THE EFFECT OF MASS CUSTOMIZATION ON COMPETITIVE STRATEGY

(THE CASE OF ADDIS ABABA TANNERY S.C & TIKUR ABBAY SHOE S.C)

A THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF BUSINESS ADMINISTRATION IN MANAGEMENT

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LETTER OF DECLARATION

I, the under signed, declare that this thesis is my original work and has not been presented for a degree in any other University, and that all the sources of material used for the thesis have been duly acknowledged.

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Yitbarek Takele (PhD) _____ _____

Advisor Signature Date

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List of Acronyms

MC	Mass Customization
S.C.	Share Company
SPSS	Software Package for Social Sciences
OR	Odds Ratio
PO	Proportional Odds

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Abstract

Now day‟s customers are demanding more and more from time to time. There is a frequent change of customers‟ needs and wants. This in turn is bringing different challenges in the manufacturing system of firms. As a result of these and other factors mass customization as a production strategy has drawn great attention from scholars in various fields in the recent years. The objective of this study was to investigate the effect of mass customization on competitive strategy in order to break the challenging paradox between the two strategies. In this study, mass customization was operationalised into four major approaches. These are: collaborative mass customization, adaptive mass customization, transparent mass customization & cosmetic mass customization. On the other hand, competitive strategy was defined as cost leadership strategy and differentiation strategy. Cost leadership was defined as low cost production of standardized products and differentiation was defined as producing products differently from competitors and trying to satisfy unique need of customers. Mixed research approach is used in this study. It is cross-sectional study. The researcher used self-constructed ordered response questionnaire and evaluated mass customization & competitive strategy of Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C, with the help of 127 professional workers of the companies who are working in different departments and thereby measured the effect of the mass customization on the companys‟ competitive strategy. The researcher has analyzed the data with help of descriptive statistics and ordinal logistic regression model for ordered response questionnaire. The result shows negative effect of mass customization on competitive strategy except for transparent mass customization which positively affected both cost leadership and differentiation strategies. The positive effect is stronger between transparent mass customization and cost leadership strategy than between transparent mass customization and differentiation strategy. Lastly, some conclusions and recommendations are forwarded regarding the result of the investigation.

Keywords: Mass customization, Cost leadership, Differentiation & Ordinal logistic regression model

Chapter One

Introduction

1.1. Background of the Study

Davis, who coined the phrase in 1987, refers to mass customization when "the same large number of customers can be reached as in mass markets of the industrial economy, and simultaneously treated individually as in the customized markets of pre-industrial economies" (Davis, 1987: 169). Pine (1993a) popularized this concept further and defined mass customization as "providing tremendous variety and individual customization, at prices comparable to standard goods and services" to enable the production of products and service "with enough variety and customization that nearly everyone finds exactly what they want." Tseng and Jiao (2001) introduced a pragmatic but precise definition. Mass customization corresponds to "the technologies and systems to deliver goods and services that meet individual customers" needs with *near* mass production efficiency." But beyond these understandings, the term is used today for all kind of strategies connected with high variety, personalization, and flexible production (Piller, 2003b).

Today, mass customization is a buzzword. This is a major part of the problem as no clear definition and common understanding of the term have evolved. "Extant literature has not established good conceptual boundaries for mass customization", state Duray et al. (2000: 606) after a literature review. But unless it is agreed on a definition and common understanding, mass customization will become neither an academic discipline nor a broad strategic concept recognized by managers. The field must not suffer from a definition debate. It needs a definition that can capture the uniqueness of mass customization with its own distinctive properties. There is also a need to delimit the domain. Not all flexible manufacturing strategies or customer-orientated product design methodologies can be termed as mass customization. There is still work needed to describe mass customization as a domain whose objectives, processes, performance,

and governance are unique in respect to a firm‟s resource allocation (Sheth and Parvatiyar, 2002) approaches.

On the other hand, whenever the issue of producing customer-oriented products is raised the issue of the level of cost which is going to be incurred to achieve the same and to what extent the producer is producing in line with the real customer needs and wants should be raised. Cost should be known because that is the point from which companies going to calculate their profit. Production cannot run when revenue is short of cost. So when trying to implement a given production strategy, companies should be sure whether it is cost effective strategy or not. The same should be applied for mass customization. The issue of differentiation should also take attention because to share substantial portion of market from competitors companies have to have something unique with which they approach customers and lure them from other competitors. This study has investigated the effect of mass customization on the competitive strategy (cost leadership and differentiation). As introduced by Gilmore and Pine (1997), there are four major mass customization approaches defined from the perspective of customer involvement in the manufacturing process. These are: collaborative mass customization, transparent mass customization, adaptive mass customization and cosmetic mass customization. Collaborative mass customization implies the early involvement of customers in the production process to specify product or service features according to customers‟ needs and wants. Transparent mass customization is producing products in accordance with customers‟ needs after deep customer research without direct contact with customers or end users. Adaptive mass customization is when customers buy a standard product but they can modify it by themselves based on their needs. Cosmetic mass customization is when companies produce a standard product but present it differently to different customers.

1.2. Statement of the Problem

Today‟s business environment is characterized with extremely tight competition between companies, countries and even entire continents. Companies are forced to constantly reduce costs and outperform. Efficiency and cost-based competition has been highlighted and production is increasingly been transferred to countries with low labour cost. At the same time, customers are becoming increasingly demanding placing pressure for customer service. Competing only with price is risky if switching costs are low. To retain customer loyalty companies should serve every customer as an individual offering customized products and services at a reasonable price (Pine 1993a). Companies are expected to pursue both efficiency and effectiveness at the same time. Combining these two aspects is difficult at best and requires reasonable trade-off between cost control and production of customer value. Mass customization, as „ability to use of flexible processes and organizational structures to produce varied and often individually customized products and services at the price of standardized, mass-produced alternatives‟ (Hart 1996), is seen as a solution in this inconsistent situation.

A study on theory of mass customization, performed by Silveira et al. (2001), reveals that, while there is little debate on theoretical aspects of concepts and objectives, there are several pending issues regarding its practical implementation. In addition, Piller (2004) quotes a team of scholars - Duray et al. (2000: 606): “Extant literature has not established good conceptual boundaries for mass customization” – and argues that unless a common understanding is established, mass customization will become neither an academic discipline nor a broad strategic concept recognized by managers. There is no as such significant number of studies showing clear relationship between mass customization and manufacturing priorities such as cost and differentiation. Most of the existing research papers on mass customization are limited to providing an understanding of the content of mass customization strategies (the organizational structures, process technologies, etc., that are best in a particular environment) and the process of mass customization strategies (the sub-strategy that an enterprise should select and how they should go about implementing the strategy). In addition to the coverage & context gap with the previous studies there is also methodological problem. While conducting investigations by using categorical data, previous researchers have used methodologies which are appropriate for

continuous data such as linear regression and Pearson correlation while methods such as logistic regression are more appropriate to be used for categorical variable. To fill this methodology gap, the current study has used ordinal logistic regression model to analyze categorical data with ordinal nature. Brian S. et al (2006) has tried to investigate the impact of mass customization on the manufacturing trade- offs in U.K. As it can be observed from the result of his study the relationship between the two variables is still confusing, calling for further investigation. It is evident from different literatures that, mass customization as a subject by itself is not well investigated. Particularly in our country Ethiopia, the concept of mass customization is new phenomena. So it needs deep investigation as a subject as well as manufacturing strategy in order to advance the manufacturing system of companies in the country. To this end, this study has investigated the effect of mass customization on the competitive strategy (cost leadership and differentiation) in the Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C in order to fill the knowledge gap and contribute to the growing body of literature in the area and thereby build the company awareness of the concept.

1.3. Research Questions

The research has tried to answer the following major research questions:

- What is the effect of mass customization on cost leadership strategy in Addis Ababa Tannery S.C. and Tikur Abbay Shoe S.C.?
- What is the effect of mass customization on differentiation strategy in Addis Ababa Tannery S.C. and Tikur Abbay Shoe S.C.?

1.4. Objectives of the Study

The major objective of the study was to investigate the effect of mass customization on the competitive strategy (cost leadership and differentiation) in the Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C. in order to know whether mass customization as internal strategy can smoothly work with generic competitive strategies as cost leadership and differentiation. Specifically; this study was undertaken in order to:

- Identify whether mass customization has any significant effect on the cost leadership and differentiation in Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C. in order to fit the appropriate mass customization approach with the appropriate competitive strategy.

- Measure the effect of mass customization on the cost leadership and differentiation in Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C. in order to identify the effect size of mass customization on each competitive strategy.
- Examine the awareness trend of workers in Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C. about mass customization and its effect on the company‟s cost leadership and differentiation strategies and there by improve their operational efficiency.

1.5. Research Hypothesis

This research has tested the following eight major hypotheses:

1: Collaborative mass customization has significant positive effect on cost leadership strategy

2: Collaborative mass customization has significant positive effect on differentiation strategy

3: Adaptive mass customization has significant positive effect on cost leadership strategy

4: Adaptive mass customization has significant positive effect on differentiation strategy

5: Transparent mass customization has significant positive effect on cost leadership strategy

6: Transparent mass customization has significant positive effect on differentiation strategy

7: Cosmetic mass customization has significant positive effect on cost leadership strategy

8: Cosmetic mass customization has significant positive effect on differentiation strategy

1.6. Significance of the Study

This research is significant in various aspects. The major significance areas of the study are:

- The results of this study use the workers in the Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C as a base to become aware of the mass customization and how they can affect their cost leadership and differentiation strategies.
- The study has added a piece of knowledge in the area of mass customization in our country and this in turn motivates other researchers to undertake further investigation in the area.
- Finally, it has given the researcher an opportunity to gain further knowledge of mass customization and its link with cost leadership and differentiation strategies.

1.7. Scope of the Study

This research was limited to the case of Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C to investigate the effect of mass customization on the competitive strategy (cost leadership and differentiation). The study was also focused only on professional workers in the company to gather data regarding the issue. This scope of the study is decided taking into consideration both time and cost constraints the researcher will face to undertake this investigation.

1.8. Limitations of the Study

Obviously mass customization is not the case of only one or two companies. It can be applied differently in different organizations. Both manufacturing and service providing industries apply mass customization to provide customers with what they need and want. This study was focused only on leather industry which is one of the manufacturing sectors. To meet the objectives of this study the researcher has considered only two companies: Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C. As long as the scope of the study is considered, this research has ignored the effect of mass customization in the overall companies in the country and has taken only the two mentioned companies as a sample to undergo this investigation. In the case of validity analysis, the issue of inter-precedence validity (cause-effect relationship validity between variables) was not addressed in this study; again considering the scope of the research it is left for future research.

1.9. Ethical Consideration of the Research

Any research is important to the extent that it is ethical in practice. This can be seen in connection with data collection and results presented in the research. In this study, respondents were approached carefully and the researcher has presented the instruments of data collection in ethical manner including the issue of confidentiality and the content of the instrument. Results and discussions in the study were also presented taking into consideration the ethical issues of the context in which the investigation was conducted.

1.10. Organization of the Paper

The following chapters in this paper are organized as follows:

The second chapter of the paper deals with review of related literature from both theoretical and conceptual perspective; the third chapter covers the issue of research approach and methodology used in the study including model specification for the research; the fourth chapter deals with the results of the investigation and its detail discussions and finally, the fifth chapter provides some conclusions and recommendations depending on the results discussed under the fourth chapter.

Chapter Two

Review of Related Literature

2.1. Introduction

This chapter deals with the literature review of the research. It covers major concepts and definitions in mass customization, theoretical aspects in mass customization, and the empirical findings in the area of mass customization together with competitive strategies. Finally, it discusses the connection between mass customization and competitive strategy and presents the conceptual framework of the research.

2.2. Concepts and Definitions of Mass Customization

The objective of mass customization is to produce goods and services meeting individual customer‟s needs with near mass production efficiency (Tseng and Jiao, 2001). Mass customization is a hybrid manufacturing concept existing to provide highly value added products. It is about delivering the desired product after the needs of an individual customer have been expressed (Piller, 2004). A standard product that bears certain flexibility, so that the retail or customers themselves can customize it, can be regarded as a mass customized product. In addition, providing a set of individual value added services around a standard product could also be regarded as a form of mass customization. On the other hand, a service can be constructed in a way where it is partly „pure customization‟ and party mass customization, in which some of its components are standardized and some custom made for each customer (Blecker and Friedrich, 2006). It is important to note that in mass customization, where customers are presented with a variety of choice, they are not involved in the specification of that variety (Duray et al., 2002). Customers must first interact with the manufacturer, the retailer, or the product itself in order to configure the end solution. In other words, depending on the situation, customers can be involved in specifying features of the product during phases of design, fabrication, assembly, or use (Zipkin, 2001; Broekhuizen and Alsem, 2002).

Despite numerous attempts to conceptualize the term mass customization, Piller (2004) argues that in practice, mass customization is "not there yet". Today the term is mistakenly used for all kind of strategies connected with high variety, personalization, direct deliveries, and flexible production (Broekhuizen and Alsem, 2002). As Piller says not all agile manufacturing strategies that involve customer interaction can be classified as mass customization. Moreover, conceptualization of mass customization began more than two decades ago; hence it has naturally evolved in its nature and execution. Piller, Europe‟s leading expert on mass customization, has been revising the definition of mass customization several times within the last decade in order to focus on issues that are relevant and distinguish mass customization from similar concepts. Then he has passed the following fundamental definition of the term:

"Customer co-design **process of** ***products and services*****, which meet the** ***needs of each individual customer*** **with regard to certain product features. All operations are performed within a** ***fixed solution space*****, characterized by stable but still** ***flexible and responsive processes*****. As a result, the** ***costs*** **associated with customization allow for a** ***price level*** **that does not imply a switch in an upper market segment."**(Piller, 2004, p. 315)

The elements used in the above definition are explained in the following paragraphs:

2.2.1. Customer Co-design and Integration

Customer co-design and integration are key to mass customization (Kumar, 2007); this is the core element that differentiates mass customization from other strategies like lean management or agile manufacturing (Piller, 2004). With today‟s information technology, mass customization customers can be included into the value creation chain by defining, configuring or modifying an individual order. Though an interactive website customers can configure specifications of the product or service, packaging and even delivery options. For example, when ordering an iMac computer on the Apple Store website, one may choose a monitor size, two or four GB RAM memory capacities, desired pre-installed software, keyboard and mouse. It is essential for customization that consumers contribute to specification of the product by communicating their needs and desires. Different than a do-it-yourself approach, which is an autonomous creation by consumers; this is done through "co-creation" – a mode of interaction with the manufacturer, who

is responsible for providing the custom solution (Ramirez, 1999). Chen and Tseng (2007) describe such interaction as “negotiation” because a middle ground between the supply and demand flexibility can be explored, as recent advances in information technology enables both parties to settle on a product that is beneficial to both.

