of evaluations and any necessary actions arising from the evaluation shall be maintained'.*

➤ **Preservation of customer property.** The ISO9001 elements related to this process are listed below.

➤ 7.5.4 Customer property.

*'The organization shall exercise care with customer property while it is under the organization's control or being used by the organization. The organization shall identify, verify, protect and safeguard customer property provided for use or incorporation into the product. If any customer property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the customer and records maintained'.*

➤ 7.5.5 Preservation of product.

*'The organization shall preserve the conformity of product during internal processing and delivery to the intended destination. This preservation shall include identification, handling, packaging, storage and protection. Preservation shall also apply to the constituent parts of a product'.*



