# The influence of the maturity of technological competence and buyer uncertainty on tender criteria issued by buyers

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## ABSTRACT

Government procurement is accountable for 10 to 15 percent of a countries GDP, nevertheless only in past history it gained interest from researchers. A broad variety of parameters influencing buyer behaviour in Business-to-Business literature is already researched, although for Business-to-Government research this is limited. This research is adding to existing literature what possible parameters are influencing the buyer behaviour and selection criteria in tender processes for high-tech solutions in Business-to-Government industry. While focusing on the influence of technological competence of customers and their uncertainties during a tender process. The study involved 3 exploratory interviews at high-tech solutions Inc. (HTS) and was further developed with a survey among 37 highly experienced respondents of HTS, all respondents are first point of contact for customers during a variety of tender processes. This research showed that the difference in importance of tender criteria can for some extent be explained by the difference in technological competence of the customer. Buyer uncertainty has as several studies already proved influence on buyer behaviour, but this research was only able to prove significant influence of buyer uncertainty on a single tender criterion. This research is contributing to existing Business-to-Government literature on the topics of technological competence, supplier selection and to some extent to buyer uncertainty literature. This research will give marketers an extra parameter for segmentation and identified buyer uncertainty as a factor influencing buyer behaviour but without significant direct effects on tender criteria.

# 1 Introduction

At High-Tech Solutions Inc. (from now on HTS) it is observed that based on the widely acknowledged theory (cited in e.g.: Kotler & Armstrong, 2011; Hanlan, Fuller, Wilde, and Wilde, 2006; Dolnicar & Leisch, 2010; Wedel & Kamakura, 1998) defined by Kotler in 1997 about the five requirements of a segmentation, HTS is not segmenting the market. HTS categorizes its portfolio into solutions matching job profiles and responsibilities of end-users. Customers and prospects may appear in multiple categories and there is not a single value proposition that fits all customers and prospects within one category. That is why HTS is now tailoring every proposition to one customer or prospect, and this is a time-consuming task. Therefore, HTS is searching for parameters influencing buying behaviour of their customers.

There are three major groups involved in a tender process in the market of HTS. These parties fulfil different roles before, during and after the tender process. Often these groups are the end-users, the government and the builder of the platform. Cova, Mazet and Salle (1996) identified the actors influencing the buying process as the 'milieu' of the customer. The current segmentation mentions these groups separately and define their characteristics, but this does not lead to group specific actions.

The parameters HTS is looking for should influence the buying behaviour of customers and potential customers. Although there is a lot written about the buying behaviour in organizations, little is tailored for the B2G industry. This causes that it is for B2G marketers harder to identify parameters who are explaining the difference in importance of buying criteria during a tender process. Johnston and Lewin (1996) combined and adapted studies from Robinson, Faris & Wind 1967, Webster & Wind 1972 and Sheth 1973 to identify many parameters influencing buying behaviour in a business-to-business (from now on B2B) environment. The new adapted model of Johnston and Lewin (1996) takes the following constructs that influences organizational buying behaviour in to account; environmental characteristics, organizational characteristics, purchase characteristics, seller characteristics, decision rules, group characteristics, informational characteristics, participant characteristics, conflict/negotiation and role stress. During exploratory interviews (appendix A, B, C) it was mentioned that the respondents experienced that the amount of technological experience and knowledge of a customer influenced the buying behaviour. The model of Johnston and Lewin (1996) takes education, motivation, perceptions, personality, risk preference and experience as the construct "organizational characteristics" in to account. Technological competence is explained by several scholars as, to what extent someone or an organization is able to use technological knowledge to develop and improve products and processes (Ritter & Gemünden, 2002; Kim, 1997; McEvily, Eisenhardt & Prescott, 2004). Fai & von Tunzelmann (2001) adds to the definition above that it is focused on a specific field of technology. The technological competence of a customer might in the variables of Johnston and Lewin (1996) be a combination of education and experience. Although this research investigates if in high-tech purchase decisions, technological competence is an additional variable that needs to be taken in to account during organizational buying behaviour.

In the research of Johnston & Lewin (1996) it is mentioned that in a purchase situation there is always a purchase risk, uncertainty of the outcome is mentioned as a variable of the purchase risk. Along with the importance of a purchase, the complexity of a purchase and the time pressure during the decision-making process. However, Johnston & Lewin (1996) mention uncertainty, it is not seen as a separate construct. Many scholars e.g. Bunn & Clopton (1993), Kline & Wagner (1994) and Gao, Wang, Sirgy & Bird (2002), state that consumer and organizational buying decisions are influenced by a high degree of uncertainty. Von Hippel (1986) identified that buyer uncertainty is partly caused by a lack of relevant experience with the solution. Gao, Sirgy & Bird (2005) describe decision making uncertainty as "a highly salient reality facing many business purchase decisions, adversely affects buyer decision making in several ways" (Gao, et al., 2005, p. 402). Davies & Brush (1997) mention that most products in a high-tech industry often have very short product life-cycles. This is understated by Eisenhardt & Martin (2000), who state that the complex and high velocity nature of high-tech markets are causing uncertainty and contribute to perceived risk, to suppliers and purchasers. By means of previous researches and the importance of buyer uncertainty, this research will try to test the direct influence of buyer uncertainty on buying behaviour in a high-tech B2G environment.

HTS is active in a B2G environment where most purchases and investments are done by tender. Therefore, this research focusses on the influence of the constructs "Technological Competence" and "Buyer Uncertainty" on tender processes with the main research question set as follows: "What is the influence of the maturity of technological competence and buyer uncertainty on tender criteria issued by buyers?".

## 1.1 Theoretical application

According to the World Trade Organization accounts government procurement for 10 to 15 percent of the GDP of an economy (WTO and government procurement, n.d.). Despite this magnitude, B2G is often neglected in the literature, according to Reid & Plank (2000) there was almost no activity between 1978 and 1997, with just 11 publications about marketing in B2G of the in total 2194 marketing related publications in the top 28 journals world-wide for example Harvard Business Review, Journal of Marketing and Journal of Marketing Research. More recent research of Brammer & Walker (2011) refer to Trionfetti 2000 and Brulhart & Trionfetti 2004, whom mention that just recently public procurement is subject of a considerable amount of academic research. This is understated by Edler & Georghiou (2007) that since 2004 interest in public procurement of innovation increased in the European Union.

Furthermore, the research of Verma & Pullman (1998) tested the importance of different attributes in selecting suppliers in B2B industries. The selected attributes were only four attributes namely quality, price, flexibility, and delivery performance. While a variety of researchers (e.g. Weber, Current & Benton, 1991; Choi & Hartley, 1996) already acknowledged more attributes involved in supplier selection. The research of Verma & Pullman (1998) researched the relative importance, but did

not investigate what might influence the relative importance of these attributes.

The research of Urbany, Dickenson & Wilkie (1989) already showed that buyer uncertainty influences the search behaviour before a purchase. Weiss & Heide (1993) research proved that certain characteristics of an industry influences the search behaviour, e.g. the pace of technological change. Nevertheless, these researches do not show if the buyer its uncertainty is directly influencing the relative importance of supplier selection criteria.

Weiss & Heide (1993) research showed that technological change influences buyer uncertainty. Edler et al. (2005) research shows that better technological competent organizations are better in procuring complex projects. This research is investigating if the level of technological competence directly influences the relative importance of supplier selection criteria.

Besides the contribution to existing B2G literature, this research is also contributing at literature about what might influence the relative importance of supplier selection criteria. This research will focus on the influence of technological competence and buyer uncertainty on a broad variety of attributes involved in supplier selection.

# 2 Research questions

The research question of this research is "What is the influence of the maturity of technological competence and buyer uncertainty on tender criteria?". To answer this main question several sub-questions were developed, and these are as follows:

1. To what extent does the technological competence of buyers, influence tender criteria issued by potential buyers?
2. To what extent does buyer uncertainty influence tender criteria issued by potential buyers?
3. Is there a correlation between Competitive Industrial Performance and technological competence of potential buyers?

The first sub-question will answer if technological competence is influencing the tender criteria. This is measured for each single criterion to get a more detailed overview of the possible influence of technological competence. The second sub-question will be researched in similar method. The last sub-question will check if the technological competence can be objectified by using an independent construct.

# 3 Literature review

In this section, the concepts and constructs used for this research will be explained and set.

## 3.1 Buying Behaviour

Hill & Hillier (1977) stated that a customer focused organization only can be achieved, with a real strategic analysis of industrial buying behaviour. Although much has been written about buying behaviour, Webster & Wind (1996) confirmed that most of these researches were focused on the buying behaviour of consumers. Buying behaviour is nothing more than an umbrella term that includes all purchasing activities in organizations to satisfy organizational goals (Hill & Hillier, 1977). The existing literature about buying behaviour of consumers cannot be used in an industrial setting, primarily due to multiple differences in the purchasing process. Industrial buying is a process with complex interactions, personal and organizational goals, and highly influenced by budget, cost, and profit considerations (Webster & Wind, 1996). In table 1 (Mudambi, 2002, p. 527) there is a brief comparison in buying characteristics between the consumer and industrial markets. This endorses that the existing literature is not sufficient for this research.

**Table 1**
Consumer and Industrial market characteristics

| Consumer markets | Industrial markets |
|---|---|
| Emphasis on the tangible product and intangibles in the purchase decision | Emphasis on tangible product and augmented services in the purchase decision |
| Standardized products | Customized products and services |
| Impersonal relationships between buyer and selling company | Personal relationships between buyer and salesperson |
| Relative unsophisticated products | Highly complex products |
| Buyers growing in sophistication | Sophisticated buyers |
| Reliance on mass market advertising | Reliance on personal selling |

*Note.* Retrieved from "Branding importance in business-to-business markets Three buyer clusters" by S. Mudambi, 2002, *Industrial Marketing Management, 31*, p.527

### 3.1.1 Understanding buying behaviour
Nevertheless, there are several models for understanding organizational buying behaviour. There is the 'Buygrid framework' from Robinson, Faris and Wind (1967) (as cited in Hill & Hillier 1977, p. 141), Webster and Wind originated in 1972 (1996) with the 'General model for understanding organizational buying behavior', and Sheth (1973) with the 'Model of industrial buying behavior'. All these models were combined by Johnston and Lewin (1996) into 'An integrated model of organizational buying behavior'. This model is quite comprehensive, it takes multiple characteristics into account e.g. organizational, environmental, purchase, seller, informational characteristics. Although this model is quite comprehensive, it is based on old literature, and buying centres with conflicting agendas within the teams, while this is nowadays replaced by process-driven buying teams (Thompson, Mitchell and Knox, 1998).

## 3.2 Supplier selection criteria
Supplier selection is a form of organizational buying, and a variety of researchers mention four key buying criteria. Namely product quality, delivery, price and service (Dempsey, 1978; Lehmann & O'Shaughnessy, 1974; Wilson, 1994). However, Weber, Current & Benton (1991) researched 74 articles related to supplier selection criteria, and they tested how often the 23 criteria from Dickson's study were mentioned. Choi & Hartley (1996) added relational and attitudinal criteria, an analysis of principle components compiled the list in eight factors as shown in table 2.

**Table 2**
Supplier selection criteria

| Factor | Sub-factors |
|---|---|
| Finances | Financial conditions |
| | Profitability of supplier |
| | Financial records disclosure |
| | Performance awards |
| Consistency | Conformance quality |
| | Consistent delivery |
| | Quality philosophy |
| | Prompt response |
| Relationship | Long-term relationship |
| | Relationship closeness |
| | Communication openness |
| | Reputation for integrity |
| Flexibility | Product volume changes |
| | Short set-up time |
| | Short delivery lead time |
| | Conflict resolution |
| Flexibility | Service contracts |
| Technological capability | Design capability |
| | Technological capability |
| Customer service | After-sales support |
| | Sales representatives competence |
| Reliability | Incremental improvement |
| | Product liability |
| Price | Low initial price |
| | Total cost of ownership |
| Off-set | Local work-share |
| | Transfer of technology |

*Note.* Adapted from "An exploration of supplier selection practices across the supply chain" by T. Y. Choi &J. L. Hartley, 1996, *Journal of Operations Management, 14*(4), p. 339; Appendix, A, B, C)

Interviewees of HTS mentioned a few other possible selection criteria used by governments, whom are not considered by Choi & Hartley (1996). The extra selection criteria HTS encounters are: service contracts, life cycle costs, local work-share and transfer of technology (Appendix, A, B, C).

Alexandra, Corina & Alina (2014) explain that "Product Life-cycle costs" take the total costs of ownership into account throughout the entire life span of the solution. Ferrin & Plank (2002) state that total costs from Cavinato 1991 & 1992, Life cycle costing from Jackson & Ostrom 1980 and total costs of ownership Elram & Siferd 1993 are almost similar. All the concepts suggest that managers should adopt a long-term perspective instead of short-term with the initial price concept.

Keohane (2002) acknowledges the fact that governments procuring solutions, often require some "off-set" arrangements to compensate local industry, HTS solves this by providing local industry some of the work-share and by transferring technology. Service contracts are very important selection criteria according to some interviewees (Appendix, C). It is explained by Stremersch, Wuyts & Frambach (2001) as a contract that fulfils all the needs of customers by product and service bundles.

Conclusively several empirical studies have researched the supplier selection and assessment of certain industries (Kannan & Tan, 2002). Thorelli & Glowacka (1995) researched the willingness of American Industrial buyers to source internationally. Dobilas & MacPherson (1997) researched the

influence of environmental regulations on the supplier selection in multinationals. But little to none of the literature investigates the supplier selection and assessment in B2G environment.

## 3.3   Technological competence
Several scholars see technological competence as "The ability to make effective use of technological knowledge and learning to develop and improve products and processes" (Ritter & Gemünden, 2002; Kim, 1997; McEvily, Eisenhardt & Prescott, 2004). The definition Fai & von Tunzelmann (2001) stated is almost like the one above, although these scholars added that it is measured per specific field of technology.  According to Mitchell (1992) technological competence are constituted by tangible and intangible technical related resources. Danneels (2002) mentions know-how of engineering and technological know-how in general, manufacturing facility and procedures for quality control as resources for technological competence.

Malerba & Marengo (1995) discovered that organizations with a high level of technological competence have greater innovation success than companies with a low level (as cited in Ritter & Gemünden, 2002). Edler et al. (2005) discovered that in some cases buyers with a "sufficiently high level of technological competence" (p. 2) were better able to procure complex projects as a one package delivery. Buyers with lower technological competence may have had unreasonable expectations (Edler et al., 2005).

Choi & Hartley (1996) mention the influence of organizational characteristics influencing organizational buying. Technological competence is the ability of organizations to make effective use of technological knowledge and learning to develop and improve products. Therefore, the technological competence might be a characteristic of an organization. The research of Lehmann & O'Shaughnessy (1974) showed that the difference in selection criteria importance was influenced by problems likely to be encountered by customers.

This research is focussing if a lack of technological competence is, just as the likely problems organizations encounter while adopting the solution, also influencing the difference in selection criteria importance.

## 3.4   Buyer uncertainty
Many scholars e.g. Bunn & Clopton (1993), Kline & Wagner (1994) and Gao, Wang, Sirgy & Bird (2002) state that consumer and organizational buying decisions are influenced by a high degree of uncertainty. During procurement processes for high-tech solutions, organizations are confronted with uncertainties. This buyer uncertainty refers to "the difficulty in predicting the outcomes of a purchase decision in terms of the likely performance and likely costs" (Collis 1992; Kohli 1989; as cited in Gao, et al. 2002). Gao et al. (2002) recognized information availability and customer knowledge as two factors causing buyer uncertainty. Von Hippel (1986) did already identify the fact that buyer uncertainty is experienced due to the lack of relevant experience with the solution, or similar solutions.

Next to these sources of uncertainty, Aldrich (1979; as cited in Cannon & Perault, 1999) and Achrol & Stern (1988) acknowledged market conditions might impose demands on the information processing capacity of a buyer as another source of uncertainty. These conditions can be caused by rapid

changes of technology in the high-tech industry (Norton & Bass, 1987; Glazer, 1991; Heide & Weiss, 1995, Cannon & Perreault, 1999), so the experience of the buyers might have become obsolete. These rapid changes cause a decrease in the chance that buyers sole-source contracts, however these rapid changes also increase the possibility that the current supplier is reselected (Weiss & Heide, 1993). Other accelerators of environmental uncertainty are high levels of heterogeneity (Weiss & Heide, 1993), frequent price changes and fluctuations in product availability (Cannon & Perreault, 1999). Also, the type of purchase situation influences the degree of uncertainty, Robinson, Faris & Wind (1967; as referred in Boer, Labro & Morlacchi, 2001) state that a new buy task is influenced by higher levels of uncertainty as modified- and straight rebuy. Min (1994) mentions that in international supplier selection unfamiliarity and uncertainty is involved.

If organizational buying in high-tech and supplier selection is influenced by uncertainty. How does the uncertainty influence the difference in selection criteria importance?

## 3.5 Competitive Industrial Performance

According to United Nations Industrial Development Organization (from now on UNIDO) "the competitiveness of the manufacturing industry is one of the basic determinants of long-run sustainable growth" (UNIDO, 2016, p. 197). When a country becomes more technological capable, expands production capacity and invests in infrastructure it might become more competitive. UNIDO developed the "Competitive Industrial Performance Index" (from now on CIP). It is "a performance indicator rather than a potential indicator" (UNIDO, 2016, p. 197), and it ranks countries based on eight sub-indicators and three dimensions of industrial competitiveness. These three major dimensions are "the capacity to produce and export manufactures", "technological deepening and upgrading" and "World impact" (UNIDO, 2016, p. 197). These should give an objective view of the current performance of the competitiveness of countries.