Customer co-design also establishes an individual contact between the manufacturer and customer, which offers possibilities for building up a lasting relationship. If the customer is satisfied with an individual purchased item, it awards the manufacturer with an increased chance for customer loyalty as reorders become simplified (Pine, Peppers and Rogers, 1995). For example, online mass customization companies offer a service where a customer creates a user profile and is able to save previous orders and hence combinations of preferences. The future orders therefore become simplified for the customer and the seller is rewarded with preference database. Broekhuizen and Alsem (2002) challenge the importance of such relationships. If the time gap between purchases is substantial, it becomes increasingly difficult to benefit from the knowledge gained from the individual consumer. In other words, the more time passes by since the last customer order, the less can the mass customizer understand its customer‟s current preferences, needs and wants, so the knowledge sharing gets impaired.

Even though co-design activities are the necessary prerequisite of mass customization, these activities are also a major cause for complexity, effort, and perceived risk from the customers‟ perspective, creating obstacles for the success of mass customization strategies. For instance, if a customer decides to order a mass customized bicycle through an online channel, it presents an element of complexity, such as multiple possible combinations; perceived risk, such as the uncertainty of the final visual and technical outcome, delivery and even fraud. Pine coined the term “mass confusion” (in Piller et al., 1995) to describe the perplexity and downsides that a customer experiences as a result of mass customization interaction processes. Hence, it turns out customer co-design is both, a necessary prerequisite, and one of the major factors for the delay in adoption of mass customization technologies in business practice. (Piller et al., 2005).

Customer integration plays a key importance in a mass customization strategy (Piller, 2004; Kumar, 2007; Kumar and Stecke, 2007). Integration means getting the customer involved in designing or configuring a product, which is by definition, an essentially central element of mass

customization. By integrating the customer into the design or configuration process, a possible adversarial relationship between a customer and provider may be transformed into a synergy (Kumar and Stecke, 2007). Customer‟s positive experience of a co-creation may lead to further gains for the company, such as positive word of mouth. This psychological transformation is a significant factor in the success of a mass customization strategy. With the development of technologies in user interface, customers are enabled to choose from offered options in a modular manner. Often, the online tool contains a price calculator, which can advise the end price of a solution, based on the selection of offerings and product configurations. This creates visibility for the consumer and reduces the barrier of uncertainty, often associated with customization.

2.2.2. Meeting the Needs of Each Individual Customer

A major success factor of mass customization is the ability to match the level of customization offered with customers‟ needs (Piller, 2004). Referring to Chamberlin‟s (1950) theory of monopolistic competition, mass customization is a consequence of a differentiation strategy. Here customers gain added value from a heterogeneous good that fits their needs better than the best standard product within reach. From an implementation point of view, customization can begin on three levels: fit & comfort (measurement), style (aesthetic design) and functionality (Piller, 2004). Let us take a simple example of cereals. Here, fit can be translated into packaging options – material or size of the package. Functionality can refer to both – packaging (size, shape, material) and nutrition (added vitamins, fibre-rich flakes). The style is defined by the aesthetic aspect of packaging – individualized design solutions.

However, a significant point of conflict in mass customization debate is determining the level of individualization that characterizes a truly mass-customized product. On the one hand, purists attribute mass customization concept only to products that fulfil all requirements made by individual customers. On the other hand, pragmatists do not require complete individualization in order to qualify as mass customization. They suggest that mass customization is about customers choosing from independent number of options and adjusting their final solution based on them (Silveira et al., 2004). According to Hart (1995) the solution for this debate lies in company‟s ability to determine and maintain the range in which products or services can be customized, and

how individuals make options upon this range, which leads us to the next section – fixed solution space.

2.2.3. Fixed Solution Space

Creation within a stable fixed solution space is what differentiates mass customization from one-of-a-kind (craft) customization. A crafted goods manufacturer re-invents both its products and its processes for each individual order. On the other hand, a mass customizer uses fixed processes to deliver varied goods (Pine et al., 1993). Fixed solution space implies that configuration options are limited to certain product features. The reason for the solution space in mass customization being fixed is the power of modular design, which reduces the complexity of processes (Kumar et al., 2008) .This, enables a mass customization company to achieve a near mass production efficiency, but also implies that the customization options are limited to certain product features. Customers are allowed to perform co-design activities only within a pre-defined list of options and components, which means customers‟ choice is restricted to a modular product architecture existing in the fulfillment system (Piller, 2004).

Setting the solution space is one of the primary competitive challenges of a mass customizing company; therefore researcher find it important to review what academia has concluded on this subject matter. As defined by von Hippel (2001) in Piller (2004, p. 316), solution space is “the pre-existing capability and degrees of freedom built into a given manufacturer‟s production system”. According to Pine (1995), flexible and responsive processes characterize a successful and dynamic flow of products in mass customization. By indicating flexible and responsive processes, Pine is referring to Flexible Manufacturing System (FMS), a manufacturing concept that is believed to be very important for the evolution of mass customization.

2.2.4. Tolerable Price and Cost Levels

In their definitions, scholars often emphasize a requirement that mass customization should not be associated with price premiums traditionally attributed to craft production (Kotler, 1989; Pine, 1993b; Kay, 1993: Silveira et al., 2001). Also in practice it is becoming apparent that a great variety of mass customization can be achieved at prices equal to or even lower to those of mass production (Pine, 1999). In fact, mass customization has clear strategic cost advantages for the

firm. As new customer acquisition is more expensive than retention of existing ones, firms should prefer to concentrate on customer relationship building rather than continuously marketing to "the masses". Mass customizers believe that customer involvement into the product creation process builds the relationship between the two, and the customer is more likely to feel attached to the product that he or she participated co-creating. Mass customization strategy is one solution for this kind of retention. Even if customized products or services are more expensive to produce, the savings generated from increased customer satisfaction and developed brand loyalty, can make up for or even exceed the costs. (E-Commerce blog) Research and observations show that consumers are often willing to pay a price premium for a customized solution to reflect added value they gain from a product that better fits their needs than the standard product (Franke and Piller, 2004; Levin et al., 2002).

Traditionally, craft customization is targeted to an upper market segment as a consequence of price premiums associated to such goods. To distinguish mass customization from craft customization, it is important to note that mass customized goods are targeting the same market segment that was or could be purchasing the standard, un-customized goods (Piller, 2004). Added value of mass customization may be considerable, but the product still needs to remain affordable to maintain competitiveness against mass-production. Here it enters uncharted territory, but in theory mass customization pricing generally lies somewhere in between the mass production prices and those of craft customization. From the manufacturer"s point of view, the discussed price level must be based on a cost level that allows such a "price premium". Customer co-design process equips with valuable information. It enables to reduce fixed costs associated with inventory stock and thus allow for a higher level of operational flexibility. (Piller, 2004)

2.2.5. Products and Services

In mass customization the line between products and services is blurry. In mass customization, customers are integrated into a product co-creation process, and in turn, they receive a customized end solution. Essentially, a service becomes an integral part of the product, thus diluting the product from a mere commodity. Management literature suggests to product manufacturers to integrate services into their core product offerings (Gadiesh and Gilbert, 1998; Quinn et al., 1990). The rationale for such integration is based on three arguments: economic,

demand, and competition. As for economic arguments, a) revenue can be generated from an installed base of products with a long life cycle b) services, in general, have higher margins than products; and c) services provide a more stable source of revenue as they are better resistant to the economic cycles (Oliva and Kallenberg, 2003). Second, customers are demanding more services. Finally, there is the competitive argument, meaning that services, being more labor dependent, are much more difficult to imitate, thus becoming a sustainable source of competitive advantage. (Oliva and Kallenberg, 2003)

According to Jiao et al., 2003, there are two angles to understand services: (1) a service can be an activity or (2) a service can be an output of a system. The activity definition refers to services as a set of activities or acts that are performed for customers, for example a pre-set hotel room or in-flight menu based on the customer preferences. The output viewpoint of services is relatively transparent to customers; as in these situations the service itself is defined as an output, instead of a physical object. (Jiao et al., 2003)

The essential characteristic associated with services is that they contribute value to customers in an immaterial way. In contrast with a manufacturing system, which produces goods (physical products), a service delivery system is considered to be an operations system that produces services – a particular kind of goods with immaterial nature. Nevertheless, both goods and activities are supposed to provide certain kinds of benefits (or services). Some services are supposed to emerge through the use of goods, and in such context service delivery systems and manufacturing goods exhibit no difference from a customer perspective. (Jiao et al., 2003)

2.3. Theoretical Framework

2.3.1. Origins of Mass Customization: The Paradigm

The system of Mass Production has propelled industrial growth and economic strength of many economies between the eighteenth and twentieth centuries. For many years it was the only production system practiced by large manufacturers and service providers, except for small craft-based shops. However, new forms of competition, society, markets, technologies and consumers have challenged the system. The breakdown of mass production began in the 1960s, accelerated in 1970s and finally alerted the management in 1980s, when a “paradigm crisis” occurred. (Piller,

1993). In the 1990s it was no longer possible to ignore changes that had been accelerating during the past decades. So, in the 1990s, why were so many companies in various industries eager to enter or switch to another paradigm? It happened because many of these industries were undergoing a fundamental change and mass customization provided a solution to overcome these challenges (Piller and Schaller, 2002). They were no longer focusing on standardized products or services for homogeneous markets. Mass Production, associated with *efficiency through stability and control*, was becoming neither stable nor under control, due to "ever-spoiled" consumers and opening markets, therefore efficiency was compromised. Emerging technology and new management methods have opened the door to *variety and customization through flexibility and quick responsiveness*, which is essential to Mass Customization. (Pine, 1993a).

While mass producers stand behind products and services at prices low enough, that nearly everyone can afford them, mass customizers advocate producing goods services with enough variety and customization so that everyone finds what they want Pioneers of mass customization, having in mind flaws associated with mass production, believed that a company, which better satisfied its customers" individual needs, would have greater sales, profits, and better knowledge of market needs. This, in turn, would lead to even more variety and customization, which will fragment the market even further (Pine, 1993a). The distinction between mass production and mass customization is clearly presented in the following table (table 2.1).

Table 2.1: Mass Customization vs. Mass Production (Pine, 1993a, pp. 263-264)

	Mass Production	**Mass Customization**
Cost	Efficiency through stability and control.	Variety and customization through flexibility and quick responsiveness.
Goal	Developing, producing, marketing, and delivering goods and services at prices low enough that nearly everyone can afford them.	Developing, producing, marketing, and delivering affordable goods and services with such variety and customization that nearly everyone finds what they want.
Key Resources	❖ Stable demand ❖ Homogeneous markets ❖ Low-cost high-quality standardized goods and services ❖ Long product development cycles ❖ Long product life cycles	❖ Fragmented demand ❖ Heterogeneous niches ❖ Low-cost high-quality customized goods and services ❖ Short product development cycles ❖ Short product life cycles

The rationalization for the development of mass customization systems is based on several central ideas (Hart, 1995; Kotha, 1995; Pine, 1993a; Silveira et al., 2001):

- Due to decreasing productivity in 1970s, the ability of Mass Production system to lower real costs and therefore prices inhibited its expansion across markets.
- More accessible international markets lead to a gradual change in consumers‟ needs and wants. What used to be a stable demand for standard goods has fragmented into a demand for differentiated goods.
- Large, homogeneous markets have become heterogeneous due to the fragmenting demand. Therefore niche businesses are emerging, shifting power to buyers who prefer individualized higher quality goods.

- Companies realize new ways to generate profits; hence they enter niches to try to meet the changing needs. First it can be done through tailoring the end product after production, but this method being costly, customization during production becomes an option.
- Creating high levels of individualized production requires flexibility in manufacturing process, which is a challenge to mass production.
- Hence manufacturing processes and machinery need to change. Driven by markets and customers, high-quality customized products need to be produced at mass production capacity via short production runs and short changeover times.
- As a result of better addressing customers‟ needs, a premium price can be charged. This additional margin covers for a loss of volume. After some experience is gained from mass customization processes, goods with many variations can be produced at the same costs or lower than mass production.
- Due to the dynamic nature of new niche markets, continuous success can be achieved by quickly producing a greater variety of goods. As the rate of technology change increases sharply, product development cycles must be shortened accordingly.
- Shorter product development cycles are followed by shorter product a life cycle, which means that products and technologies are constantly improved and/or replaced.
- This results in demand fragmentation (less demand for each individual product), and a higher demand for the company and its products relative to the old system and to its competitors. Niche markets become attractive avenues due to possibilities to fulfil ever-growing demand fragmentation (Pine, 1993b) as well as due to new distributions channels and information technologies that allow direct contact between customers and manufacturers.

To sum up, mass customization originated because of external pressures and changes across industries. However, it should be acknowledged that many companies withstood the pressures and only some companies saw mass customization as a clear strategic alternative. First, increasing global competition puts pressure on cost structures. At the same time, customers increasingly demand for product variety and customized goods to fulfil their individual needs. These demands, though, are changing all the time, which makes them difficult to determine and difficult to rely on, therefore companies become reluctant to rely on mass production. In addition

to all that, while technological changes are accelerating, product life cycles are shrinking. These factors increase market turbulence, which in turn brings volatility, uncertainty and lack of control in the firms‟ operating environment. If businesses can no longer count on a stability of the demand, they can no longer realize the efficiencies and the economies of scale of mass production. At this stage and point, for some companies mass customization becomes a clear strategic alternative. (Pine, 1993b)

2.3.2. Operational Definitions/Approaches of Mass Customization

Research on mass customization tackles several issues with regard to developing, producing, and selling individualized products and services for rather large customer segments (Piller et al., 1995). In order to demonstrate the differences between methods of mass customization, a framework has been developed to illustrate how customers are integrated into value creation by defining, configuring, matching, or modifying their individual solution. Four major stages can be shown in a firm‟s value chain: design, assembly, additional services and product usage. The final stage – application (or usage), represents the customer‟s interaction with the end solution. Each column in Figure 2.1 refers to a different approach and indicates at which stage of the value chain mass customization occurs and into which type of a product it results. For instance, cosmetic customizers may standardize a product up until production stage and make it possible to individualize it only towards the end of the value chain, eg. Packaging, which results into a product type „customized additional services‟ (see Figure 2.1). This theory is the focus of the current study among others. This theory is preferable because it looks into mass customization from customers‟ involvement perspective. And as long as customers are the center of discussion in mass customization, this theory is preferred. Below is the summary of the four major mass customization approaches and conditions for when they are appropriate to be used (from Gilmore and Pine, 1997):

2.3.2.1. Adaptive Mass Customization

This approach implies that standard goods can be modified to suit each customer‟s needs after the purchase, through use or application of the end product. Here the provider has created multiple variations into a standard, but customizable, offering; therefore each individual derives his or her own value from the product. This approach is appropriate when customers want the product to

perform in differently on different occasions, and available technology makes it possible to customize the product on their own. The dialogue is rather between a customer and a product than between a customer and a provider.

For example, companies like Nudie Jeans and Baldwin Denim make and sell high quality unwashed denim jeans and instruct their customers to wear their jeans for at least six months before washing them. By doing this, each resulting pair is completely "custom worn", shaped and colored, as a function of the way the wearer has used them. Both companies use this element heavily in their consumer communication and advertising.

In 1991, Gillette introduced the Sensor razor, which automatically adjusts to the contours of one‟s face while shaving, i.e. through application. Gillette could have segmented the market and created several models to satisfy each segment. Instead, they created one standard product that is mass produced, yet is designed to customize itself to the individual user. (Pine, 1993b)

2.3.2.2 Cosmetic Mass Customization

This approach is adopted when a standard product satisfies a customer and only its outward appearance or the way the service is presented needs to be customized. Cosmetic approach is appropriate when customers use a product the same way and are only interested in unique ways of how it should be presented. Rather than a product being customized, a standard offering is packaged individually for each customer. Cosmetic customization mostly happens at or near the end of the value chain. For instance, a simple tailoring process of including a customer‟s name to the product creates individualization without a dialogue associated with collaborative customization. Although it may seem that such personalization is *merely* cosmetic, it still adds value to customers. The examples are various, as this level of customization does not require dramatic changes to the value chain. A Swiss cigarette brand „Parisienne‟ had launched a campaign, inviting customers to customize the visual look of the packaging through an online software interface. After designing the look of the pack, using text and a limited set of images, the customer could order the standard product in the customized pack design.

Another cosmetic customization approach is executed by Heineken, one of the biggest beer manufacturers worldwide. The campaign „Your Heineken" was launched and currently is limited to Ireland. Through an interactive 3D website interface, customers can customize the outward appearance of the beer bottle, and place the order for delivery. In a fixed solution space customers can choose from 6 different base categories (party, sports, festive, etc.) and apply personalized messages and picture to the bottle. Like the case of Parisienne, this is entirely cosmetic customization because the product remains the same (beer and cigarettes) without being customized, only the outward appearance, in this case packaging, is customized within the fixed solution space. Similarly, wineries will often provide customized labels for bottles, where the product (wine) remains the same, but the outward appearance is tailored to an individual customer.

2.3.2.3. Collaborative Mass Customization

This approach, also known as co-creation, involves customers already at the product design stage, and represents the essence of mass customization, because through "customer integration" a dialogue is created between the manufacturer and the end user. Mass customizers help customers to articulate their needs and influence the outcome of the product based on the possibilities available to them. Collaborative customization is suitable when customers cannot easily express what they want and may become frustrated when presented with an overabundance of options. This approach also reduces the customer sacrifice, i.e. the gap between what the customer wants and what he or she settles for. The possibility to influence on the design of the product allows minimizing that gap (Broekhuizen and Alsem, 2002).

My Muesli is a recent German start-up which has, in reasonably short time, become one of the most successful mass customization companies in Europe. My Muesli builds on the current trend of customizing food and nutrition and it works as a great example of „œllaborative customization". It offers its customers a possibility to mix their own blend of muesli using a broad, but predetermined, selection of ingredients. The customer can then customize the packaging to their liking, before ordering a delivery. In essence the customer is offered a controlled access to the entire value chain of the company.

2.3.2.4. Transparent Mass Customization

This approach Provides customer with individualized goods or services in an unobvious way, without letting them know that customization ever took place. Such approach is appropriate for businesses whose customers‟ needs are predictable and especially when customers do not want to be bothered with direct collaboration. Instead of engaging into customer cocreation, transparent customizers observe behaviors over time, looking for predictable preferences and then discreetly customizing their offerings within a standard package. This approach is as deep into value chain as collaborative one, but the underlying difference is that there is no dialogue with the buyer and the provider, i.e. customer co-creation is non-existent.

For example, Ritz-Carlton hotels came up with a discrete way of learning about its customers‟ needs. It observes individual guests each stay – preferences for pillows, newspapers, or meals. The company then stores this information in a database and uses it to tailor the service each time a customer returns to the hotel. In the end, the more someone stays in Ritz-Carlton hotels, the more the company learns about the guest and thus is able to fit more customized goods and services, resulting in increasing the guest‟s preference for that hotel. Mass customization levels and the four strategies are summarized in the following figure (Figure 2.1).

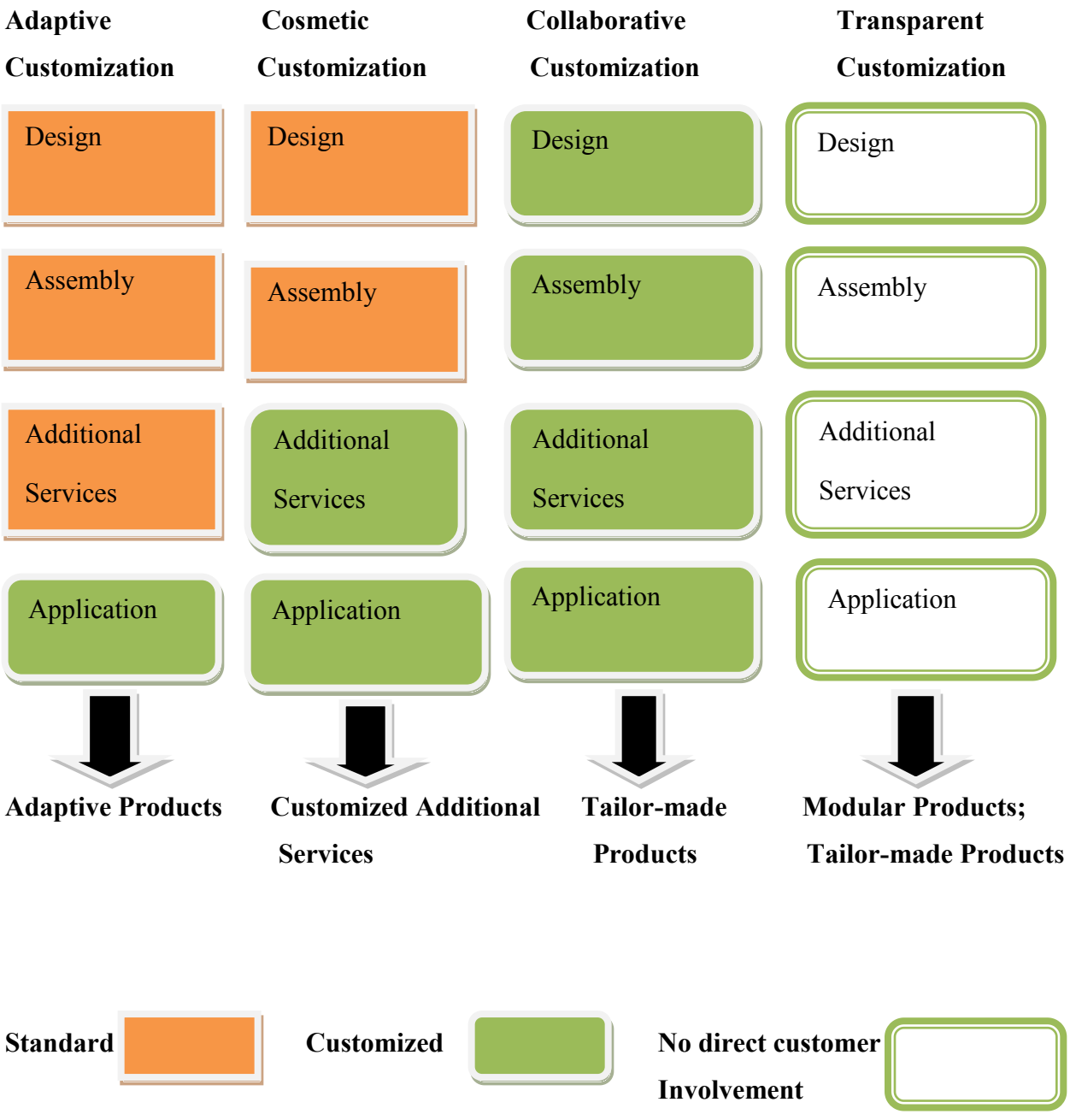

Figure 2.1: Customer involvement level and approaches of mass customization

(Source: Adapted from Broekhuizen and Alsem (2002))

2.4. Empirical Review of Mass Customization and its Connection with Competitive Strategy

In recent years, researchers and practitioners have paid increasing attention to the marketing strategy of customization (e.g., Dellaert and Stremersch 2005; Gilmore and Pine 2000; Kotha 1995; Syam, Ruan, and Hess 2005; Varki and Rust 1998). These efforts have been driven by both the supply side and the demand side. First, there is a constantly increasing supply of technology which facilitates individualization. The production costs for individualized offerings are declining (Duray et al. 2000; Kahn 1998; Peppers and Rogers 1997), and the internet has led to a decline in the costs of communication with customers (Ansari and Mela 2003; Sheth, Sisodia, and Sharma 2000). Research has also found ways to reduce the customer effort required (Alba et al. 1997; Randall, Terwiesch, and Ulrich 2005; Randall, Terwiesch, and Ulrich 2007). At the same time, the customers' demand for individualized products has increased, as customer preferences have become increasingly heterogeneous in many markets (Gilmore and Pine 1997 Smith 1956). Scholars and practitioners alike have developed high expectations regarding the promise of customization (Ansari and Mela 2003; Sheth and Sisodia 1999). As Simonson (2005) puts it, "It has been assumed in recent years that the age-old practice of targeting market segments is dominated and will be displaced by individual marketing" (p. 42).

However, some scholars have questioned the merits of customization, as it requires extensive customer participation (e.g., Fang, 2008; Huffman and Kahn 1998; Zipkin 2001; Simonson 2005). Spectacular failures in customization such as Levi Strauss' "Original Spin" jeans and Mattel's "MyDesign Barbie" (see Franke and Piller 2004) appear to support these doubts. Moreover, it has been found that customers sometimes prefer the default configurations provided by the producer and fail to recognize the opportunities offered (Dellaert and Stremersch 2003; Hill 2003).

Delivering positive value to the customer is a prerequisite for the long-term success of any customization strategy. Therefore, a number of scholars have begun to analyze the benefits customization strategies create for customers. However, empirical findings yield mixed results. Franke and Piller (2004), Schreier (2006), and Franke and Schreier (2008a and b) compared students' willingness to pay for both standard and customized products in different low-price

consumer goods categories, and found a higher willingness to pay (WTP) for the customized products. Schoder et al. (2006) measured consumer acceptance of traditional and customized newspapers using conjoint analysis and concluded that people prefer customized newspapers but are not willing to pay more for them than for traditional ones, thus questioning the benefits of customization. The stimuli provided in that study were relatively abstract (operationalized as verbal stimuli: "regular newspaper" vs. "personalized newspaper"). Bardakci and Whitelock (2004) investigated consumer agreement or disagreement with statements relating to the benefits and disadvantages of customized cars. The results show that although people seem to be interested in customized products, only 58% of the participants claimed to be willing to pay a slight premium for an individualized car. Once again, "customization" was only given as an abstract representation, meaning that the subjects did not actually experience customized products, which casts doubt on the validity of the findings. The findings in many of these researchers has shown the big paradox between mass customization strategy and competitive strategy although there was no research that has directly undergone the cause effect relationship between the two variables except (Qi, Yinan, et al, 2008) that has tried to show the effect of mass customization practices on competitive strategies. In addition to this, in most of the papers the issue of validity and reliability was not discussed while this could play great role in validating the findings. So both context and methodology gap can be clearly seen from previous empirical evidences. This calls for further systematic analysis of the benefits created by mass customization compared to other strategies and of the conditions under which those benefits take effect and how can this goes with the issue of competitive advantage that comes through competitive strategy.

2.4.1. Cost Leadership and Differentiation as Competitive Strategies

Costs are an important determinant of prices charged by firms. It has been argued that companies with lower costs gain competitive advantage by charging lower prices whereas the ability to differentiate allows companies to charge higher prices (Porter 1985). Furthermore, some companies are able charge higher prices by going after niche markets. While these three strategies make intuitive sense, the details of how one goes about executing with these strategies are not as unambiguous. One particular aspect that has been questioned is how a cost leader should use its cost advantage in pricing decisions. Tyagi (2001) argues that in horizontally differentiated markets, lower cost firms might find it advantageous to charge higher prices in

equilibrium. Indeed, there are instances where a cost leader in a horizontally differentiated market might charge higher prices. For example, it is often argued that P&G is the cost leader in many categories but often charges higher prices in markets that typify horizontal differentiation. However, there is evidence in previous empirical research (as well as some anecdotal evidence) suggesting that cost leaders do charge lower prices even in a horizontally differentiated market. Noble and Gruca (1999) surveyed pricing practices of 270 managers and found that in competitive pricing situations, a cost advantaged firm (due to lower supplier cost) prices lower than the competitor.

Differentiation is the ultimate aim of many marketing strategies and is recognized as a source of competitive advantage (Porter 1985). However, like many other things, differentiation is usually not free. Hall (1980) in a study of 64 companies in eight major industries found that many of the most profitable firms had achieved either the lowest cost or the most differentiated positioning within their industry. Implicit in this notion is that it is more expensive to make differentiated products. Horsky and Nelson (1993) find some empirical evidence in the automobile market that a new entrant has an incentive to differentiate to maximize profits even though it is costly to differentiate. More specifically, it allows a component of cost to depend on the degree to which a firm wants to differentiate itself from its competitors.

2.4.1.1. Cost Leadership Strategy

A cost leadership strategy is based upon a business organizing and managing its value adding activities so as to be the lowest cost producer of a product (good or service) within an industry. A successful cost leadership strategy is likely to rest upon a number of organizational features. Attainment of a position of cost leadership depends upon the arrangement of value chain activities. The broad scope of cost leaders means that they attempt to serve a large percentage of the total market. Companies pursuing a low-cost strategy will typically employ one or more of the factors such as accurate demand forecasting combined with high capacity utilization, economies of scale, technological advantages, outsourcing and/or learning/experiencing effects to create their low-cost positions.

2.4.1.2. Differentiation Strategy

A differentiation strategy is based upon persuading customers that a product is superior in some way to that offered by competitors. In differentiation strategies, the emphasis is on creating value through uniqueness, as opposed to lowest cost. Uniqueness can be achieved through service innovations, superior service, creative advertising, better supplier relationships leading to better services, or in an almost unlimited number of ways.

The key to success is that customers must be willing to pay more for the uniqueness of a service than the firm paid to create it. Firms following a differentiation strategy can charge a higher price for their products. The differentiation strategy appeals to a sophisticated or knowledgeable consumer interested in a unique or quality product.

2.4.2. The Connection between Mass Customization and Competitive Strategy

According to Davis, the goal of mass customization system is to develop, produce, market, and deliver goods and services with enough variety that nearly every one finds what they want with low cost. This philosophy breaks the competitive strategy paradox and focuses on achieving the advantages of overall cost leadership and differentiation simultaneously. To achieve this, mass customizers pursues both economic of scope and scale by combing the “pull” and “push” methods and relocating the decoupling point in the manufacturing process.

Although the number of research papers done on the idea whether or not mass customization is effective in terms of cost leadership and differentiation strategies are too limited, the existing results strongly supported the positive connection between mass customization and competitive strategy. One of this is the research done in China by (Qi, Yinan, et al, 2008) that has concluded the positive effect of competitive strategy on mass customization practices. To this end, this study has tried to investigate the effect of mass customization on the competitive strategy in the Ethiopian context taking Tikur Abbay Shoe S.C. & Addis Ababa Tannery S.C. as case companies to contribute a piece of information to the growing body of literature in the area.

2.5. Conceptual Framework of the Research

The conceptual relationship between variables used in the study can be depicted as follows:

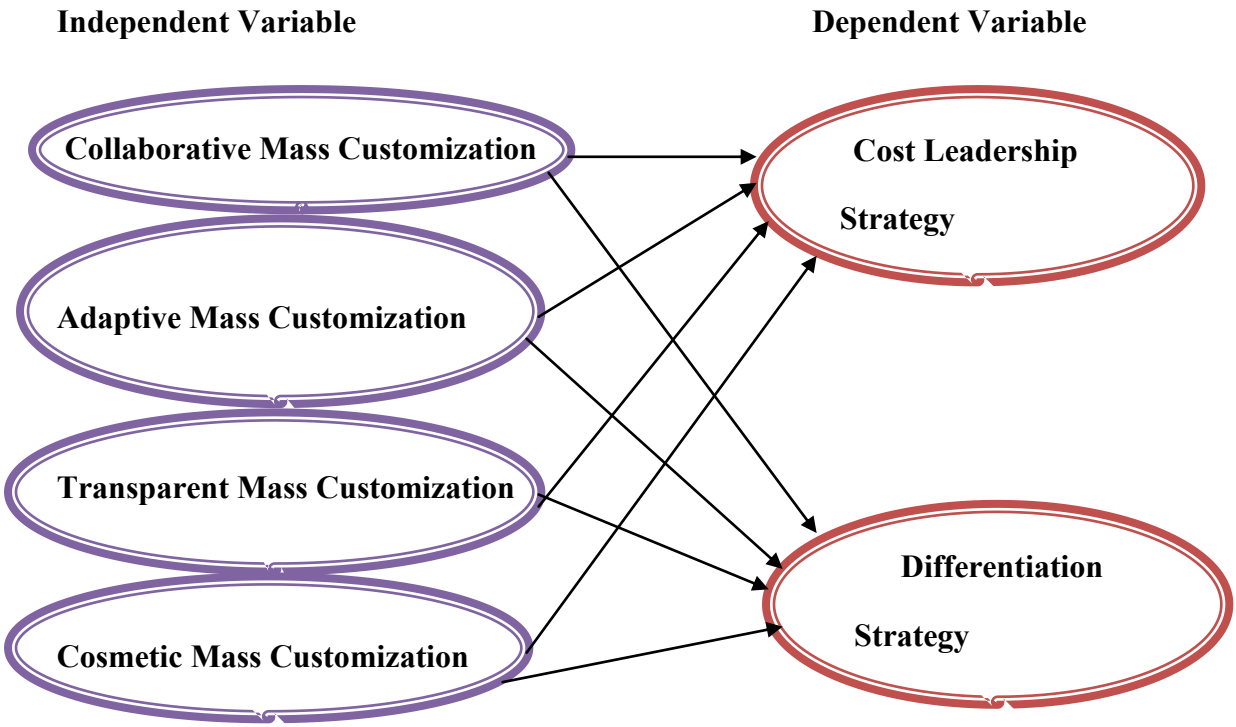

Figure 2.2: Conceptual framework of the research

Chapter Three

Research Approach and Methodology

3.1. Introduction

This chapter deals with methodology used in this research. This includes research approach, research design, method of data collection and analysis, instruments used to collect data, data type, unit of analysis, sample design and model specification of the study.

3.2. Research Approach and Design

The research has followed mixed research approach. Now days mixed research is becoming more advantageous than pure quantitative and pure qualitative because in this research approach the researcher can share the quality of both approaches. It is cross-sectional research. It is designed as explanatory research. It explains the cause-effect relationship between the independent and dependent variables.

3.3. Method of Data Collection, Instruments and Data Type

Case study method is used in this research. According to Anol Bhattacherjee (2012), Case research is a method of intensively studying a phenomenon over time within its natural setting in one or a few sites. Multiple methods of data collection, such as interviews, questionnaires, observations, prerecorded documents, and secondary data, may be employed for deriving rich, detailed, and contextualized inferences about the phenomenon of interest. Case research can be employed in a positivist manner for the purpose of theory testing or in an interpretive manner for theory building. This method is more popular in business research than in other social science disciplines. Case research has several unique strengths over competing research methods such as experiments and survey research. First, case research can be used for either theory building or theory testing. In interpretive case research, the constructs of interest need not be known in advance, but may emerge as the research progresses. Second, the research questions can be modified during the research process if the original questions are found to be less relevant or salient. This is not possible in any positivistic method after the data collection process has started.

Third, case research can help derive richer, more contextualized, and more authentic interpretation of the phenomenon of interest than most other research methods by virtue of its ability to capture a rich array of contextual data. Fourth, the phenomenon of interest can be studied from the perspectives of multiple actors. Fifth, case research can examine a problem from multiple levels of analysis (e.g., individual and organizational) by virtue of its ability to record and analyze data at different levels.

At the same time, case research also has some weaknesses. Because it involves no experimental treatment or control, internal validity of inferences remain weak. Of course, this is a problem for all research methods except experiments. However, the problem of controls may be addressed in case research using "natural controls". Second, the quality of inferences derived from case research depends heavily on the integrative powers of the researcher. An experienced researcher may see concepts and patterns in case research data that a novice researcher may miss. Hence, the findings are sometimes criticized as being subjective. Finally, because the inferences are heavily contextualized, it may be difficult to generalize case research based inferences to other contexts or other organizations. Questionnaire and interview were used as data collection instruments in this research. Ordinal type of data is used in this research to collect information.

3.4. Sample Design

The area of interest for this study was leather industry. Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C were purposely selected companies for the study. Actually, the researcher has gone to different companies before choosing these two companies as case companies. However, most of the organizations were not in a position to welcome the researcher and share data for this research purpose. This is why the researcher has chosen these two companies purposely depending on their willingness.

Addis Ababa Tannery S.C. is the pioneer private owned company in the tanning sector of the country, Ethiopia. To say few things on the background of this share company, it was first established in 1925 as the oldest of its kind and is the pioneer in the tanning industry in Ethiopia. The factory was established under the share of two Armenians called Muse Savajian and Avadis Savajian. But after three years, one of the share holders had been substituted by another five

foreigners. After 1935, it was owned by the Armenian founder Avadis Savajian. Later on October 1999, renamed and reinstated by regulation of Ministry of Trade and Industry pursuant to business license proclamation No. 67/1997 and Federal Regulation No. 13/1997. According to the privatization process, Addis Ababa Tannery S.C. was transferred to private ownership in 2006 on 100% sale basis. The Share Company currently produces Hides and Skins at semi-processed and finished level for both local and foreign markets. Accordingly, for local market the company produces Shoe upper, Lining, Hide Garment, Cow Napa, Sole Lather, Bag Leather and Upholstery lather from hide, sheep and Goat Lining etc. For export market the company produces Semi-processed product such as Wet Blue Hides, Hide Crust, Cow Lining and Finished Lather. (Source: Company Profile Manual, 2013).

Tikur Abbay Shoe S.C is one of the highly competing shoe manufacturer companies in the country in both domestic and international markets. It is a private owned company first established in 1948. During the last 65 years it has been growing steadily and continuously. Tikur Abbay Shoe S.C. is specialized in making different types of shoes and reorganized in 2006 by having 3500 shares with paid up capital of $ 3,500,000 and proved that it is one of the most reliable, durable and fashionable shoe producer. Currently the company is producing different types of shoes for both domestic and foreign customers. One of the branches of the company is found at Addis Ababa in kolfe Karanio sub-city and the researcher has contacted this branch because it is the most accessible of all. (Source: Company Website, 2013)

So the researcher has chosen these companies purposely to conduct a sample study as long as there is no as such significant research conducted prior to this study on the area within the country so that further research can be undertaken by other researchers in the large coverage. The target population for this study is professional workers in these two companies. From these two companies the samples of professional workers from different departments were purposely drawn to respond to the research questionnaire. The researcher has used professional workers as a sample frame in order to gather reliable data from professional respondents. Out of 400 total employees, Addis Ababa Tannery S.C has about 51 professional employees as of the data gained in June, 2013. All of them were included in the sample since they were limited in number. Out of 558 total employees, Tikur Abbay Shoe S.C has 76 total numbers of professional employees

again as the data gained in June, 2013 shows. All of these employees were included in the sample since their number was manageable. In general, the total number of respondents for the research was 127 professional employees. All of them have responded to the questionnaire and returned to the researcher so that there is no missing value on the sample size. In general, non-probability sampling which is purposive sampling was used to draw the sample out of total population.

3.5. Method of Data Analysis and Unit of Analysis

The units of analysis for this study were professional workers in the Addis Ababa Tannery S.C. and Tikur Abbay Shoe S.C. The gathered data was summarized and coded and finally analyzed using SPSS (Software Package for Social Sciences) version 20 software. Both descriptive and inferential statistics were used in the analysis. To analyze the data ordinal logistic regression model was applied. Ordered response questionnaire (Likert scale type) was developed and analyzed using this model.

3.6. Variables in the Study

In this research mass customization was independent variable and it was operationalised into four major approaches as collaborative mass customization, adaptive mass customization, transparent mass customization and cosmetic mass customization. On the other hand, competitive strategy was taken as dependent variable and has been defined as cost leadership and differentiation strategies. The variables are clearly shown in the following table (table 3.1).

Table 3.1: Dependent and Independent Variables

Dependent Variable	**Independent Variable**
Competitive Strategy ❖ Cost leadership strategy ❖ Differentiation strategy	Mass Customization ❖ Collaborative mass customization ❖ Adaptive mass customization ❖ Cosmetic mass customization ❖ Transparent mass customization

3.7. Research Model

3.7.1. Logistic Regression Model

The logistic model, as a non-linear regression model, is a special case of generalized linear model where the assumptions of normality and constant variance of residuals are not satisfied. This model is a statistical technique for predicting probability of an event, given a set of predictor variables. The procedure is more sophisticated than the linear regression procedure. Logistic regression is used to predict the probability of dependent variable on the basis of independent variables and to determine the effect size of the independent variables on the dependent; to rank the relative importance of independents; to assess interaction effects; and to understand the effect of covariate control variables. The impact of predictor variables is usually explained in terms of odds ratio and hence the name logistic regression, also called the log-odds function. This model applies maximum likelihood estimation after transforming the dependent into a logit variable (the natural log of the odds of the dependent occurring or not).

3.7.2. Assumptions of Logistic Regression

The validity of inferences drawn from modern statistical modeling techniques depends on the assumptions of the statistical model being satisfied. In order to valid the analysis the model should satisfy the following assumptions:

i. It does not need a linear relationship between the dependent and independent variables.
ii. The error terms need to be independent. Logistic regression requires each observation to be independent. That is, the data-points should not be from any dependent samples design, e.g., before-after measurements, or matched pairings. Also the model should have little or no multicollinearity. However, there is the option to include interaction effects of categorical variables in the analysis and the model. If multicollinearity is present centering the variables might fix, i.e. deducting the mean of each variable. If this does not lower the multicollinearity a factor analysis with orthogonally rotated factors should be done before the logistic regression is estimated.

iii. Logistic regression assumes linearity of independent variables and log odds; it requires that the independent variables are linearly related to the log odds. Otherwise the logistic regression underestimates the strength of the relationship and rejects the relationship easily, that is being not significant (not rejecting the null hypothesis) where it should be significant. A solution to this problem is the categorization of the independent variables. That is transforming metric variables to ordinal level and then including them in the logistic regression model. Another approach would be to use Discriminant analysis, if the assumptions of homoscedasticity, multivariate normality, and no multicollinearity are met.

iv. Logistic regression requires quite large sample sizes. Because in the case of small sample size maximum likelihood estimates are less powerful than ordinary least squares (e.g., simple linear regression, multiple linear regression).

3.7.3. Ordinal Logistic Regression Model

Logistic regression model can be classified as multinomial, ordinal and binary. In this investigation Ordinal logistic regression model was used. The ordinal logistic regression procedure empowers one to select the predictive model for ordered dependent variables. It describes the relationship an ordered response variable and a set of explanatory variables. The explanatory variables may be continuous or discrete (or any type).

Ordinal response models have major importance in social sciences as well as demography and many social phenomena. The responses are discrete or qualitative rather than continuous or quantitative in nature. Many such analyses involve an outcome or dependent variable that is ordinal and in these studies the logistic regression model has become the statistical model of choice. The most popular model in ordinal logistic is the Proportional Odds model.

3.7.4. Proportional Odds (PO) