TECHNOLOGY BASED SELF-SERVICE OPTION 
INCREASING SERVICE QUALITY

- A STUDY OF FAST CASHIERS IN A GROCERY STORE

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Abstract

Technology-based self-service (TBSS) has during the past years changed the way how companies interact with customers. This technology is used for example in self-checkouts, Internet banking, ATMs and grocery stores. Because TBSS is a relatively new implementation in Sweden, companies are often unaware of how service quality is formed and this gives us an opportunity to study this interesting field. Therefore, the purpose of this research is to study how different aspects affect service quality in TBSS. We are going to study how TBSS works in practice through a speed of delivery investigation and furthermore, through investigating the company’s and customers’ perceptions of service quality in TBSS. This research will be carried out by linking both the literature review and the empirical study in our research. The empirical study consists of one Swedish grocery store, Ica Luthagens Livs, which is located in Uppsala. The results of this research paper include mainly that TBSS option is in all senses advantageous for companies. Nevertheless, if companies wish to increase service quality in TBSS, there are certain aspects that have to be taken into account. TBSS functions should be easy to use and reliable for customers. In addition, companies’ customer segments should consist of young adults, who purchase less than four products. Also, TBSS is a good option for companies where it frequently becomes crowded and is consequently needed. The empirical study has also shown that there is a gap between the company’s perception and the customers’ perception regarding speed of delivery. This factor was considered important by the company, but not by the customers. Our results will help companies to improve TBSS so that it matches with the customers’ needs and thereby increase the service quality. Finally, we will like to thank our mentor Ulf Olsson for guiding us in this research and Ica Luthagens Livs store manager Fredrik Brunnberg for his helpful collaboration.

Keywords
Technology-based self-service (TBSS), grocery stores, fast cashiers, service quality, the attribute-based model, Pratibha A. Dabholkar
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1. Technology innovations changing the service delivery

Over the past several decades new perspectives have emerged where there is more focus on providing services rather than goods. The focus is shifting away from tangible products to intangible interactions, meaning that companies give more focus on the customers than the production itself (Vargo and Lusch 2004). Technology has developed radically nowadays which has encouraged companies to use new ways to provide services in order to become more efficient in serving customers.

Today, we experience that full service is increasingly replaced with technology-based self-service (TBSS) counters in order to facilitate the daily activities. Self-service technology has changed the way how customers interact with companies meaning that customers nowadays perform the services themselves instead of interacting with the company’s employees (Wang 2007:1). TBSS has been a successful instrument, for instance at the airports in the form of self-check-in counters, in train stations and even grocery stores have been taking advantage of this new technology.

The concept of TBSS is according to Wang (2007:9) “an activity or benefit based on hard technologies that service providers offer so that customers can perform the service, or parts of the service, by themselves”. In order to define the difference between the TBSS and traditional counters it is important to recognize who performs the services. In the case of TBSS, the service is provided by a machine and the rest of the process is up to the consumers, whereas using the traditional counters it is the employees who provide the whole service process (Wang 2007:9).

Presently in the US, the large national retail grocery chains and supermarkets are increasingly utilizing self-service technology. This phenomenon is not restricted to the USA but there has also been an interest in Europe i.e. The Netherlands, Germany and Sweden (Dabholkar, Bobbitt and Lee 2003). Because self-service technology is a new innovation in the food industry in Sweden, our research will be carried out at a grocery store. Also, the emphasis in the academic literature has been almost entirely on the interpersonal service counters, therefore there is still much to be learned about TBSS. Furthermore, there is not so much knowledge how interactions with TBSS influences customers evaluation of service quality (Meuter, Ostrom, Roundtree, and Bitner 2000). Companies are trying to seek for ways to improve their services in a world where competition has become more intense and they try to make companies as competitive as possible. The use of TBSS has become
the key to improve competitiveness and provide better service quality in the market. Within TBSS, we find different types of technologies that have been implemented in grocery stores, for instance self-scanning devices and fast cashiers. Our research object, Ica Luthagens Livs, has only introduced the fast cashier option. With the use of fast cashiers option, customers scan their products, pay and pack by themselves.

Implementing TBSS embodies advantages for the companies, but it does not always work in the way the company has expected. This depends on the fact that customers perceive the use of TBSS in a different way than companies. In this study, we have identified several factors which might have an influence on customers’ perceptions and company’s perceptions of service quality in TBSS. Companies are often unaware of the factors that customers consider when evaluating service quality in TBSS. One of the reasons why companies implement TBSS is to provide faster service delivery and this is carried out because according to many studies the fast service delivery increases service quality (Maister 2010, Dabholkar et al. 2003). For these reasons, speed of delivery is an essential factor to investigate and determine which other factors affect speed of delivery. This research will help companies to understand which aspects are relevant when improving TBSS and how differently company and customers perceive TBSS.

Therefore, the purpose of this study is to investigate how different aspects affect service quality when using TBSS. For this, we are going to investigate the speed of delivery and the gap between customers’ expectations and the company’s perceptions of customers’ expectations. A conceptual framework is carried out to integrate two important research issues. The following research model (figure 1) visualizes how our study is built up.
1.1 Framework of the research

Figure 1, Framework over our study

The first issue is based on two different sub questions, which will help us to complement the context. In order to know how speed of delivery in TBSS affects service quality, we will study if speed of delivery is in fact faster at the TBSS option than at traditional counters. To know how other factors affect speed of delivery and thereby influence service quality in TBSS, we will study crowdedness and number of products. In the second issue we will investigate perceptions of service quality in TBSS, which includes both customers’ and company’s perceptions. Therefore our sub questions for the second issue are: What are the attributes that affect customers’ perceptions of service quality and what are the company’s perceptions of service quality when implementing TBSS?
2. Literature review

“We are stuck with technology when what we really want is just stuff that works.”


2.1 What is service quality?
According to Parasuraman, Zeithaml and Berry (1985) service quality is an abstract concept because it is intangible, heterogeneous and inseparable. There are also other factors that make difficult for companies to understand service quality. Firstly, service quality is more difficult for customers to evaluate than product quality; secondly, there is a risk that customers’ expectations of service quality differ from the delivered service from the company. Thirdly, the customers not only evaluate the received service, but even the whole service delivery process (Parasuraman et al. 1985).

2.2 The factor speed of delivery

2.2.1 The importance of speed of delivery
According to Maister (2010) "Waiting is frustrating, demoralizing, agonizing, aggravating, annoying, time consuming and incredibly expensive". When customers are forced to wait in lines it will have an effect on their perceptions of service quality. This leads to that service quality improves when speed of delivery becomes faster (Maister 2010).

Studies of waiting lines reveal that customers’ perceived waiting time is usually longer than the actual waiting time. This means that customers often overestimate the speed of delivery time (Dabholkar 1996). Maister (2010) finds correlation between customers’ perceived waiting time and customers being part of the service. He suggests that when customers are occupied the time passes faster than when customers are unoccupied. Maister (2010) also argued that service quality is perceived less when speed of delivery is slow, thus customers evaluate service quality more highly when they expect service to be delivered fast.

Studies have point out that speed of delivery is an important determinant when customers prefer to use TBSS in general. Also, the time it takes to perform certain activities is one of the most important factors for customers when evaluating service quality at both TBSS options and at traditional option (Anselmsson 2001:140). This means that speed itself is a main factor why customers like and prefer to use TBBS and it has a significant value for customers. Moreover, speed
of delivery is particularly important when customers use TBSS at grocery stores (Dabholkar et al. 2003). In contrast, Dabholkar’s (1996) research results that speed of delivery is an attribute that does not have any influence on the service quality and it does not increase customers’ intentions to use TBSS. However, previous literature has shown the importance of speed of delivery and for this reason we will study if speed of delivery is an important factor for improving service quality.

2.2.2 Factors that affect speed of delivery
Dabholkar (1996) points out, that different situational factors could have a significant influence on customers’ decision of using TBSS. The type of factors that could take place are when customers are alone, or accompanied, or within a crowd. Customers tend to use TBSS when they are alone because they are searching something to do or be occupied (Forman and Sriram 1991). According to this theory, being accompanied or alone affects the intentions of using TBSS. Therefore, we disregarded in this study this factor because it does not affect the speed of delivery.

2.2.2.1 Crowdedness
Dabholkar et al. (2003) reveal that there is only one situational factor that has influence on customers’ evaluation of TBSS, this is crowdedness. This factor can cause a negative effect on customers’ intentions to use TBSS by making them anxious and wanting to find the fastest way to leave the place. In addition, customers also tend to avoid using TBSS in the presence of other customers since it makes them feel uncomfortable. Moreover, it also causes stress and lack control, which makes customers far away from using TBSS (Dabholkar and Bagozzi 2002). Previous research point out an explanation why waiting time is a factor that affects the most service quality. This argument discusses that when people are waiting in the line, they are even more able to evaluate the other alternative in detail and realize if it is worth waiting for it (Dabholkar 1996). These reasons have led us to assume that crowdedness has an effect in the speed of delivery at fast cashiers.

2.2.2.2 Number of products
Another factor which according to Meyer (2010) has no impact on waiting time is the number of products. This is because the payment process and the number of customers require more time to conclude the service process than scanning the products. Meyer (2010) had investigated the waiting lines at traditional cashiers in the United States. In this research, it was shown that when a customer enters a line, this line becomes 48 seconds slower. In addition, every product that customer has will make the waiting line even longer with approximately 2.8 seconds. In this case, the number of products did not matter when looking for the shortest line. To study the number of products is relevant because Meyer (2010) has studied how this factor affects the speed of delivery at
traditional counters and our interest is therefore to study if we obtain a different reaction in the speed of delivery in TBSS.

2.2.2.3 The chain of the factors that influence service quality and intentions to use TBSS

![Figure 2, Model over how factors influence service quality and intentions to use TBSS]

In our model (figure 2) we show how the two different factors mentioned previously influence the speed of delivery and thereby service quality and intentions to use TBSS. The number of products and crowdedness can affect the speed of delivery either positively or negatively. This means that the speed of delivery can become faster or slower and can either increase or decrease the service quality and intentions to use TBSS. This model helps to understand how factors which the companies have no control over can affect their delivered service quality.

2.3 Company's perception of TBSS

Bitner, Ostrom and Meuter (2002) suggest three reasons why companies should implement technology-based self-service. One of the reasons is that by implementing TBSS the company can reduce costs. While cost savings is one of the major reasons to establish this technology, customers do not consider cost savings as far as they do not take part of it. The common reaction is that when the customers realize that the company is saving money, then the customers usually refuse to use the technology.

The second reason that Bitner et al. (2002) discuss is customer satisfaction and loyalty. There are situations where customers tend to demand TBSS and express their dissatisfaction by turning to a competitor. But, if the implemented technology is appreciated more than the traditional counter, then customer satisfaction will eventually increase.
The last motive that Bitner et al. (2002) described is the possibility to reach new customer segments. In some cases, TBSS is used to create new forms of reaching new customer segments which before have been difficult to achieve. Through these three reasons, we will find out why the grocery store introduced TBSS and this will reveal their perceptions of service quality.

2.4 Customers’ perceptions of service quality

2.4.1 Dabholkar’s attribute-based model

According to Dabholkar (1996) speed of delivery, ease of use, reliability, enjoyment and control are significant attributes that TBSS possesses. These five attributes are important for the customers to evaluate the TBSS and its use. This attribute-based model is seen as a general instrument of measurement for the TBSS and has a cognitive approach of the customer’s decision-making process. The attribute-based model has a positive correlation with the customers’ expected service quality. This means that if the attributes are evaluated important then it will increase the expected service quality. In the following model (figure 3), it can be seen that the different attributes influence the expected service quality which leads to intentions to use TBSS.

The original attribute-based model

(Cognitive Evaluation of Characteristics Associated with Technology-Based Self-Service Options)

- **Speed of delivery**
  The time according to Dabholkar (1996) is divided in waiting time and the time for the service to be delivered. Dabholkar’s (1996) investigation reveals that speed of delivery has no influence on evaluating service quality and it is independent of situational aspects.

- **Ease of Use**
  It is important that self-service is easy to use because it can cause customers social risks i.e. they do not dare to make mistakes in front of others. This attribute was found to be a
relevant determinant of service quality and at the same time influences intentions to use TBSS (Dabholkar 1996).

- **Reliability**
  When customers are not familiar with TBSS this can lead to that they become more worried about the risks that the option might not work properly. However, reliability did not have an impact on evaluations of service quality. These results can be caused by the relationship between control and reliability, meaning that there is a correlation between independent variables (Dabholkar 1996).

- **Enjoyment**
  If the TBSS is perceived as an interesting and entertaining technology, then customers will become curious and will be attracted to use it. Enjoyment was found to be the most important attribute when evaluating service quality under different situational aspects. However, if TBSS is established for a longer period of time, then enjoyment would not be that important (Dabholkar 1996).

- **Control**
  Control is characterized as a factor which is intrinsically valuable for most customers and that is why it is a significant attribute when evaluating TBSS. The feeling that customers are in charge of the service process affects service quality positively. Therefore, it has a direct impact on the intentions of using TBSS (Dabholkar 1996).

### 2.4.2 The developed attribute-based model

In our study, we have developed Dabholkar’s (1996) attribute-based model in order to adapt it to our research objective. In this new version, we have decided to add an extra attribute, which is need of interaction and change the position of the attribute enjoyment.

Need of interaction was added as an extra attribute in our developed attribute-based model (figure 4) because according to Forman and Sriram (1991), customers consider that the interaction with employees is relevant when evaluating service quality. The need of interaction can be seen in lonely individuals where they require personal service to satisfy their personal needs, these is applied especially to elderly (Dean 2008, Forman and Sriram 1991).

Dabholkar (1996) had investigated how the need of interaction and the attitude towards using technological products had an impact on service quality and intentions to use TBSS option in an overall affect model. However, we disregard the attitude towards using technological products
because of the difficulty of measuring customer’s attitude. Instead took we into account need of interaction attribute. Furthermore, need of interaction has a negative effect on service quality for TBSS because customers that have a high need of interaction prefer using traditional cashiers (Dabholkar’s 1996). The researches reveal that based on the degree of interaction, customers obtain different perceptions about TBSS (Dabhokar 1996, Forman and Sriram 1991). For example, a positive effect occurs when customers with a low need of interaction do not need to interact with employees. Anselmsson (2001:202) obtained other findings regarding need of interaction with employees. He suggests that customers usually do not experience the need of interaction, but instead they experience a need of independency.

We have changed the position of the attribute enjoyment because according to Dabholkar (1996) and Anselmsson (2001:193) enjoyment is a very significant determinant of how customers perceive service quality. In addition, enjoyment is a clear factor that defines service quality and intentions to use TBSS especially for the first time. Also, Anselmsson (2001:193) found that even though customers have used TBSS for several years, they can still enjoy using it meaning that enjoyment is still a significant determinant of service quality. Furthermore, enjoyment is relevant for service quality when customers can choose TBSS themselves, which is to say voluntarily (Anselmsson 2001:142f). According to Dabholkar’s (1996) study it was shown that enjoyment is an important factor under all the situational conditions; for instance, during high waiting line and short waiting time. Moreover, Dabholkar (1996) found in her study that when customers enjoy using fast cashier then they evaluate more positively TBSS. That is why enjoyment is the most important attribute in the whole model; this is to say that it is a relevant indicator of service quality.

According to our developed attribute-based model (figure 4), there are six attributes that are relevant when studying intentions to use TBSS, and therefore our sub question is to investigate which are the attributes that affect customers’ perceptions of service quality when using TBSS.
The developed attribute-based model

Figure 4, the developed attribute-based model, which is based on Dabholkar’s (1996) attributed-based model

2.4.3 Demographic factors
In past research it has been discussed how demographic factors affect the use of TBSS. Age is one of the relevant aspects of demographic factors. For instance, young customers tend to use and adapt to TBSS more likely than older customers do (Dean 2008). Another relevant aspect is gender, where the differences in it have been noted in the adoption of technology. For instance, women have for example phobia and anxiety attitudes towards technology, while men are more open to using technology (Lee et al. 2010). In contrast, nowadays the elderly, women, the less educated, and the ones that have lower income have access to use and have adapted more to TBSS. This means that demographic factors are unlikely to have significant influence on the evaluation and use of TBSS (Dabholkar et al. 2002). There are several studies pointing out that demographic effects are insignificant in the customers’ intention of using TBSS. Nevertheless, in this research we are going to give focus to age and gender because of the broad presence in past literature.
2.5 The gap between the customers’ and the company’s perceptions of service quality

Parasuraman et al. (1985) developed a model (figure 5) showing different gaps that are seen from both the company’s and the customer’s side, which affect service quality. However, as mentioned before, service quality is difficult to evaluate, and this means that there can easily occur gaps between the company’s and the customer’s expectations. Parasuraman et al. (1985) discuss five different gaps that are likely to occur in service quality. However, we are only taking into consideration Gap 1, which refers to the gap between customers’ expectations and what companies think customers’ needs are. This is because companies do not always understand what factors a service must have in order to meet customers’ needs. It is also difficult for companies to know in advance which factors improve service quality from customers’ side. Since the companies usually lack understanding, it may affect the quality perceptions of the customers and this means that the service quality worsens (Parasuraman et al. 1985).

Figure 5, the service quality model, Source: Parasuraman et al. (1985)
3. Methods

Our objectives are to study how different aspects affect service quality in TBSS option. In order to get an overview we have divided our research into two investigations: the speed of delivery and the perceptions investigation. All these research objectives, except the interview, will be studied during two days at three different time slots at Ica Luthagens Livs. The research was carried out in week 37 on Wednesday and Friday. In addition, the interview was done in week 36 on Friday.