The CIP is available for the country of every respondent participating in this research. In appendix E, the complete list of the CIP scores are shown per respondent.

UNIDO is a specialized part of the United Nations (from now on UN) and promotes industrial development to reduce poverty, and is also located at the UN campus in Vienna, Austria (United Nations, n.p.).

## 3.6 Government favouritism

Favouritism is a widely researched phenomenon, especially in the public procurement industry. The Quality of Government team researched for the ANTICORRP project the "perceived unfairness of treatment from public services" in Europe among 88.000 respondents (Mungiu-pippidi & Kukutschka, 2015, p. 10). This research discovered that in Northern Europe a third of those asked, perceived favouritism and discrimination when dealing with public services. In Mediterranean Europe, almost half of the respondents perceived this. While in Eastern Europe it is perceived in the majority of the cases. "Government Favoritism" is explained as "The administrative behavior by which such a non-random distributional outcome is reached" (Mungiu-pippidi & Kukutschka, 2015, p. 12). Government favouritism does not always have the same cause,

governments may favour a domestic organization to contribute to the domestic welfare instead of assigning the order to a foreign organization (Branco, 2002). Györfi, Molnár, Reszketö & Váradi (2016) mentioned that assigning orders based on the relationship with the political elite is also a form of corruption in Europe, and that this is often done by tailoring the public procurement requirements, so just a few companies can fulfil these. But also bribery and private gain of public servants may also be important to gain government favouritism.

### 3.6.1 Personal relationships
One way to get in favour with governments is with personal relationships. Lian & Laing (2007) state that the role of personal relationship is a critical element in the purchasing process of B2B. Lian & Laing (2007) also state that recognizing the importance of personal relationships and including this in marketing planning could help to improve and cultivate these relationships. But according to John Browne, CEO of British Petroleum, the relationship is always between individuals and never between two organizations (Prokesch, 1997; as cited in Adobor, 2006).

## 3.7 Constructs
In table two below the definitions of the constructs used in this research are listed. In appendix D the measures of the variables and constructs are shown.

**Table 2**
List of constructs

| Construct | Definition | Reference |
|---|---|---|
| **Buying behaviour (BB)** | An umbrella term which covers purchasing activities in all types of organizations to satisfy organizational goals. | Hill & Hillier (1977) |
| **Supplier Selection Criteria** | Eight criteria which are used to determine the fit of the suppliers: Finances, Consistency, Relationship, Flexibility, Technological capability, Customer service, Reliability, Price | Choi & Hartley (1996) |
| | Service costs | Stremersch et al. (2001) |
| | Product life-cycle costs | Alexandra et al. (2014) |
| | "Off-set" (Transfer of technology & Local workshare) | Keohane (2002) |
| **Technological competence (TC)** | The ability to make effective use of technological knowledge and learning to develop and improve products and processes. | Ritter & Gemünden (2002); Kim (1997); McEvily, Eisenhardt & Prescott (2004) |

| | | |
|---|---|---|
| **Buyer uncertainty (BU)** | "The difficulty in predicting the outcomes of a purchase decision in terms of the likely performance and likely costs." | Collis, 1992; Kohli, 1989; as cited in Gao, et al. 2002) |
| **Market uncertainty (MU)** | Uncertainty caused by pace of technological change, technological heterogeneity and the lack of experience. | Heide & Weiss (1995) |
| **Competitive industrial performance index (CIP)** | An index that ranks countries based on various dimensions to examine their current industrial competitiveness. | UNIDO (2016) |
| **Government favouritism** | "The administrative behaviour by which such a non-random distributional outcome is reached." | Mungiu-pippidi & Kukutschka (2015, p. 12) |

### 3.7.1    Causal model

This research is testing the influence of two constructs on eleven tender criteria. Every tender criterion is tested seperately to provide insights what criteria are influenced by technological competence and buyer uncertainty.  Figure 1 shows the model for sub-question 1.



Fig. 1: proposed research model sub-question 1.

Figure 2 shows the proposed model for sub-question 2, the model is similar as fig. 1, but now buyer uncertainty is tested.
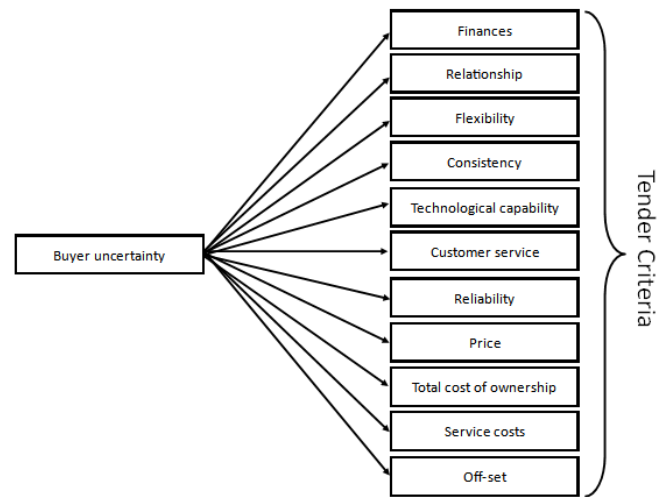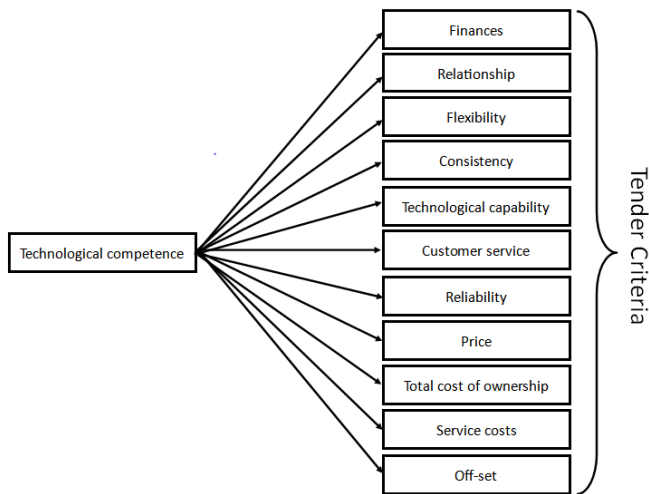


Fig. 2: proposed research model sub-question 2.

The last sub-question is testing if technological competence can be objectified and therefore be substituted for competitive industrial performance.

# 4    Research Methodology

A survey as quantitative research method will be used to reach the goal of this research. Which is to answer the research question "How does the maturity of technological competence and buyer uncertainty influence tender criteria issued by buyers?".

## 4.1    Survey

In social science, variables need to be created to be able to measure an abstract concept (Vanderstoep & Johnston, 2009). The survey is the most used data gathering technique in social sciences (Neuman, 2007). Neuman (2007) states that surveys are almost too popular.

### 4.1.1    Preparation

In preparation of the survey three exploratory interviews were conducted with experienced sales managers. These interviews were used to get more insights in the specific industry, so the survey would be more suited to HTS. The results of these interviews and the literature review will be used as basis for the survey. Neuman (2007) identified six phases before conducting the survey. These steps will be followed during this survey. Next to these steps Neuman (2007) also identified three principles for an effective questionnaire "Keep it clear, keep it simple, and keep the respondent's perspective in mind" (p. 169/170).

### 4.1.2    Sample size and sampling

Within this research the sample size and sampling methods are limited. For the best results, the respondents of the questionnaire would be (potential) clients, but these are off-limits during this survey. Therefore, it is bound by sampling within the human resources of HTS, the respondents will be all be the first point of contact with potential clients during a tender process and highly experienced in this line of work. According to Neuman (2007) the described method is called purposive sampling and is suitable in three occasions, firstly when the researcher needs unique cases that are extremely informative,

secondly when the researcher needs to question a specialized part of the population like experts, thirdly when the researcher wants to identify a particular type of cases for an in-depth investigation (Neuman, 2007). The second occasion applies for this research, the sample will be experienced in the market and well informed about the behaviour of (potential) customers, this approach creates 44 potential respondents, and 37 responded, which creates an 84% response rate.

Before sampling the survey, a mail was send to the respondents, with a brief introduction about the research. In this mail it was mentioned that the survey would be distributed personally to give some instructions and to increase the response rate of the respondents. This approach was time consuming due to the limited attendance of the respondents at HTS Headquarters. Nevertheless was this approach essential for the high response rate of this survey.

### 4.1.3    Experts
Due to the fact this research is bound by non-random sampling and a relative small sample size of 37 respondents, the quality needs to be secured in another manner. This research is therefore relying on the expertise of the respondents, and only experts are qualified to answer this survey. But when can a respondent be considered an expert, Hoffman et al. (1995) selected for their research experts based on years of experience and professional experience (e.g. Graduate degrees, training experience, publication record etc.) However, according to Welch, Marschan-Piekkari, Penttinen & Tahvanainen (2002) an expert needs to meet the following requirements, he or she needs to be working in senior or middle management; he or she has functional responsibility in an important area within organizational values; he or she possesses a large social network; he or she has considerable international exposure. Kolb (2008) describes experts as respondents that are not potential customers, but have specific knowledge about the industry and the company its target segment.

**Table 4**
Functions of the respondents

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Director Business Development | 1 | 2,7 | 2,7 |
| Director export marketing & sales | 1 | 2,7 | 5,4 |
| Key account manager | 3 | 8,1 | 13,5 |
| Marketing manager | 2 | 5,4 | 18,9 |
| PLCM specialist | 1 | 2,7 | 21,6 |
| Product manager | 1 | 2,7 | 24,3 |
| Sales director | 13 | 35,1 | 59,5 |
| Sales manager | 15 | 40,5 | 100,0 |
| Total | 37 | 100,0 | |

Table 4 shows that all the respondents had senior functions with an average of 19,89 years of experience at HTS (SD = 11,020).

### 4.1.4    Data collection
The data is collected by means of a semi self-administered survey. In the first part, there was global information about the respondent and the customer and end-user the respondent is responsible for, these were open and multiple-choice questions. Second part tested the technological competence of the customers, and was measured with a 5-point Likert-scale. The questions where based on information provided by researches on technological competence (e.g. Ritter & Gemünden, 2002; Kim, 1997). The third part tested the buyer and market uncertainty, and tested with factors causing this according to Heide & Weiss (1995) and Gao et al. (2002). This was measured with a 5-point Likert-scale to what extent the end-user experienced uncertainty during the tender process. The fourth part tested the how important each tender criterion was during a tender process. This was measured with a 7-point Likert-scale, to get more detailed information. The mentioned tender criteria where adopted from Choi & Hartley (1996), and complemented with criteria mentioned during the exploratory interviews in HTS and endorsed by several sources (Stremersch et al., 2001; Alexandra et al., 2014; Keohane, 2002). In the fifth and last part was a control variable about the governmental influence during a tender process, again with a 5-point Likert-scale.

The data was collected hardcopy, this gave the researcher the chance to check if everything was filled-in successfully, and gave respondents the chance to give some additional information about some statements. The collected data was transmitted into IBM SPSS 23, where the data was analysed.

### 4.1.5    Conclusion
The survey was conducted among 44 respondents and 37 did respond this can be considered a high response rate with 84%. Although the sample size is not that large, it is a highly experienced and qualified sample, what neutralizes the relative small sample. The data will be analysed with a variety of tests in IBM SPSS 23.

# 5    Data analysis and Results
## 5.1    Descriptive
### 5.1.1    HTS and its industry
To get a better understanding of this research, it is important to have more insights in HTS and the industry where HTS is active in. First it is important to understand that the prime-contractor is rarely the end-user of the solutions. Table 5 shows that in at least 54,1% of the cases the manufacturer is the prime contractor of HTS. With "Other" it is often a semi-governmental organisation that has the lead in tender processes.

**Table 5**
The prime-contractor of HTS

| | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Manufacturer | 20 | 54,1 | 54,1 |
| End-user | 3 | 8,1 | 62,2 |
| Government | 5 | 13,5 | 75,7 |
| Other | 6 | 16,2 | 91,9 |
| Varies a lot | 3 | 8,1 | 100,0 |
| Total | 37 | 100,0 | |

Furthermore in 75,7% of the cases HTS has done business with the prime contractor.

**Table 6**
Ever done business with HTS

|  | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Yes | 28 | 75,7 | 75,7 |
| No | 9 | 24,3 | 100,0 |
| Total | 37 | 100,0 | |

Although in many cases HTS has done business with the prime-contractor, the role of HTS varies. Table 7 shows just three of the four possible answers. None of the respondents answered that HTS is only responsible for the integration of the solutions. It is either as OEM or as OEM and Integrator.

**Table 7**
Role of HTS

|  | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| OEM | 13 | 35,1 | 35,1 |
| Both | 22 | 59,5 | 94,6 |
| N/A | 2 | 5,4 | 100,0 |
| Total | 37 | 100,0 | |

Because HTS is competing in a high-tech industry, the respondents were asked to categorize the end-users based on the "Diffusion of innovation model" developed by Everett Rogers in 1962 (Rogers, 1982). Table 8 shows that the biggest group of end-users are identified as "late majority", so this sample of end-users is not that willing to innovate in these solutions.

**Table 8**
Diffusion of innovation model

|  |  | Frequency | Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | Innovators | 3 | 8,1 | 8,3 |
|  | Early Adopters | 7 | 18,9 | 27,8 |
|  | Early Majority | 8 | 21,6 | 50,0 |
|  | Late Majority | 13 | 35,1 | 86,1 |
|  | Laggards | 5 | 13,5 | 100,0 |
|  | Total | 36 | 97,3 | |
| Missing | System | 1 | 2,7 | |
| Total |  | 37 | 100,0 | |

### 5.1.2 Technological competence

The main construct of this research is Technological Competence. In the survey, this part contained eight variables, and the KMO (0,694) and Bartlett's (0,000 sig) test confirmed a factor analysis was appropriate to find communality. After a principal component analysis, two factors were identified with an eigenvalue above one. Seven variables measured the same construct, namely technological competence, one variable measured the influence of prestige (see Appendix F). This construct afterwards was tested on reliability using Cronbach's Alpha, with a score of 0,868 (table 9) it was very reliable, deleting an item would not make it more reliable.

**Table 9**
Reliability of Technological Competence

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| ,868 | 7 |

### 5.1.3 Uncertainty

The same tests were conducted as for Technological competence, although this part contained 10 variables testing several factors influencing uncertainties that might influence a tender process. With a KMO (0.662) and Bartlett's (0,000 sig) test that confirmed that a factor analysis was appropriate. A principal component analysis showed three possible factors with an eigenvalue above one. The identified factors can be best named as follows "Market Uncertainty", "Buyer Uncertainty" and "Trust in Supplier", although the last one contained just one variable therefore cannot be considered a construct (Appendix G). But nevertheless, is it an interesting result, that trust in a supplier cannot be count as a part of uncertainty, although literature suggested that trust influences the amount of uncertainty. For Market Uncertainty and Buyer Uncertainty a reliability analysis was conducted and showed the following results.

Market Uncertainty contained 4 variables based on the principal component analysis, although the reliability analysis showed that the reliability would increase from a=0.688 to a=0.789 if "Alternatives of HTS' solutions available" was deleted. The increase in reliability justifies the loss of data therefore the item was deleted.

**Table 10**
Cronbach's Alpha Market Uncertainty

**Item-Total Statistics**

|  | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| 29. Market characterized by rapidly changing technologies | 7,0541 | 5,608 | ,372 | ,681 |
| 30. Market characterized by frequent price changes | 7,5676 | 4,474 | ,686 | ,486 |
| 31. Market characterzied by fluctuations in product availability? | 7,7297 | 3,814 | ,715 | ,436 |
| 32. Alternatives of Company X' solutions available | 7,9730 | 6,083 | ,192 | ,789 |

Buyer uncertainty contained 5 variables based on the principal component analysis. The reliability analysis showed a reliability of a=0.841 what is highly reliable, although deleting 1 variable would increase the Cronbach's Alpha to a=0.848. The increase in reliability cannot justify the loss in data so the variable will not be deleted during this research.

**Table 11**

Cronbach's Alpha Buyer Uncertainty

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| 33. End-user has extensive prior knowledge | 13,9697 | 11,593 | ,626 | ,814 |
| 34. End-user familiar with the performance of the solution | 13,9091 | 10,585 | ,822 | ,757 |
| 35. End-user has information about likely performance | 13,6364 | 11,989 | ,783 | ,780 |
| 36. End-user finds it hard to evaluate future performance | 14,3333 | 12,417 | ,538 | ,837 |
| 38. Final decision was hampered by a lot of uncertainty | 13,8485 | 12,070 | ,513 | ,848 |

### 5.1.4    Tender criteria

The tender criteria constructs were adapted from Choi & Hartley (1996). During this research, the respondents were asked to provide an answer how important a specific criterion was for a customer during a tender process on a 7-point Likert-Scale. These predefined constructs were tested on reliability in this research, and the results were as follows (see table 12).

**Table 12**

Constructs tender criteria

| Construct | Items | Items deleted | Cronbach's Alpha |
|---|---|---|---|
| Finance | 4 | 0 | 0.706 |
| Flexibility | 4 | 1 | 0.709 |
| Technological Capability | 2 | 0 | 0.805 |
| Reliability | 2 | 0 | 0.729 |
| Price | 2 | - | -0.232 |
| Consistency | 3 | 1 | 0.678 |
| Relationship | 3 | 1 | 0.721 |
| Off-set | 2 | 0 | 0.872 |
| Customer service | 2 | - | 0.153 |

George & Mallery (2003; as cited in Gliem & Gliem, 2003) provided a rule of thumb for the Cronbach's Alpha as follows, "_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable" (George & Mallery, 2003, p. 231; as cited in Gliem & Gliem, 2003, p. 87). Six of the nine constructs are acceptable to good, while one, consistency, is questionable. Two of the constructs are unacceptable. The first unacceptable one is price, the two variables put together for this construct was initial price and total cost of ownership (from now on TCO), these two are so different that both variables were used separate during further analysis. Customer service contained "after sales support" and "sales representative competence", these were also valued different during the research and will be used separate during further analysis.

### 5.1.5    Government favouritism

The last part of the survey contained questions about governmental influence during tender processes. This part was always meant to be a control variable, but the results of this part were not reliable enough to be used in further analysis of this research. During the exploratory interviews of this research the construct government favouritism became clear to be hard to evaluate. According to the interviewees the influence of governments was evident, but hard to measure. To get more insight in the influence of government favouritism, more research is needed. That is why this research acknowledge the fact that there is government favouritism and this influences the process, although it is not clear to what extent the influence reaches.

## 5.2    The influence of technological competence on tender criteria

To answer the first sub-question: "To what extent does the technological competence of buyers, influence tender criteria issued by potential buyers?" a correlation matrix was constructed to see if there was any correlation between technological competence and the tender criteria. There were five criteria significant at a 0.01 level (2-tailed), namely: Finances, Flexibility, Technological capability, Reliability, Total cost of ownership (see Appendix G). One criterion, after sales support was significant at a 0.05 level (2-tailed). For these criteria, a scatterplot was created to see how the correlation was distributed, as you can see for total cost of ownership in Appendix J below.

In the scatterplot in Appendix J, a linear regression is shown with an $R^2$ of 0.458. A linear regression was used to test if the influence of TC on TCO was significant, in table 13 the results of a linear regression is shown and it is a significant effect.

**Table 13**

Correlation Technological competence vs. TCO

**Correlations**

| | | Technological _Competence | 63. Total cost of Ownership |
|---|---|---|---|
| Technological_Competence | Pearson Correlation | 1 | ,677** |
| | Sig. (2-tailed) | | ,000 |
| | N | 37 | 37 |
| 63. Total cost of Ownership | Pearson Correlation | ,677** | 1 |
| | Sig. (2-tailed) | ,000 | |
| | N | 37 | 37 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 14**

Linear regression Technological competence vs. TCO

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | ,837 | ,675 | | 1,240 | ,223 |
| | Technological_Competence | 5,902 | 1,085 | ,677 | 5,440 | ,000 |

a. Dependent Variable: 63. Total cost of Ownership

The same tests were conducted with the other tender criteria and the results are shown in table 15.

**Table 15**
Technological competence vs. Tender criteria

| Tender criteria | $R^2$ (explained variance) | Significant |
|---|---|---|
| Technological capability | 0.444 | 0.000 |
| Flexibility | 0.380 | 0.000 |
| Reliability | 0.197 | 0.007 |
| Finance | 0.191 | 0.007 |
| TCO | 0.458 | 0.000 |
| After sales support | 0.133 | 0.026 |

Clearly technological competence has some influence on tender criteria. The criteria "Technological capability" (0.444), "Flexibility" (0.380) and "TCO" (0.458) have a higher $R^2$ in comparison with the other criteria, and therefore the variance in these criteria are better explained by technological competence. Although the $R^2$ is not very high, the influence is of technological competence on tender criteria is undeniable.

## 5.3 The influence of buyer uncertainty on tender criteria

The second sub-question is: "To what extent does buyer uncertainty influence tender criteria issued by potential buyers?", to answer this question the same steps were taken as for the first sub-question. Therefore, first a correlation matrix was constructed (see Appendix I), and only "Reliability" (-0.460 at a 0.01 level) and "TCO" (-0.351 at 0.05 level) have a significant negative correlation with buyer uncertainty. The correlation matrix also shows that two other criteria would be significant at a 0.1 level, so there might be more criteria that are influenced by buyer uncertainty, but in this research, it was not significant.

The scatterplot in Appendix K shows a negative linear regression with an $R^2$ of 0.212. But the scatterplot also shows a wide spread, and possibly some outliers. Table 16 displays that the effect is significant at a 0.01 level.

**Table 16**
Correlation Buyer uncertainty vs. Reliability

**Correlations**

| | | Buyer_Uncertainty | BC_Reliability |
|---|---|---|---|
| Buyer_Uncertainty | Pearson Correlation | 1 | -,460** |
| | Sig. (2-tailed) | | ,006 |
| | N | 35 | 34 |
| BC_Reliability | Pearson Correlation | -,460** | 1 |
| | Sig. (2-tailed) | ,006 | |
| | N | 34 | 35 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 17**
Linear regression Buyer uncertainty vs. Reliability

**Coefficients**[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | ,903 | ,095 | | 9,466 | ,000 |
| | Buyer_Uncertainty | -,705 | ,240 | -,460 | -2,933 | ,006 |

a. Dependent Variable: BC_Reliability

Table 18 shows a brief oversight of the criteria influenced by buyer uncertainty.

**Table 18**
Buyer uncertainty vs. Tender criteria

| Tender criteria | $R^2$ (explained variance) | Significant |
|---|---|---|
| Reliability | 0.212 | 0.006 |
| TCO | 0.123 | 0.039 |

In conclusion, buyer uncertainty has influence on tender criteria but just on a few criteria and it just explains a small portion of the variance.

## 5.4 The relation between technological competence and CIP

The key of the third sub-question "Is there a correlation between Competitive Industrial Performance and technological competence of potential buyers?" was developed to possibly being able to objectify the results of this research. The CIP is already being used as parameter for segmentation within HTS and regarded as a reliable source in this research. This because the use of many parameters to define the CIP and being used and developed by a trustworthy organisation as United Nations.

As first step to answer this question a correlation matrix (see table 19) was developed. And this shows that there is a moderate positive correlation between Technological competence and CIP.

**Table 19**
Correlation Matrix Technological competence vs. CIP

**Correlations**

| | | Technological_Competence | Competitive_Industrial_Performance |
|---|---|---|---|
| Technological_Competence | Pearson Correlation | 1 | ,549** |
| | Sig. (2-tailed) | | ,000 |
| | N | 37 | 37 |
| Competitive_Industrial_Performance | Pearson Correlation | ,549** | 1 |
| | Sig. (2-tailed) | ,000 | |
| | N | 37 | 37 |

**. Correlation is significant at the 0.01 level (2-tailed).

The next step after the correlation matrix was to check if it can be concluded that there is a linear regression between CIP and Technological competence. At first a linear regression seemed right because a $R^2$ of 0.302 (see table 20) appeared, and the effect is significant at a 0.01 level. But the scatterplot (Appendix L) showed a wide spread of observations and with just a few observations with a high CIP in the middle, and a small drop at the last observation, therefore a quadratic regression seemed plausible. Table 18 shows that the quadratic regression have

an $R^2$ of 0.322 and is also significant at a 0.01 level. Nevertheless other than that small drop no implications were found in the data that a quadratic regression is the best model.

**Table 20**
Model summary CIP vs. Technological competence

**Model Summary and Parameter Estimates**

Dependent Variable: Technological_Competence

| Equation | Model Summary | | | | | Parameter Estimates | | |
|---|---|---|---|---|---|---|---|---|
| | R Square | F | df1 | df2 | Sig. | Constant | b1 | b2 |
| Linear | ,302 | 15,139 | 1 | 35 | ,000 | ,480 | ,728 | |
| Quadratic | ,322 | 8,076 | 2 | 34 | ,001 | ,440 | 1,302 | -1,169 |

The independent variable is Competitive_Industrial_Performance.

Conclusively there is a significant linear relation between CIP and Technological competence. End-users with a higher technological competence tend originate from countries that have an industry that is more competitive.

# 6  Conclusion and recommendations

This research studies the influence of technological competence and buyer uncertainty on the tender criteria (potential) customers lay emphasis on. It is shown in previous chapters that technological competence influences tender criteria. Six of the nine identified criteria are influenced by the level of technological competence of end-users. Nevertheless, some criteria are important for every (potential) customer despite the maturity of their technological competence, for example a low initial price.

Buyer uncertainty have a negative influence on the importance of a tender criteria. In literature, it is acknowledged that buyer uncertainty influences buying behaviour, although according to this research it has limited direct influence on the difference in importance of the tender criteria. Nevertheless, buyer uncertainty is important to keep in mind during tender processes, it is important to find out what uncertainties do (potential) customers experience and how can these uncertainties be taken away. This research experimented with the data to test this hypothesis, but no positive results were found.

Technological competence highly influences the importance of tender criteria, while this construct itself has a linear relation with CIP, and even a stronger quadratic relation. Its explained variance is limited, this research therefore sees CIP as a control variable. It gives an independent overview of the current industrial situation in the customers country, what can be useful during a procurement process. Countries with a higher CIP tent to have customers with a higher technological competence, what causes difference in the importance of a variety of tender criteria.

This research also acknowledges that this environment is highly influenced by high-level international politics. Some tenders will be won or lost based on grounds that suppliers will never know or be able to influence. In the literature review, this is explained as government favouritism, while it is impossible based on the results of this research to add as a parameter in segmentation, it cannot be ignored. It influences tender processes and buyer behaviour in the B2G environment, although the amount of variation fluctuates per country and might even fluctuate per tender. Therefore, this does not limit the research but it must be kept in mind.

## 6.1  Theoretical implications

This research is an addition to existing literature about supplier selection, technological competence and buyer uncertainty in a B2G industry. But it adds also new insights for existing TCO literature. Most researches about TCO (e.g. Alexandra, Corina & Alina, 2014; and as cited in Ferrin & Plank, 2002: Cavinato, 1991; Cavinato, 1992; Jackson & Ostrom, 1980; Elram & Siferd, 1993) suggest that managers should take a long-term perspective in consideration during a procurement. This research found out that not every customer values TCO equally important as supplier selection criteria. Although there is a linear relationship between the technological competence and the relative importance of TCO. Customers with a higher technological competence are in general more focused on TCO. While the importance of a low initial price is not related to the level of technological competence of customers.

Edler et al. (2005) state that organizations with a high level of technological competence are better able to procure complex projects. This research adds that one of the possible explanations is that a highly technological competent organization lay emphasis on other supplier selection criteria. By focusing on different criteria, different outcomes may occur what influences the success of a procurement process.

A broad variety of scholars (e.g. Bunn & Clopton, 1993; Kline & Wagner, 1994; Gao, Wang, Sirgy & Bird, 2002) stated that buyer uncertainty influences buying decisions of consumers and organizations. This research investigated if buyer uncertainty is directly influencing the relative importance of certain supplier selection criteria, but only discovered a direct significant effect between the importance of the reliability of suppliers and buyer uncertainty. For the other criteria, no significant effect was found.

## 6.2  Practical implications

Results of this study may provide insights and understanding for B2G marketers in the influence of technological competence on the buying behaviour and the relative importance of supplier selection criteria. Technological competence influences how potential customers select a supplier during a tender process. More insights in this process will give the B2G marketers the ability to better fulfil the requirements of potential customers, to improve the success rate of these tender processes.

Although buyer uncertainty has almost none significant direct effect on the importance of the variety of supplier selection criteria in this research. Some influence of buyer uncertainty on the importance of certain selection criteria was observed. B2G marketers should be aware of uncertainties present at the potential customers, especially in high-tech industries. This research found that highly uncertain buyers are more focused on supplier and product reliability, therefore B2G marketers should emphasize their reliability during tender processes with highly uncertain buyers.

This research furthermore tried to see what the influence was of government favouritism and if CIP would help marketers to understand the potential customers. While government

favouritism was experienced, there was no direct link with the importance of supplier selection criteria. During the interviews, it was mentioned that sales managers experience that government favouritism influences the results of tender processes in the past, although it is almost never possible to point this factor as single factor of losing a tender.

CIP does correlate with the technological competence of potential customers in a high-tech B2G industry, but it can only be used as a control variable, to get a little more insight in the potential customer. It might give the B2G marketer insight in macro environmental forces influencing the potential customer, but that is all.

## 6.3 Limitations and future research

This research has as every other research its limitations, although the limitations of this research might be more comprehensive. As mentioned not the decision makers were respondents of the survey, but managers of HTS. Therefore, the results might be a bit biased. This research tried to tackle this research by selecting only highly experienced managers that are in close contact with the decision makers. Furthermore, the research has a relatively small sample, 37 respondents give a small basis for the conclusions based on this survey. Therefore, is it for future research recommended to test these results on a larger sample, with only respondents directly involved in decision making process as (potential) customer. This would be ideal, although hard to accomplish in a B2G environment highly influenced by confidentiality.

Another recommendation for further research would be the influence of buyer uncertainty on tender processes. This research acknowledges that customers have uncertainties, although there is just little significant effect of these uncertainties on tender criteria. Therefore, the influence of buyer uncertainties on tender processes in a high-tech B2G environment would be useful for many companies alike HTS.

## 6.4 Acknowledgments

First, I would like to thank my supervisors at HTS, first Boudewijn Geerink MSc, for the excellent supervision during the most important part of my research, the data collection and analysis. Secondly, I would like to thank my first supervisor Dr. Raymond Loohuis for the feedback and guidance during the course of the research. Last but not least I would like to thank Dr. Victor Paashuis for giving me the change to conduct this research at HTS.

# 7 Appendix

Since the interview transcripts are prohibited for distribution, these cannot be included within this report. To get access for these transcripts please get in touch.

## 7.1 Appendix A
**Interview transcript 03-02-2017**

Since the interview transcripts are prohibited for distribution, the transcript of the interview with sales manager Latin-America of HTS, cannot be included within this report. To get access for these transcripts please get in touch.

## 7.2 Appendix B
**Interview transcript 09-02-2017**

Since the interview transcripts are prohibited for distribution, the transcript of the interview with the director export marketing and sales Asia of HTS, cannot be included within this report. To get access for these transcripts please get in touch.

## 7.3 Appendix C
**Interview transcript 13-02-2017**

Since the interview transcripts are prohibited for distribution, the transcript of the interview with the marketing and sales director Northern-Europe of HTS, cannot be included within this report. To get access for these transcripts please get in touch.

## 7.4 Appendix D
**Variables and measures**

| Variable | Measure |
|---|---|
| **Technological competence (TC)** | Did the customer already buy HTS Inc. solutions?<br>Based on historical transactions, which category represents the end-user? (The diffusion of innovation model, Everett Rogers 1962)<br>How can the overall purchase history be characterized<br>To what extent familiar with high-tech solutions<br>To what extent able to think along during NPD<br>To what extent does the end-user demand a tailored solution<br>To what extent able to provide tailor requirements<br>How extensive are the requirements in a RFQ?<br>To what extent is the latest high-tech solutions required<br>To what extent willing to risk buying un-fielded solutions?<br>To what extent is prestige a buying motive |
| **Buyer uncertainty (BU) + Market uncertainty (MU)** | Market characterized by rapidly changing technologies<br>Market characterized by frequent price changes<br>Market characterized by fluctuations in product availability<br>Alternatives of HTS' solutions available<br>End-user has extensive prior knowledge<br>End-user familiar with the performance of the solution<br>End-user has information about likely performance<br>End-user finds it hard to evaluate future performance<br>End-user sees HTS as trustworthy supplier<br>Final decision was hampered by a lot of uncertainty |
| **Tender criteria** | |
| **Finance** | Financial conditions<br>Profitability of potential supplier<br>Disclosure of Financial records<br>Performance awards |
| **Consistency** | Compliancy, Conformance quality<br>Consistent Delivery<br>Quality philosophy<br>Prompt Response |
| **Relationship** | Long-term relationship<br>Relationship Closeness<br>Communication openness<br>Reputation for integrity |
| **Flexibility** | Product volume changes<br>Short set up time<br>Short Delivery lead time<br>Conflict Resolution<br>Service Contracts |
| **Technological capability** | Design capability of the supplier<br>Technological capability of the supplier |
| **Customer service** | After-sales support<br>Sales representatives competence |
| **Reliability** | Incremental Improvements<br>Product Liability |
| **Price** | Low Initial price<br>Total cost of Ownership (TCO) |
| **Off-set** | Local Work-share<br>Transfer of Technology |
| **Competitive industrial performance index (CIP)** | Appendix E; UNIDO (2016) |
| **Government favouritism (GOV)** | How is the relationship between Dutch government and government of destinatic<br>How is the economic situation<br>How is the political stability<br>Does the relationship between governments influence tender process<br>Does the economic situation influence the tender process<br>Does the political stability influence the tender process |

## 7.5 Appendix E

CIP rank per respondent

| Resp_# | Competitive_Industrial_Performance |
|---|---|
| 1 | 0,039 |
| 2 | 0,040 |
| 3 | 0,058 |
| 4 | 0,309 |
| 5 | 0,118 |
| 6 | 0,108 |
| 7 | 0,341 |
| 8 | 0,072 |
| 9 | 0,042 |
| 10 | 0,176 |
| 11 | 0,576 |
| 12 | 0,321 |
| 13 | 0,188 |
| 14 | 0,176 |
| 15 | 0,067 |
| 16 | 0,069 |
| 17 | 0,143 |
| 18 | 0,143 |
| 19 | 0,237 |
| 20 | 0,083 |
| 21 | 0,067 |
| 22 | 0,066 |
| 23 | 0,313 |
| 24 | 0,007 |
| 25 | 0,073 |
| 26 | 0,073 |
| 27 | 0,019 |
| 28 | 0,167 |
| 29 | 0,183 |
| 30 | 0,186 |
| 31 | 0,442 |
| 32 | 0,130 |
| 33 | 0,022 |
| 34 | 0,042 |
| 35 | 0,297 |
| 36 | 0,030 |
| 37 | 0,466 |

## 7.6 Appendix F

**Component Matrix[a]**

| | Component | |
|---|---|---|
| | 1 | 2 |
| 21. To what extent familiar with high-tech solutions | ,726 | -,425 |
| 22. To what extent able to think along during NPD | ,844 | -,216 |
| 23. To what extent does the end-user demand a tailored solution | ,632 | ,504 |
| 24. To what extent able to provide tailor requirements | ,823 | -,239 |
| 25. How extensive are the requirements in a RFQ? | ,742 | -,160 |
| 26. To what extent is the latest high-tech solutions required | ,799 | ,344 |
| 27. To what extent willing to risk buying un-fielded solutions? | ,687 | ,332 |
| 28. To what extent is prestige a buying motive | -,019 | ,841 |

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

## 7.7 Appendix G

**Component Matrix[a]**

| | Component | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 29. Market characterized by rapidly changing technologies | ,003 | ,726 | -,480 |
| 30. Market characterized by frequent price changes | -,386 | ,800 | ,173 |
| 31. Market characterzied by fluctuations in product availability? | -,332 | ,843 | ,236 |
| 33. End-user has extensive prior knowledge | ,731 | ,201 | ,190 |
| 34. End-user familiar with the performance of the solution | ,864 | ,132 | ,241 |
| 35. End-user has information about likely performance | ,843 | ,244 | -,055 |
| 37. End-user sees thales as trustworthy supplier | -,194 | -,160 | ,856 |
| 36. End-user finds it hard to evaluate future performance | ,717 | -,083 | ,133 |
| 38. Final decision was hampered by a lot of uncertainty | ,719 | ,002 | -,242 |
| 32. Alternatives of Thales' solutions available | ,360 | ,405 | ,256 |

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

## 7.8 Appendix H
### Correlation matrix TC vs. Tender criteria

Correlations

| | | Technological_Competence | BC_Finances | BC_Consistency | BC_Relationship | BC_Flexibility | BC_Technological_Capability | BC_Reliability | BC_Off_Set | 62. Low Initial price | 63. Total cost of Ownership | 58. After-sales support | 59. Sales representatives competence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Technological_Competence | Pearson Correlation | 1 | ,437** | ,224 | -,023 | ,616** | ,666** | ,444** | -,071 | -,267 | ,677** | ,365* | -,125 |
| | Sig. (2-tailed) | | ,007 | ,188 | ,891 | ,000 | ,000 | ,007 | ,678 | ,111 | ,000 | ,026 | ,468 |
| | N | 37 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| BC_Finances | Pearson Correlation | ,437** | 1 | ,354* | ,030 | ,564** | ,355* | ,415* | ,070 | ,084 | ,269 | ,201 | ,013 |
| | Sig. (2-tailed) | ,007 | | ,034 | ,860 | ,001 | ,034 | ,013 | ,679 | ,620 | ,108 | ,233 | ,941 |
| | N | 37 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| BC_Consistency | Pearson Correlation | ,224 | ,354* | 1 | ,391* | ,592** | ,315 | ,280 | -,016 | -,013 | ,194 | ,215 | ,335* |
| | Sig. (2-tailed) | ,188 | ,034 | | ,019 | ,000 | ,065 | ,104 | ,928 | ,939 | ,258 | ,208 | ,046 |
| | N | 36 | 36 | 36 | 36 | 33 | 35 | 35 | 36 | 36 | 36 | 36 | 36 |
| BC_Relationship | Pearson Correlation | -,023 | ,030 | ,391* | 1 | ,282 | ,299 | ,258 | -,005 | -,050 | -,040 | -,067 | ,460** |
| | Sig. (2-tailed) | ,891 | ,860 | ,019 | | ,112 | ,076 | ,135 | ,978 | ,768 | ,812 | ,691 | ,005 |
| | N | 37 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| BC_Flexibility | Pearson Correlation | ,616** | ,564** | ,592** | ,282 | 1 | ,595** | ,545** | -,076 | ,192 | ,524** | ,403* | ,150 |
| | Sig. (2-tailed) | ,000 | ,001 | ,000 | ,112 | | ,000 | ,001 | ,673 | ,284 | ,002 | ,020 | ,404 |
| | N | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| BC_Technological_Capability | Pearson Correlation | ,666** | ,355* | ,315 | ,299 | ,595** | 1 | ,544** | ,072 | -,151 | ,560** | ,354* | -,041 |
| | Sig. (2-tailed) | ,000 | ,034 | ,065 | ,076 | ,000 | | ,001 | ,676 | ,379 | ,000 | ,034 | ,815 |
| | N | 36 | 36 | 35 | 36 | 33 | 36 | 34 | 36 | 36 | 36 | 36 | 35 |
| BC_Reliability | Pearson Correlation | ,444** | ,415* | ,280 | ,258 | ,545** | ,544** | 1 | ,190 | ,031 | ,499** | ,709** | ,018 |
| | Sig. (2-tailed) | ,007 | ,013 | ,104 | ,135 | ,001 | ,001 | | ,274 | ,860 | ,002 | ,000 | ,918 |
| | N | 35 | 35 | 35 | 35 | 33 | 34 | 35 | 35 | 35 | 35 | 35 | 35 |
| BC_Off_Set | Pearson Correlation | -,071 | ,070 | -,016 | -,005 | -,076 | ,072 | ,190 | 1 | ,296 | ,034 | ,029 | -,189 |
| | Sig. (2-tailed) | ,678 | ,679 | ,928 | ,978 | ,673 | ,676 | ,274 | | ,075 | ,842 | ,865 | ,269 |
| | N | 37 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 62. Low Initial price | Pearson Correlation | -,267 | ,084 | -,013 | -,050 | ,192 | -,151 | ,031 | ,296 | 1 | -,106 | -,222 | -,186 |
| | Sig. (2-tailed) | ,111 | ,620 | ,939 | ,768 | ,284 | ,379 | ,860 | ,075 | | ,533 | ,188 | ,277 |
| | N | 37 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 63. Total cost of Ownership | Pearson Correlation | ,677** | ,269 | ,194 | -,040 | ,524** | ,560** | ,499** | ,034 | -,106 | 1 | ,555** | -,061 |
| | Sig. (2-tailed) | ,000 | ,108 | ,258 | ,812 | ,002 | ,000 | ,002 | ,842 | ,533 | | ,000 | ,722 |
| | N | 37 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 58. After-sales support | Pearson Correlation | ,365* | ,201 | ,215 | -,067 | ,403* | ,354* | ,709** | ,029 | -,222 | ,555** | 1 | ,083 |
| | Sig. (2-tailed) | ,026 | ,233 | ,208 | ,691 | ,020 | ,034 | ,000 | ,865 | ,188 | ,000 | | ,630 |
| | N | 37 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 59. Sales representatives competence | Pearson Correlation | -,125 | ,013 | ,335* | ,460** | ,150 | -,041 | ,018 | -,189 | -,186 | -,061 | ,083 | 1 |
| | Sig. (2-tailed) | ,468 | ,941 | ,046 | ,005 | ,404 | ,815 | ,918 | ,269 | ,277 | ,722 | ,630 | |
| | N | 36 | 36 | 36 | 36 | 33 | 35 | 35 | 36 | 36 | 36 | 36 | 36 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

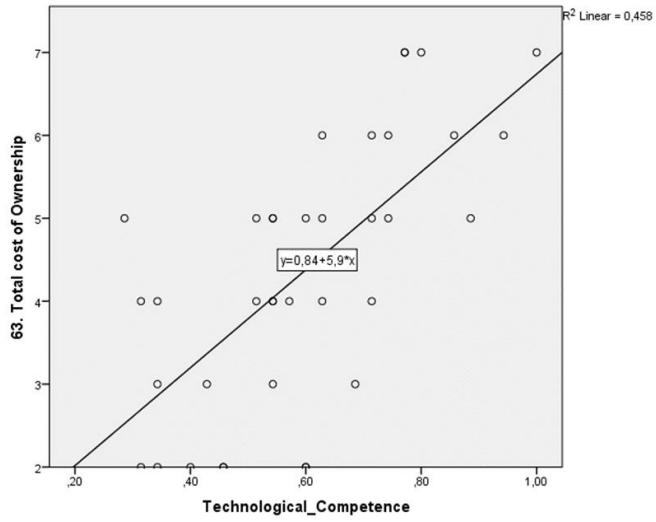## 7.9 Appendix I
### Correlation matrix BU vs. Tender criteria

Correlations

| | | Buyer_Uncertainty | BC_Finances | BC_Consistency | BC_Relationship | BC_Flexibility | BC_Technological_Capability | BC_Reliability | BC_Off_Set | 62. Low Initial price | 63. Total cost of Ownership | 58. After-sales support | 59. Sales representatives competence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Buyer_Uncertainty | Pearson Correlation | 1 | -,197 | ,072 | ,034 | -,113 | -,240 | -,460** | -,304 | ,129 | -,351* | -,193 | ,282 |
| | Sig. (2-tailed) | | ,258 | ,681 | ,847 | ,537 | ,172 | ,006 | ,076 | ,461 | ,039 | ,266 | ,100 |
| | N | 35 | 35 | 35 | 35 | 32 | 34 | 34 | 35 | 35 | 35 | 35 | 35 |
| BC_Finances | Pearson Correlation | -,197 | 1 | ,354* | ,030 | ,564** | ,355* | ,415* | ,070 | ,084 | ,269 | ,201 | ,013 |
| | Sig. (2-tailed) | ,258 | | ,034 | ,860 | ,001 | ,034 | ,013 | ,679 | ,620 | ,108 | ,233 | ,941 |
| | N | 35 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| BC_Consistency | Pearson Correlation | ,072 | ,354* | 1 | ,391* | ,592** | ,315 | ,280 | -,016 | -,013 | ,194 | ,215 | ,335* |
| | Sig. (2-tailed) | ,681 | ,034 | | ,019 | ,000 | ,065 | ,104 | ,928 | ,939 | ,258 | ,208 | ,046 |
| | N | 35 | 36 | 36 | 36 | 33 | 35 | 35 | 36 | 36 | 36 | 36 | 36 |
| BC_Relationship | Pearson Correlation | ,034 | ,030 | ,391* | 1 | ,282 | ,299 | ,258 | -,005 | -,050 | -,040 | -,067 | ,460** |
| | Sig. (2-tailed) | ,847 | ,860 | ,019 | | ,112 | ,076 | ,135 | ,978 | ,768 | ,812 | ,691 | ,005 |
| | N | 35 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| BC_Flexibility | Pearson Correlation | -,113 | ,564** | ,592** | ,282 | 1 | ,595** | ,545** | -,076 | ,192 | ,524** | ,403* | ,150 |
| | Sig. (2-tailed) | ,537 | ,001 | ,000 | ,112 | | ,000 | ,001 | ,673 | ,284 | ,002 | ,020 | ,404 |
| | N | 32 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| BC_Technological_Capability | Pearson Correlation | -,240 | ,355* | ,315 | ,299 | ,595** | 1 | ,544** | ,072 | -,151 | ,560** | ,354* | -,041 |
| | Sig. (2-tailed) | ,172 | ,034 | ,065 | ,076 | ,000 | | ,001 | ,676 | ,379 | ,000 | ,034 | ,815 |
| | N | 34 | 36 | 35 | 36 | 33 | 36 | 34 | 36 | 36 | 36 | 36 | 35 |
| BC_Reliability | Pearson Correlation | -,460** | ,415* | ,280 | ,258 | ,545** | ,544** | 1 | ,190 | ,031 | ,499** | ,709** | ,018 |
| | Sig. (2-tailed) | ,006 | ,013 | ,104 | ,135 | ,001 | ,001 | | ,274 | ,860 | ,002 | ,000 | ,918 |
| | N | 34 | 35 | 35 | 35 | 33 | 34 | 35 | 35 | 35 | 35 | 35 | 35 |
| BC_Off_Set | Pearson Correlation | -,304 | ,070 | -,016 | -,005 | -,076 | ,072 | ,190 | 1 | ,296 | ,034 | ,029 | -,189 |
| | Sig. (2-tailed) | ,076 | ,679 | ,928 | ,978 | ,673 | ,676 | ,274 | | ,075 | ,842 | ,865 | ,269 |
| | N | 35 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 62. Low Initial price | Pearson Correlation | ,129 | ,084 | -,013 | -,050 | ,192 | -,151 | ,031 | ,296 | 1 | -,106 | -,222 | -,186 |
| | Sig. (2-tailed) | ,461 | ,620 | ,939 | ,768 | ,284 | ,379 | ,860 | ,075 | | ,533 | ,188 | ,277 |
| | N | 35 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 63. Total cost of Ownership | Pearson Correlation | -,351* | ,269 | ,194 | -,040 | ,524** | ,560** | ,499** | ,034 | -,106 | 1 | ,555** | -,061 |
| | Sig. (2-tailed) | ,039 | ,108 | ,258 | ,812 | ,002 | ,000 | ,002 | ,842 | ,533 | | ,000 | ,722 |
| | N | 35 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 58. After-sales support | Pearson Correlation | -,193 | ,201 | ,215 | -,067 | ,403* | ,354* | ,709** | ,029 | -,222 | ,555** | 1 | ,083 |
| | Sig. (2-tailed) | ,266 | ,233 | ,208 | ,691 | ,020 | ,034 | ,000 | ,865 | ,188 | ,000 | | ,630 |
| | N | 35 | 37 | 36 | 37 | 33 | 36 | 35 | 37 | 37 | 37 | 37 | 36 |
| 59. Sales representatives competence | Pearson Correlation | ,282 | ,013 | ,335* | ,460** | ,150 | -,041 | ,018 | -,189 | -,186 | -,061 | ,083 | 1 |
| | Sig. (2-tailed) | ,100 | ,941 | ,046 | ,005 | ,404 | ,815 | ,918 | ,269 | ,277 | ,722 | ,630 | |
| | N | 35 | 36 | 36 | 36 | 33 | 35 | 35 | 36 | 36 | 36 | 36 | 36 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

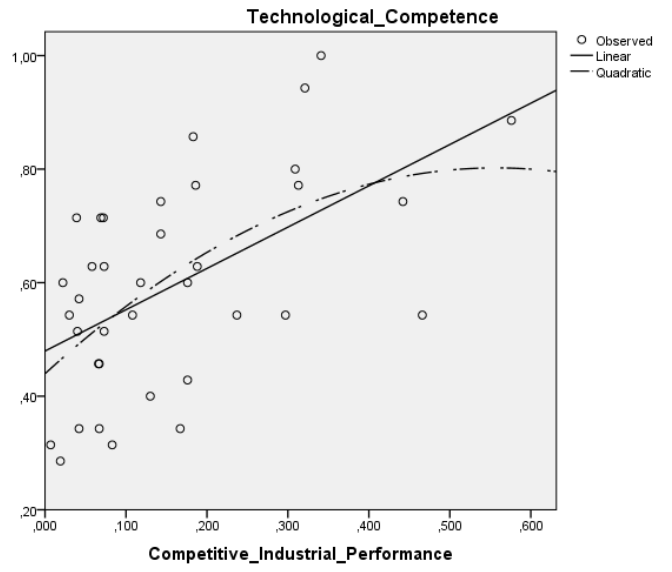## 7.10 Appendix J
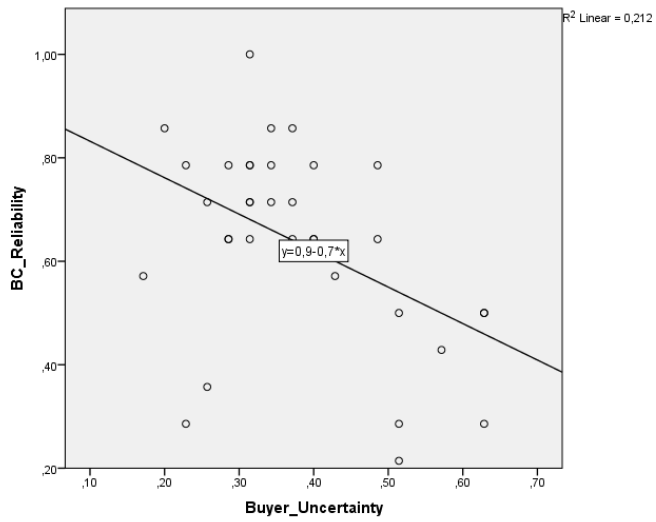Scatterplot Technological Competence vs. TCO



$y=0,84+5,9*x$

R² Linear = 0,458

## 7.12 Appendix L
Scatterplot CIP vs. Technological competence



## 7.11 Appendix K
Scatterplot Buyer uncertainty vs. Reliability



$y=0,9-0,7*x$

R² Linear = 0,212

# 8 References

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