3.1 Research context and design

Dabholkar (1996) suggests that enjoyment would not be an important attribute for customers when TBSS is established for a longer period of time. In our developed model, enjoyment is referred to as intentions to use TBSS (see figure 4). Therefore it can be said that this research is more suitable for companies who have recently established TBSS. This is because enjoyment is the most important factor for customers when they start using TBSS in the beginning (Dabholkar 1996). However, Anselmsson (2001:193) found out that in some cases customers still after several years find enjoyment as an important factor for service quality. That is why we assume that our research can be also helpful for companies that have introduced TBSS options long time ago.

We chose to study and highlight the service delivery factor for several reasons. During the past two decades there have been scientifically studies and researches which point out the correlation between the service quality and the speed of delivery (Anselmsson 2001:14f, Dabholkar et al. 2003, Maister 2010). Due to this, we will define a high service quality as a fast service delivery. The second reason is the main function of TBSS is to provide a fast service delivery. In this case, Ica Luthagens Livs has implemented their fast cashiers in order to provide a faster service and at the same time decrease the waiting lines (Brunnberg 2010). These are the central reasons why we find it important to study speed of delivery.

The research was carried out in a context where the customers had the alternative to choose between the fast cashiers and the traditional cashiers. We only took into account traditional cashiers to be able to compare these two options to each other and know if TBSS is a better option, for instance in the terms of speed of delivery. We have selected grocery stores industry because in this sector the same customers visit shops daily and because TBSS is a relatively new implementation in Sweden. It was decided that the research is identified as a field study at Ica Luthagens Livs for a number of reasons. Firstly, the research will be carried out in a short period of time. Secondly, the
questionnaires were short enough to be administrated in this field study. By using field study, we observe the customers’ behavior in a natural environment rather than in a laboratory, which means that the outcome is more reliable. However, we take into account the fact that in this field study we can neither have control over all the variables nor take into consideration other factors that influence our research objectives (Malhotra, 2006:278ff). The fact that Ica Luthagens Livs was chosen is because it attracts different target groups with different demographic characteristics (Brunnberg 2010). Between these characteristics there are retired people, students and families and we can obtain different perspectives about TBSS. Moreover, Ica Luthagens Livs has introduced this technology-based self-service more than a year ago. Therefore, we have the interest from the company’s side to be part of our investigation.

3.2 Ethics and reliability
In our research, we have taken part of ethical issues in order to ensure participants a fair treatment. The customers who answered to our questionnaires are completely anonymous in order to respect their privacy. In addition, we tried not to ask customers that seem to be stressed or uncomfortable with answering questionnaires (Saunders, Lewis, Thornhill (2009:185). The anonymity of our respondents has no influence whatsoever in our results. Our interviewee could decide himself to be anonymous or not and in our case he permitted us to use his name. The whole research was performed with ethical neutrality, which in our case aims to avoid complications. We gathered the data being in a passive position and letting participants be more active in order to reduce our influence in their answers.

Our perception questionnaire is based on Dabholkar’s (1996) attribute-based model, because she is the one who created this model. Furthermore, Pratibha Dabholkar is a professor of marketing and has research interest in technology service delivery and service quality among others (The University of Tennessee, 2010). The service quality model was originally developed by Parasuraman et al. (1985) and these researchers are remarkable professors in the marketing area (The University of Miami, 2010; The University of North Carolina, 2010; Texas A&M University, 2010). These models have been developed during the 1980s and 1990s, meaning that they are relatively old researches. However, there are recent researches which have referred to them and no major changes have been done.

For our study, we have used several articles and books which are written by professionals of the studied area in this research. But, we have also used an investigation found in a blog made by
Meyer (2010), who is a teacher of Mathematics in the US. His research was not completely scientific, but rather more informal which can have influenced on the reliability of his results.

3.3 Methods for the speed of delivery investigation
To be able to research if speed of delivery is an important factor to improve service quality, the time of the service delivery process was measured. We made observation notes of speed of delivery at the traditional cashier and at the fast cashier in order to compare these two options with each other. For these, we have collected a total 100 observations of the time it took for customers to perform the service process, where 50 belong to traditional cashiers and the other 50 to fast cashiers. Due to the fact that we investigate time, we disregard taking into consideration the demographic factors for instance age and gender. This is because we assume that they have no relevant impact on the speed of delivery, which is to say the time. This investigation will show us if speed of delivery at fast cashiers is faster than traditional cashiers in average, and if fast cashiers improve service quality as it has been argued in an earlier research (Maister 2010).

Maister (2010) discusses that when speed of delivery is fast then service quality improves. Due to this fact, we will measure speed of delivery in order to find out if we obtained similar results. We measured the comparison of speed of delivery between the fast and the traditional cashiers by taking the time with a timer. We started to take the time when two customers were entering the line at the same time. One in fast cashier and other in traditional cashier and stopped we stopped the timer when they had packed their groceries. This enabled us to compare speed of delivery in both cashiers. Service delivery includes waiting time and the time it takes to perform the payment and pack groceries. In this case, service quality defined as fast speed of delivery and by comparing speed of delivery of traditional cashier with fast cashier it reveals if fast cashier increases service quality. However, we comprehend that customers’ opinion about the service quality they obtained from speed of delivery, might be different than our results.

We also took into account the factors that affect the speed of delivery. These factors were crowdedness and the number of products and the data was collected through observation notes. Crowdedness was measured to be able to evaluate how long waiting lines affect the speed of delivery in the fast cashiers and thereby service quality. First, we measured how crowdedness behaved during the day. We observed crowdedness two times in each three time slots during two days and obtained a total of 24 observations (see exhibit 1). First, we measured our own perceptions of how crowded Ica Luthagens Livs was and it was expressed by using a five-point Likert scale.
This measurement scale has five response categories scoring from ‘strongly disagree’ to ‘strongly agree’ (Malhotra, 2006:304f). Our perceptions were done independently in order to obtain a more reliable outcome. However, our perceptions are subjective and we only are two persons who judge crowdedness, which can affect how trustworthy are our observations. We took also into consideration the number of open cashiers, because we assume that the number of opened cashiers gives an alert of how crowded it is at the moment. In this way, we could also observe how Ica Luthagens Livs considers when it is crowded by opening more cashiers when needed.

Meyer (2010) investigated that the number of products has no relevant impact on the speed of delivery. Due to this fact, we observed the number of products and measured the speed of delivery at both fast and traditional cashiers, in order to investigate if the number of products had any effects on the speed of delivery at fast cashiers. In this test we considered two groups where the first group is integrated by customers who had more than four products and the other group had less than four products. We had observed that most of the customers that used fast cashiers did not have so many products, but around four products per purchase occasion. Due to this we decided to use four products as a specific measure. For this research, we have observed a total of 30 customers where 18 had more than four products and 12 less than four products both at fast and traditional cashiers. We made these observation notes separately to the investigation of speed of delivery at fast and traditional cashiers. We started the timer when two customers that belonged to the same group of number of products entering the queue, where the one customer used the traditional cashier and the other the fast cashier. Afterwards, we could analyze how the number of products had influenced in the speed of delivery in both of the options.

3.4 Methods for the perceptions investigation
In order to give an overview over the gap between the company’s and customers’ perception of service quality, we will make use of the service quality model developed by Parasuraman et al. (1985). We will focus on the customers’ expectations and the company’s perceptions of customers’ needs. This is because TBSS is a new technology at Ica Luthagens Livs and they have not carried out similar customer research, and therefore it is interesting to study this gap. The perceptions investigation consists of both the company's perceptions and customers’ perceptions’ of service quality. This will define which attributes from the developed attribute-based model (figure 4) are the most relevant for customers when evaluating service quality by using TBSS. In order to know company’s perceptions about fast cashiers, the store manager, Fredrik Brunnberg at Ica Luthagens Livs was interviewed for several reasons. Firstly, we wanted to ensure
that the questionnaires would be complemented carefully with the information provided by the manager. Secondly, the manager could explain questions that may not be understood completely and provide first-hand information. The negative part is that the response rate is related to the abilities and attitude of the interviewer (see exhibit 2).

In order to know customer’s perceptions about the service quality and their intentions to use TBSS we designed a customer survey (see exhibit 3). The questionnaire for customers was based on “The attribute-based model” which was developed by Dabholkar (1996) with the aim to provide reliable outcomes. According to Dabholkar (1996), the attribute-based model is tested for expectations of service quality before customers have used service counters, but also it is suitable for perceptions of service quality after using the service counters. In our case, we studied customers’ perceptions of service quality after they used fast cashiers. The attribute-based model consists of five attributes which are speed of delivery, control, reliability, ease of use and enjoyment. (Dabholkar 1996) found also that need of interaction was relevant when evaluating service quality and intentions to use TBSS. Additionally, Ica Luthagens Livs’ customers were identified to have a high degree of interaction with employees (Brunnberg, 2010). Due to these particular reasons, we considered to add need of interaction in the developed attribute-model and be part of the questionnaire for customers.

We have changed the position of the attribute enjoyment in Dabholkar’s (1996) attribute-based model for several reasons. Firstly, according to previous studies (Anselmsson 2001, Dabholkar 1996) it has been shown that enjoyment is a very important factor when determining the service quality and thereby the intentions to use TBSS. Secondly, customers find enjoyment a very important factor when they have the opportunity to choose the option freely (Anselmsson 2001:142f). In our research, customers can choose themselves between traditional cashiers and fast cashiers, which make enjoyment an important factor. For these particular reasons, enjoyment is defined as equal to intentions to use TBSS. However, according to the research of Dabholkar et al. (2003) certain customers, who had tried TBSS, use fast cashiers because it is viewed as a fast option. That is to say, that they use TBSS because it is fast not because they enjoy using it. However, we will study intentions to use TBSS in our research rather than its actual use. There is a difference between the intentions of the customers and their behaviors. This means that the customers can have the intention to use the TBSS, but in the end they act in a different manner. According to previous facts, it is still expected to obtain strong correlations between the attribute
enjoyment and the intentions to use TBSS. In addition, we assume that customers use TBSS if they enjoy using it, in other words if customers dislike using TBSS they do not logically continue to use it.

Questions concerning the attributes were set in a five-point Likert scale, with two questions per attribute in order for them to complement each other and for us to get more reliable results. The attributes in the questionnaire have a positive effect on the service quality and on intentions to use TBSS, when customers find attributes relevant. The questions were constructed as followed: “Using fast cashiers gives a sense of control” (I strongly agree 5 /disagree 1). However, in order to get a positive effect for every attribute, the question for need of interaction had to be inverted as followed: “Need of interaction is NOT important”.

3.5 Data collection
Data collection for the research was done randomly; this means that customers were selected randomly by us during three different time periods: morning, afternoon and evening during two days. Due to the fact that the geographical area where the store is located is small, it was important to ask customers to fill in our questionnaires, it was suitable to use simple random sampling (Malhotra, 2006:367ff). Because the customers were selected by us, it was taken into account that this influenced the type of customers chosen. Also, when the questionnaire was filled in, there was the opportunity for us to directly guide the customers if there were any misunderstandings. This was an advantage for us because customers provided more information than required, but also a disadvantage because our opinion could have influenced customers’ answers. The questionnaires were answered both by customers that have used the fast cashiers and customers that have not used them. To encourage the customers to answer our questionnaires, candy was offered in exchange of their time. We were standing at the end of the cashiers in order to be able to catch the customers and asked them directly after they had bought their groceries. In addition, it was voluntary for customers to decide if they want to participate in answering to our questionnaire. There were a number of customers who had declined to participate and therefore these non-respondents might have different opinions which could have influenced in our results.

3.6 Statistical methods
For the statistical analysis, we are using the p-value of 0.05 which is 95% in confidence interval. The p-value is a probability, with a value ranging from zero to one. This means that if p-value is above 0.05 then the result is not significant, meaning that our hypothesis is not valid. On the other
hand, if the p-value is below 0.05, the result is significant and relevant to analyze. The p-value is defined in the tables as “sig.”.

### 3.6.1 Statistical methods for the speed of delivery investigation

In order to answer if speed of delivery is faster at fast cashiers than at traditional cashiers, we developed a frequency table. We chose frequency table because it summarizes data and records how often each value occurs, which in our case is time, in each of the cashiers. We investigated how speed of delivery acts during the day, meaning that we disregarded crowdedness’ impact the speed of delivery. We only investigate in general how speed of delivery acts in the two cashier options.

Firstly, we wanted to study how the factor crowdedness behaves during morning, afternoon and evening, which are defined by time slot 1, time slot 2 and time slot 3. For this, we make use of descriptive statistics in order to analyze crowdedness. This is used to describe the basic characteristics of the data and to provide simple summaries about our observation notes which make it suitable for our data. Secondly, to obtain how crowdedness influenced on speed of delivery in fast cashiers, we tested our data using one-way ANOVA. This was chosen because it examines the differences in the means of the dependent variable for several categories. In our case, speed of delivery is our dependent variable and it is divided in three different categories, which are time slots 1, 2 and 3. Then, it will examine the differences between the means in each of the time slots. The categories are the time slots because according to our previous study it resulted in that time slot 1 represents low crowdedness, time slot 2 represents medium crowdedness and time slot 3 a high crowdedness level.

T-test indicates the differences between means of two groups, meaning that it evaluate whether the means of two groups are significantly different from each other. Therefore this test is suitable to analyze how the number of products impacts on the speed of delivery in fast cashiers. There were two groups, which one consisted of customers who had more than four products and the other group had less than four products. The t-test examines the differences in the speed of delivery between these two groups.

Levene’s test for equality of variances is used to test equality of variances in different samples. It tests if the means have equal variances in the population, which is a precondition for t-test and one-way ANOVA. If the p-value from the Levene’s test is less than 0.05, then the variances are
significantly different and the tests can’t be used. For the t-test, the Levene’s test is used to determine if the two groups’ variances are approximately equal. If the Levene’s test gives a p-value above 0.05, then the group variances are not different enough so we can use “equal variances are assumed” row, meaning that the t-test is suitable.

3.6.2 Statistical methods for the perceptions investigation
For the company’s perception, we have done interview with the store manager, and this data does not require any statistical analysis. To be able to study the collected data from the questionnaire, a regression analysis was ran in order to analyze the relationship between the dependent variable and the independent variables. In addition, the regression analysis provides an understanding of how the dependent variable intentions to use TBSS changes when any one of the independent variables varies, while the other independent variables are constant.

In the regression analysis, the dependent variable is the attribute enjoyment and the independent variables are speed of delivery, control, reliability, ease of use and need of interaction. There is a high correlation between enjoyment and the intentions to use TBSS (Anselmsson 2001, Dabholkar 1996). Therefore, the dependent variable enjoyment will be named as intentions to use TBSS in our statistical analysis. The regression analysis in this study can be also run in a different way which is by classifying the customers if they had used the TBSS or not.

The R square will indicate how well the model fits our data and it will show us if it is possible to make use of regression analysis. The R square values lie between 0 and 1, where the 0 means that there is no correlation and the closer the value gets to 1 it will indicate a perfect correlation between the data and the regression analysis.

T-test is suitable for analyzing demographic factors, because it examines the differences in the means between the two groups. A t-test for age had two groups which were divided into young adults and the elderly, where the young adults group integrates ages up till 30 years old and the elderly goes from 31 years old upwards. In addition, a t-test for gender is logically divided into female and male.
4. Empirical study
4.1 Data for speed of delivery in fast and traditional cashier

According to our research, fast cashiers generally had a faster speed of delivery than the traditional cashiers. This is represented by a mean of 1.9064 for fast cashiers and a mean of 2.1720 for traditional cashiers, both measured in minutes in the frequency table (see exhibit 4). In the following figures 6 and 7 it can be appreciated how speed of delivery is spread in both cashier options. It was observed that speed of delivery is more spread at the fast cashiers (figure 6) than at traditional cashiers (figure 7). This means that the time it took to go through the service process varied individually when using fast cashiers. Furthermore the frequency table will show us, the minimum time the service process required at fast cashiers was 0.21 minutes and the maximum was 5.10 minutes, which is greater range compared to traditional cashiers with values of 0.51 minutes as minimum and 4.32 minutes of maximum time (see exhibit 4).

![Figure 6, speed of delivery at fast cashiers](Image)

![Figure 7, speed of delivery at traditional cashiers](Image)

4.2 Data for factors that affect speed of delivery

4.2.1 Crowdedness

Different degrees of crowdedness were observed in the three time slots. In time slot 1 low crowdedness was observed, while time slot 2 had a medium degree and time slot 3 had the highest degree of crowdedness. In other words, it was observed that crowdedness increased from 9 in the morning to 6 in the evening (exhibit 5). For studying the factor of crowdedness we obtained also
that in the morning when crowdedness was low, the customers usually chose to use the traditional cashiers although there was no line for the fast cashiers. Furthermore, there were few occasions where customers stood in the queue to the traditional cashier even though the fast cashiers were free. The use of TBSS increased during the day, meaning that customers tend to use TBSS option when the grocery store is crowded.

We tested also how crowdedness influences the speed of delivery at fast cashiers, using one-way ANOVA (see exhibit 6). Since Levene’s test gave a p-value of 0.152, which is more than 0.05 meaning that the variances are approximately equal and the one-way ANOVA can be used. Furthermore, in the ANOVA table we can see that the p-value is 0.053 which is in this case defined to be significant. Therefore, we can say that there are significant differences between time slots in a range of speed of delivery. In the descriptive statistics (see exhibit 6) we can observe how big these differences are. In time slot 2, speed of delivery had the lowest mean of 1.3338 minutes, meaning that the speed of the delivery was surprisingly faster during the afternoon. Time slot 1, in the morning, follows with a value of 1.6520 and time slot 3 had the highest value of 2.1662 minutes, meaning that the speed of delivery was slowest during the evening. Figure 8 below shows that the speed of delivery was unexpectedly at its slowest point when crowdedness was characterized in a medium degree not when crowdedness was lowest.

![Figure 8, Average of the speed of delivery during three time slots](image-url)
4.2.2 Number of products
Since Levene’s test (see exhibit 7) was significant with a value above 0.05 probability, we assume equal variances for both fast and traditional cashiers. This means that we only take into consideration the “Equal variances are assumed” row and that the t-test is suitable for our data. The t-statistic obtained from the independent sample test (see exhibit 7), tells us that for the group of “More than 4 products” it logically took longer time to complete the service process in both cashiers, whereas speed of delivery for the other group was faster. This implies that speed of delivery decreases when customers have more than four products at both cashiers. This result was observed from the positive t-statistics which indicate that the mean of the group one “More than 4 products” is greater than group two “Less than 4 products”. The means represent the time it took to perform the service process in minutes.

In the group statistics (table 1) below, the means also shows us that fast cashiers are faster than traditional cashiers independently of the number of products. However, we found that the difference between the traditional and fast cashier was minimal for the group of “More than 4 products”. This was calculated by taking the difference between the two means of the group “More than 4 products” (2.7356 – 2.6544= 0.0812) which is approximately 8 seconds.

<table>
<thead>
<tr>
<th>Group Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of products</td>
</tr>
<tr>
<td>Fast Cashier</td>
</tr>
<tr>
<td>More than 4 products</td>
</tr>
<tr>
<td>Less than 4 products</td>
</tr>
<tr>
<td>Traditional Cashier</td>
</tr>
<tr>
<td>More than 4 products</td>
</tr>
<tr>
<td>Less than 4 products</td>
</tr>
</tbody>
</table>

Table 1, group statistics for number of products

4.3 Data for company’s perception
From the company’s perception this study investigates why Ica Luthagens Livs implemented TBSS in order to find out the perceptions of service quality in TBSS. For this we have interviewed the store manager, Fredrik Brunnberg. He was able to decide by himself that the grocery store could introduce fast cashiers. In addition, he mentioned that Ica Luthagens Livs was the first grocery store that introduced fast cashiers in Uppsala, Sweden. In the beginning, the store had seven traditional cashiers, but the waiting lines were still too long, consequently Brunnberg decided to replace one traditional cashier with four fast cashiers. Therefore, the main reason for introducing fast cashiers was to reduce waiting lines. Brunnberg’s idea was that by reducing waiting lines he could increase service quality and keep its existing customers satisfied. In addition, he described that there is a
strong relationship between service quality and speed of delivery and that reducing the costs was not an important motive. However, he mentioned that in the future they can consider reducing the number of employees in order to reduce personnel costs. By implementing fast cashiers the store is able to maintain its existing customers rather than targeting new customers. Furthermore, Ica Luthagens Livs consist of customers with different characteristics, for instance students, families, retired and customers who have a high degree of interaction with employees.

4.4 Data for customer’s perception
For the customers’ perceptions investigation there were a total of 80 customers, who responded to the questionnaire. From the sample almost half of the customers were women with a 53.75% and men represented a 46.25%. Furthermore, most of the men were 51+ and women’s age was between 21 and 30 (see exhibit 9 and 10). The regression analysis was run in order to analyze the correlation between dependent variable, which is intentions to use TBSS and independent variables, which are speed of delivery, control, reliability, ease of use and need of interaction. The obtained R square value is 0.339, this means that approximately 34% of the variance is explained by the regression model (see exhibit 8). This number is suitable for our study taking into consideration the small sample size of 80 observations. In order to determine whether the relationship between variables is statistically significant we analyzed the F-statistic and the p-value which are obtained from the ANOVA table (see exhibit 8). We obtained a p-value of 0.000, which is below 0.05, meaning that the relationship between attributes is significant. In addition, F-statistics is large enough to state that the attributes help explain variation on the dependent variable intentions to use TBSS.

In the coefficients (table 2) below the speed of delivery has a p-value of 0.339, control has a p-value 0.055 and need of interaction has a p-value of 0.726 meaning that they are not significant attributes. This means that they do not have any impact on service quality and intentions to use TBSS, because the p-values are above 0.05 of probability. The two attributes reliability and ease of use had a significant impact on service quality and intentions to use TBSS, because they have p-value below 0.05 of probability. Each of the two attributes has a positive effect on service quality, meaning that if customers qualify one of these attributes high then service quality and intentions to use TBSS increases. Unstandardized Beta-value shows us how strong the correlation is between the variables and if it is positive or negative. The closer the Beta-value is to 1, the stronger effect attributes have on intentions to use TBSS. Among these attributes, ease of use had the most important positive impact on service quality with the highest Beta-value of 0.502, because it has the highest value that
approximates 1. There were also two following attributes which are reliability and control that have a likely impact on the intentions to use TBSS with a Beta-value of 0.295 and 0.267. Briefly, it was shown that the attributes that had the most significant impact on service quality and intentions of using TBSS are ease of use and reliability, whereas speed of delivery, control and need of interaction had no significant influence.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td>-3.176</td>
<td>-1.880</td>
<td>.064</td>
<td></td>
</tr>
<tr>
<td>SpeedOfDelivery</td>
<td>.148</td>
<td>.107</td>
<td>.963</td>
<td>.339</td>
</tr>
<tr>
<td>Control</td>
<td>.267</td>
<td>.209</td>
<td>1.946</td>
<td>.055</td>
</tr>
<tr>
<td>Reliability</td>
<td>.295</td>
<td>.206</td>
<td>2.144</td>
<td>.035</td>
</tr>
<tr>
<td>EaseOfUse</td>
<td>.502</td>
<td>.397</td>
<td>3.816</td>
<td>.000</td>
</tr>
<tr>
<td>NeedOfInteraction</td>
<td>.044</td>
<td>.034</td>
<td>.352</td>
<td>.726</td>
</tr>
</tbody>
</table>

a. Dependent Variable: IntentionsToUseTBSS

Table 2, Correlations between the dependent variable and the independent variables

The correlation can be also visualized in the following line graphs, where positively increasing line indicates a strong correlation. In figure 9, we can appreciate that there is no correlation between intentions to use TBSS and need of interaction, because the line shows an unclear progressive pattern. In figure 10, we can observe a positive correlation between intentions to use TBSS and ease to use, which is illustrated by the increasing line. This indicates that intentions to use TBSS increases for instance with the attribute of ease of use.
4.4.1 Demographic factors

4.4.1.1 Data for gender

The Levene’s test (see exhibit 9) is significant for all the six attributes, with a p-value above 0.05 probability and therefore we only use the row “Equal variances assumed”. The p-value in the t-test for equality of means (see exhibit 9) on the row “Equal variances assumed” tells us if the attributes explain if there are significant differences between females and males. It was obtained that each of the attributes has a p-value above 0.05 probability meaning that they all are insignificant. Therefore, there is no significant evidence to support that gender has an impact on the evaluation of the attributes. Also, in figure 11, it shows that there are no relevant differences in the means of the attributes between females and males.
4.4.1.2 Data for age

The Levene’s test (see exhibit 10) shows that all the six the attributes have a p-value above 0.05 probability, which means that we use the row of “Equal variances assumed”. In addition, the p-values obtained in the t-test for equality of means (see exhibit 10) on the row of “Equal variances assumed”, show that there are five attributes that are not significant, meaning that they have a p-value above 0.05. These attributes are: intentions to use TBSS, speed of delivery, control, reliability and ease of use. These attributes have insufficient evidence to show that age has an effect on the evaluation of them. However, the p-value of need of interaction attribute in the t-test for equality of means on the row of “Equal variances assumed” gave a p-value of 0.046, which is below 0.05 probability. This indicates that there is a difference in need of interaction between young adults and elderly. In other words, these two groups have different perceptions when evaluating the need of interaction. This is also shown in figure 12 where there is a relevant difference in means between the elderly and the young adults in need of interaction. Furthermore, the t-statistic illustrates a negative value of -2.021 which indicates that the mean of the elderly is less than that of the young adults. In this case it has to remembered that the question for need of interaction was constructed inversely (need of interaction is NOT important), meaning that a low mean indicates higher need of interaction. This can be also seen in the group statistics table where it is obtained a low mean for the elderly and high mean for the young adults (see exhibit 5.1.2).
5. Discussion and strategic implications

Nowadays, customers have the possibility to either perform the services themselves with the use of technology-based self-service or utilize the services interacting with employees. In this study, we have identified several factors that influence the speed of delivery and customers’ perceptions and companies’ perceptions of the service quality in TBSS. It is important for the companies to understand their service quality, especially in the service sector because the product is complemented with service. In addition, service quality is an abstract concept, which makes it problematic for companies to improve it (Parasuraman et al. 1985). This study helps companies to recognize the factors that affect the service quality and improve the technology-based self-service counters.

5.1 The importance of speed of delivery

The fast cashiers are a faster option than traditional cashiers in general and, furthermore, TBSS reduces the waiting time. This outcome in our investigation correlated with Ica Luthagens Livs’s assumptions. This means that the service quality improves, because fast cashiers make the speed of delivery faster (Maister 2010). Nevertheless, it was not considered by customers that speed of delivery would improve the service quality provided by TBSS. However, customers’ perceptions do not totally argue against Maister’s (2010) theory that the speed of delivery is an important factor for service quality. This is explained by that customers who use TBSS and have more control over the time it takes to perform the service process. Due to the customers’ participation in the service process, they feel more occupied and perceive that time passes faster (Maister 2010). This means that customers are able to focus more on speed of delivery when they are using traditional cashiers,
because an employee controls the speed of delivery of the service. For these results, speed of
delivery is an important factor for increasing service quality, especially at traditional cashiers,
where customers remain unoccupied and perceive that time passes more slowly. In addition, it is
importance to reduce waiting line in traditional cashiers because customers tend to perceive waiting
time longer than it actually is (Dabholkar 1996).

The time to perform the service delivery is more spread at fast cashiers than at traditional cashiers,
because customers control the time themselves, and therefore the service process varies. When
customers can control their service process, problems in TBSS are much more likely to happen.
From our research, the service process in TBSS can take from 20 seconds up to 5 minutes
depending on the customers’ ability to perform the service, which is a bigger difference than at
traditional cashiers. Since customers expect TBSS to provide fast service delivery, they become
furious if the opposite happens. This is explained by the fact that when customers expect TBSS to
be fast, they expect greater service quality (Maister 2010). Customers expect TBSS to be fast
because the company itself advertises this technology as a fast option and if their expectations are
not fulfilled it can affect the service quality negatively. Therefore, companies should focus on the
customers that are loyal to TBSS and which are more familiar with it, because this decreases risks
of problems in the service process.

5.2 The factors that affect speed of delivery

5.2.1 Crowdedness
Regarding crowdedness, fast cashiers were a faster option for customers than traditional cashiers. It
took less time for customers to perform the service process in TBSS during the afternoon. This is
unexpected, because one can assume that the service process would take least time in the morning
when it is not crowded. This could indicate that customers tend to be influenced by other
customers’ behavior. That is to say, if customers observe the other customers feeling in hurry or
being stressed then it will affect them as well, meaning that these customers start to feel in a hurry
in the same way. This psychological effect makes the customers perform the service process faster,
because they feel agitated. Instead, the customers that purchase during the morning are more likely
to perform the service process more calmly, because there are fairly no customers. This results in
that, the speed of delivery is slower during the morning. Furthermore, during the evening
crowdedness increases significantly causing long waiting lines to the TBSS option. This leads to the
fact that the speed of delivery becomes the slowest due to the long waiting lines at this time of the
day.
The statement of Dabholkar et al. (2002) about crowdedness causing stress, anxiety and lack control gives a negative effect on customers’ intentions to use TBSS. Despite that, we obtained that crowdedness has a positive effect on TBSS. This finding is explained by two reasons; firstly, the speed of delivery attribute is more important for customers when the waiting lines become longer, meaning that the speed of delivery attribute has in this case influences the service quality and intentions to use TBSS. This was observed that during the day customers started to use more TBSS option when crowdedness and waiting lines increased. Secondly, when customers are standing in the waiting line they are more able to perceive what is happening in their surrounding, meaning that they can consider using another option if they see it going faster than their current option (Dabholkar 1996). Because of these reasons, crowdedness influences positively the intentions to use TBSS.

During the morning it was observed that when crowdedness was low, customers tended to choose the traditional cashiers even though there was no waiting line to the fast cashiers. This indicates that when there are no situational aspects affecting then customers prefer to use the traditional counters instead of TBSS. This means that, customers do not like TBSS itself, but they use it because the speed of delivery becomes more important for customers during crowdedness. Customers use TBSS option because it is fast not because they enjoy using it (Dabholkar et al. 2003). This statement correlates with the finding that during crowdedness, the attribute enjoyment was less important for customers. However, during low crowdedness enjoyment is the most important attribute for customers, supporting the research of Anselmsson (2001) and Dabholkar (1996). Due to this fact, it is important that companies consider implementing TBSS only if it is needed, for instance to reduce the waiting lines.

5.2.2 Number of products

Number of products does not have a vital impact on waiting time at the traditional cashiers, because the number of customers and the payment process has a greater impact on the service process (Meyer 2010). In our investigation fast cashiers were a faster option compared to traditional cashiers and this was independently of the number of products. However, particularly for customers who had more than four products the time difference of 8 seconds between the two cashiers was not relatively large. This means that customers can either use traditional or fast cashiers when purchasing more than four products without influencing the speed of delivery. For customers who purchase less than four products it is more advantageous to use fast cashiers because the service
process requires less time. This is to say that in contrast to traditional counters, the number of products has a greater impact on speed of delivery in TBSS. These findings point out that companies should focus on customers who usually buy less than four products in order to ensure a fast service delivery and improve service quality. This means that grocery stores where customers buy large amounts of products at a time, should consider twice about implementing TBSS because the number of products is more important in TBSS.

5.3 Company’s perception of service quality
Ica Luthagens Livs has implemented TBSS in order to increase customer satisfaction and loyalty, which will improve service quality. This was done because the company believes that customers tend to appreciate the fast cashiers more than the traditional cashiers (Bitner et al. 2002). This is because fast cashiers reduce the waiting time and can provide a faster service delivery process. This means that the grocery store perceives speed of delivery as an important. Reducing costs and targeting new customers are factors that do not influence the service quality, but give a direct benefit to the company. That is the reason why implementing TBSS in order to increase service quality, makes speed of delivery an important factor in the company’s perception.

In reality, the reduction of cost can also be seen as a reason for implementing TBSS. Ica Luthagens Livs is a good example of a company that wants to convey to customers that the point of having fast cashiers is to satisfy customers and to improve the service quality. Nevertheless, companies usually face situations where they have to make a decision of either hiring more employees or implementing the TBSS option in order to shorten waiting lines. As a result, implementing TBSS companies can avoid higher personnel costs and costs can be reduced. In addition, when customers are familiar with the TBSS, there is a possibility for companies to implement more TBSS options in the future and reduce the number of employees (Brunnberg, 2010). However, customers cannot see the reduction of costs, for instance personnel costs, because it is only the company which saves money not the customers. And as a result, customers might get a negative attitude towards using TBSS if they realize how they do not take of the reduction of costs (Bitner et al. 2002). Due to this fact, it is more suitable for companies to create an image for customers that TBSS are meant to improve service quality instead of reducing the costs for the company.

By implementing TBSS companies can also reach new customer segments (Bitner et al. 2002). Companies usually classify their customers in different segments according to their demographic factors, for instance age and gender, which is easy to measure. However, it is difficult to define
customer segments for TBSS due to the fact that demographic factors do not matter considerably, according to our results. It was obtained that gender did not have any effect and age only matters when referring to need of interaction. This means that if companies want to reach new customer segments by implementing TBSS, they should classify their customer segment differently. This can be done by taking into account other aspects such as workers who usually come by lunch time and buy one or two products. This is to say, that lifestyle is a more important factor when classifying customer segments. However lifestyle can be more complicated to study than demographic factors, due to its difficulty to identify.

5.4 Customers’ perceptions of service quality

Our developed attribute-based model (figure 5) worked sufficiently due to the fact that our results are similar to Dabholkar’s (1996) results. This was seen when it comes to speed of delivery, ease of use and need of interaction.

According to our results customers do not perceive speed of delivery as relevant attribute. This finding is in contrast with previous research where speed of delivery is defined as the determinant for choosing the TBSS option (Anselmsson 2001; Dabholkar et al. 2003). The reason for this is that people in general tend to be afraid of testing new technologies. This does not motivate customers to try the new technology and reduces customers’ intentions to use TBSS. Due to this, speed of delivery is not considered important for customers because other attributes such as reliability and ease of use have more psychological effect, according to our results.

The attribute ease of use is the most important factor for customers, meaning that if it is easy to use TBSS, it increases the service quality and the intentions to use TBSS, which supports Dabholkar’s (1996) research. This can be explained by psychological aspects, that customers may feel afraid or embarrassed to use the technology in front of others and do not want to be seen as stupid if they do not know how to use it, especially when it is crowded. It was obtained that during the morning, customers always chose the traditional cashiers even though there were no lines to the fast cashiers. This is because using traditional cashiers customers do not need to do much effort. This means that employees perform most of the service delivery process at traditional cashiers, in contrast customers perform the process themselves in fast cashiers. For these reasons, companies should try to make it easy as possible for the customers to use TBSS, because this factor is the most essential for TBSS.
Control and reliability were not defined similarly as in the research of Dabholkar’s (1996). According to our results, reliability was defined as an important attribute for customers when they evaluate TBSS, while control was defined as an unimportant attribute. This difference between the studies can be explained by the fact that in Dabholkar's (1996) research it was found an intercorrelation between the attributes control and reliability, which can have influenced her results. Furthermore, in our research it was also found that control and reliability are associated to each other. This is due to that the attributes have similar Beta-values, meaning that they have approximately equal correlation to the intentions to use TBSS. This can be explained by the fact that control and reliability go hand in hand. Customers who perceive the service as reliable, they at the same time believe that they have more control over TBSS, for instance in the payment process. This means that reliability and control are associated when customers evaluate TBSS. Customers will not use TBSS if they know that it will not provide a reliable service and that they do not have full control over the service process. This can be explained by psychological aspects that customers may have a fear that if TBSS is not reliable or controllable they will experience problems, which will cause irritation and stress. In addition, as in the case of ease of use customers may also experience the fear of being seen stupid by others if they do not know how to use TBSS. Even though control is not considered as a relevant attribute, it is important for companies to focus on both reliability and control, because they influence each other one.

The need of interaction was an insignificant attribute according to our research. This is not surprising, because the attribute has a negative effect on the intentions to use TBSS (Dabholkar 1996). This means that if customers have a high need of interaction, they usually prefer traditional cashiers instead of fast cashiers and this affects negatively the intentions to use TBSS.

**5.4.1 Demographic factors**

As it was mentioned earlier demographic factors did not have a relevant impact on intentions to use TBSS. Gender did not seem to have any effect on the evaluation of using TBSS according to our results. Men and women have similar preferences regarding the six attributes from the attribute-based model questionnaire. This can be explained by the fact that nowadays females and males tend to have the same interest in technology and have the same access to it (Dabholkar et al. 2002). According to our results, women do not have less favorable attitudes towards the use of technology than men do, which is in contrast to the results of Lee et al. (2010).
As regards age, the attribute need of interaction was the only one perceived differently by the elderly and the young adults. For the elderly, there was a higher need for interaction, meaning that they prefer using traditional cashiers rather than the fast cashiers, supporting previous research (Dabholkar 1996). This is explained by the fact that lonely and elderly customers like to rely on personal service in order to satisfy their personal needs (Dean 2008, Forman and Sriram 1991). However, customers can experience a high degree of independence (Anselmsson 2001) and according to our obtained results; the young adults were the customers who experienced a need of independence, which is preferable for the use of TBSS. The reason for this is that young adults are more used to living an independent life and doing activities that do not require personal contact, for instance Facebook, Internet bank and distance education. Altogether, the degree of interaction defines the evaluation of customers’ perceived service quality (Dabholkar 1996). Companies that have customer segment that consist of both age groups should consider having traditional and fast cashiers. This is so that customers can have the alternative to choose between them, according to customers’ need of interaction. Furthermore, companies that have customers with a high degree of interaction should think twice before implementing TBSS because it might not be profitable and would not fulfill the needs of their customers.

5.5 The gap between the customers’ and the company’s perceptions of service quality

It is vital to identify companies’ and customers’ perspectives of factors which are relevant to TBSS. This is because the company has to know why customers use the TBSS option in order to match customers’ needs with the TBSS’s functions. Therefore, the gap between customers’ expectations and what the company thinks customers expect has to be diminished. From Ica Luthagens Livs perspective, there is a strong relationship between the service quality and the speed of delivery. However, the speed of delivery was not perceived as an important attribute according to customers when evaluating the use of TBSS. This indicates that the speed of delivery is irrelevant to improve the service quality and further on the intentions to use TBSS by customers. Our study points out that the gap between customers and company is large due to the different apprehensions of service quality. This can be explained by that it is difficult for companies to know in advance what factors are important to improve service quality from customers’ perspective (Parasuraman et al. 1985), especially in terms of new technology. Companies should introduce regular customer surveys in order to find out how customers perceive the service quality and how to improve it. This is important according to Parasuraman et al. (1985) because the lack of understanding of customers’ perceptions decreases service quality.
Considering that the company only gives importance to speed of delivery and not to the attributes that customers perceive important makes the gap between the company and the customers greater. Therefore companies should give more focus on other attributes that were important to customers such as ease of use, reliability and control. Companies believe that customers appreciate physical aspects for example the time that service delivery process takes, but instead customers perceive psychological aspects more important. This means that, customers care more about their feelings and try to avoid uncomfortable situations. For these reasons, companies should convey to customers that TBSS is reliable, easy to use and controllable. These attributes make customers feel more comfortable and secure when using TBSS, which can help them to decrease their fears towards this new technology and thereby increase their intentions to use TBSS. Giving focus to these implications it will help to diminish the gap between the company and the customers.

6. Summary
The field study research which is shown in this investigation provides several ideas and suggestions about how companies can improve their TBSS options. In general, TBSS improves the service quality, because it is faster than traditional counters and reduces waiting time. However, it was important to reduce waiting time at traditional cashiers than at fast cashiers. It was obtained two factors that affect the speed of delivery, which are crowdedness and the number of products. Crowdedness has a positive effect on the use of TBSS, meaning that when it becomes crowded then the intentions to use TBSS increases. In addition, during crowdedness TBSS option still provides the fastest service delivery and improves service quality. The factor number of products affect on the speed of delivery except when customers had more than four products. As regards demographic factors, age and gender have no effect in how customers consider TBSS, except on need of interaction. The older customers tend to have higher degree of interaction while young adults have higher need of independence. Surprisingly, customers do not perceive the speed of delivery as an important attribute, which leads to a gap between customers’ perception and company’s perceptions of service quality. Furthermore, crowdedness had a great effect on customers’ perception of speed of delivery, meaning that speed of delivery became more important for customers when crowdedness increased. Companies should focus on other attributes which are more important for customers such as reliability and ease of use, where ease of use was the most important attribute.
7. Limitations and further research
For this research study, limitations include that we have only investigated one company in a certain sector, which is a grocery store. For any further research, it is desirable to have more geographical distribution where several companies from different sections are investigated in order to make more reliable generalizations. Our research object was fast cashiers, which have different functions compared to other TBSS options such as self-scanning, self check-in at airports, ATMs, Internet bank and self-service gas station among others. The methods used for this research, for instance the questionnaires were appropriate for this grocery store and can be difficult to adapt to other studies. Furthermore, the results from this investigation cannot be directly indicated into the actual behavior. For the time investigation, the situational aspects such as the time of the day, week, and holidays have a significant influence on the speed of delivery and crowdedness. This means that if the study is performed in a different time period, then it might obtain different outcomes.

Our field study required also limitations by having to develop short questions, which mean that not every aspect was taken into account in the questionnaire. For the company’s perception, it was just considered the manager’s point of view, which may differ to other managers in other grocery stores. Cultural differences may also affect the perceptions of the attributes, especially need of interaction. In some countries, people tend to have a higher need of interaction which is associated with their culture. For further study, it would be relevant to study how culture affects the necessity to implement TBSS in certain geographical areas meaning that some cultures people are less inclined to adapt TBSS.

There were only two situational aspects addressed in this study: the number of products and crowdedness. There are also other situational aspects that can affect our result, especially speed of delivery. In further research, it can be interesting to see how other factors such as customers being in hurry or when they are accompanied especially with children or alone influence the use of TBSS. In our study, TBSS had been introduced recently which can have an effect on how customers perceive the attributes, for instance ease of use and reliability may be more important for customers in our case.

Overall, it would be interesting to corporate additional attributes to Dabholkar’s (1996) attribute-based model to see if there are other attributes that affect the intentions to use TBSS while the model remains to be generalized for the TBSS. In addition, it can be motivating to study how the
gaps on Parasuraman’s et al. (1985) service quality model affect the service quality in TBSS. In this study, we only considered the gap between the customers’ expectations and the companies’ perception of customers’ expectations.
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**Interview**

Brunnberg, Fredrik, Store Manager Ica Luthagens Livs, Uppsala 2010-09-10
Appendixes

Exhibit 1: Observation notes model for crowdedness

Observation notes for crowdedness

Strongly agree 5……1 Disagree

<table>
<thead>
<tr>
<th>Researcher 1</th>
<th>Hour 1</th>
<th>Crowd</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>not crowded</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hour 2</td>
<td>Crowd</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>not crowded</td>
</tr>
</tbody>
</table>

Number of cashiers open, Hour 1:  Hour 2:

<table>
<thead>
<tr>
<th>Researcher 2</th>
<th>Hour 1</th>
<th>Crowd</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>not crowded</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hour 2</td>
<td>Crowd</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>not crowded</td>
</tr>
</tbody>
</table>

Number of cashiers open, Hour 1:  Hour 2:

Date:  Time slot:
**Exhibit 2: Interview questions**

**Interview with Fredrik Brunnberg, Ica Luthagens Livs store manager**

**Date: September 9th, 2010**

1) Har ni undersökt någon typ av statistik om snabbkassor eller någonting liknande?
2) Fick ni/du bestämma själv att implementera snabbkassor eller hade ICA Group påverkan?
3) Om ni själva har bestämt, varför har ni infört snabbkassor?
4) Hur länge har Du jobbat på Ica Luthagens Livs som butikschef?
5) Om det var Ica, var för har de bestämt sig att inför det?
6) Har de använt sig av någon statistik för att se om det behövdes snabbkassor?
7) Vad var syftet med att införa snabbkassor?
8) Vilka reaktioner har ni fått från personal och kunder?
9) Har ni/Ica Group gjort någon kundundersökning beträffande systemet
10) Vilka förväntningar har ni mot snabbkassor med dess implementering?
11) Vilken tidsplan har ICA för införandet av systemet på ICA Luthagens Livs?
12) Är ni själv nöjd med användningen av snabbkassor och sina funktioner?
13) Hur skulle ni vilja förbättra snabbkassor? Vilka funktioner?
14) Har ni gjort någon förbättring?
15) Har ni någon feedback system från kunder? (Dvs. Att om de trivs med det nya systemet)
16) Vet ni om ICA Group har någon statistik om hur snabbkassor påverkar service kvalitet?
17) Vad tror Du är orsaken till att kunderna inte använder snabbkassor?/ vad tror du att kunderna inte använder snabbkassor?
18) Tror du själv att snabbkassor går snabbare än vanliga kassor?
19) Vilken faktor tror du spelar mest roll när kunderna bestämmer sig att använda snabbkassor? Exempelvis: kunderna har bråttom, de har sällskap, att det finns mycket folk, antal varor.
20) Tror du att risken finns att kunder avstår från att prova systemet på grund av att det är krångligt?
21) Tror du att kunderna tycker att snabbkassor går snabbare än vanliga kassor?
22) Tror du att det finns en koppling mellan service kvalitet och leveranshastighet? Dvs. Om det går snabbare i kön, får man bättre service?
Exhibit 3: Customer survey

Undersökning- ICA Luthagens Livs

5= Instämmer helt
4= Instämmer delvis
3= Vet ej
2= Instämmer till liten del
1= Instämmer inte alls

Kön: Man □ Kvinnan □
Ålder: -20 □ 21-30 □ 31-40 □ 41-50 □ 51+ □

Leveranshastighet
Att använda snabbkassor går snabbt
5 4 3 2 1
Att använda snabbkassor är tidsparande
5 4 3 2 1

Kontroll
Att använda snabbkassor ger mig en känsla av kontroll
5 4 3 2 1
Att använda snabbkassor ger mig en känsla av att jag har ansvar
5 4 3 2 1

Pålitlighet
Att använda snabbkassor är tillförlitligt
5 4 3 2 1
Att använda snabbkassor är felfritt
5 4 3 2 1

Användarvänlighet
Att använda snabbkassor är enkelt
5 4 3 2 1
Att använda snabbkassor är ansträngande
5 4 3 2 1

Användarglädje
Att använda snabbkassor är trivsamt
5 4 3 2 1
Att scanna livsmedel själv är roligt
5 4 3 2 1

Behov av personlig Interaktion
Personlig uppmärksamhet är oviktigt
5 4 3 2 1
Personlig kontakt med butikspersonal gör shoppingen otrivsam
5 4 3 2 1
Exhibit 4: Data for speed of the delivery at fast and traditional cashiers

<table>
<thead>
<tr>
<th>Frequency table</th>
<th>Fast Cashier</th>
<th>Traditional Cashier</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>1.9064</td>
<td>2.1720</td>
</tr>
<tr>
<td>Median</td>
<td>1.5700</td>
<td>2.2100</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>1.15928</td>
<td>.83771</td>
</tr>
<tr>
<td>Minimum</td>
<td>.21</td>
<td>.51</td>
</tr>
<tr>
<td>Maximum</td>
<td>5.10</td>
<td>4.32</td>
</tr>
</tbody>
</table>

Exhibit 5: Data for crowdedness

<table>
<thead>
<tr>
<th></th>
<th>Time slot 1</th>
<th>Time slot 2</th>
<th>Time slot 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researcher 1</td>
<td>6</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Researcher 2</td>
<td>6</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Cashiers open</td>
<td>5</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>SUM</td>
<td>17</td>
<td>34</td>
<td>48</td>
</tr>
</tbody>
</table>

Calculations:

*Time slot 1*
Researcher 1 = 2+1+1+2=6
Researcher 2 = 2+1+1+2=6
Open cashiers= 2+3

*Time slot 2*
Researcher 1 = 4+4+3+3=14
Researcher 2 = 3+2+3+3=11
Open cashiers= 5+4=9

*Time slot 3*
Researcher 1 = 4+5+4+5=18
Researcher 2 = 4+5+4+5=18
Open cashiers= 6+6=12
Exhibit 6: Data for speed of delivery in different time slots at fast cashiers

Descriptives statistics

<table>
<thead>
<tr>
<th>Time slot 1</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval for Mean</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>1.6520</td>
<td>.92172</td>
<td>.29147</td>
<td></td>
<td>.9926</td>
<td>2.3114</td>
<td>.39</td>
<td>3.36</td>
</tr>
<tr>
<td>Time slot 2</td>
<td>16</td>
<td>1.3338</td>
<td>.81922</td>
<td>.20480</td>
<td></td>
<td>.8972</td>
<td>1.7703</td>
<td>.21</td>
<td>2.59</td>
</tr>
<tr>
<td>Time slot 3</td>
<td>29</td>
<td>2.1662</td>
<td>1.27438</td>
<td>.23665</td>
<td></td>
<td>1.6815</td>
<td>2.6510</td>
<td>.42</td>
<td>5.10</td>
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<tr>
<td>Total</td>
<td>55</td>
<td>1.8305</td>
<td>1.14440</td>
<td>.15431</td>
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<td>1.5212</td>
<td>2.1399</td>
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</table>

Test of Homogeneity of Variances

<table>
<thead>
<tr>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
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<tbody>
<tr>
<td>1.957</td>
<td>2</td>
<td>52</td>
<td>.152</td>
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ANOVA

<table>
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<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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<tbody>
<tr>
<td>Between Groups</td>
<td>7,535</td>
<td>2</td>
<td>3,768</td>
<td>3.101</td>
</tr>
<tr>
<td>Within Groups</td>
<td>63,186</td>
<td>52</td>
<td>1,215</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>70,721</td>
<td>54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Exhibit 7: Number of products

#### Group Statistics

<table>
<thead>
<tr>
<th>Number Of Products</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Cashier</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 4 products</td>
<td>18</td>
<td>2.654</td>
<td>.93175</td>
<td>.21962</td>
</tr>
<tr>
<td>Less than 4 products</td>
<td>12</td>
<td>1.035</td>
<td>.79964</td>
<td>.23084</td>
</tr>
<tr>
<td>Traditional Cashier</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 4 products</td>
<td>18</td>
<td>2.736</td>
<td>.83666</td>
<td>.19720</td>
</tr>
<tr>
<td>Less than 4 products</td>
<td>12</td>
<td>1.428</td>
<td>.54441</td>
<td>.15716</td>
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</table>

#### Independent Samples Test

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
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<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
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<td></td>
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<tr>
<td>Fast Cashier</td>
<td>Equal variances assumed</td>
<td>.240</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>Equal variances assumed</td>
<td>5.080</td>
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<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>3.962</td>
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<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>5.184</td>
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Exhibit 8: Data for customer's perception

Regression analysis

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<th>Model Summary</th>
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<sup>a</sup> Predictors: (Constant), Need Of Interaction, Reliability, Speed Of Delivery, Ease Of Use, Control

<table>
<thead>
<tr>
<th>ANOVA&lt;sup&gt;b&lt;/sup&gt;</th>
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<td>Model</td>
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<sup>a</sup> Predictors: (Constant), NeedOfInteraction, Reliability, SpeedOfDelivery, EaseOfUse, Control
<sup>b</sup> Dependent Variable: IntentionsToUseTBSS

<table>
<thead>
<tr>
<th>Coefficients&lt;sup&gt;a&lt;/sup&gt;</th>
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</tbody>
</table>

<sup>a</sup> Dependent Variable: IntentionsToUseTBSS
Exhibit 9: Demographic factors: Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentions To Use TBSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>43</td>
<td>5.9070</td>
<td>2.82686</td>
<td>.43109</td>
</tr>
<tr>
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<td>37</td>
<td>5.9189</td>
<td>2.38489</td>
<td>.39207</td>
</tr>
<tr>
<td>Speed Of Delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>female</td>
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<td>2.05678</td>
<td>.31366</td>
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<tr>
<td>male</td>
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## Independent Samples Test for gender

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### Exhibit 10: Demographic factors: Age

#### Group Statistics for age

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# Independent Samples Test for age

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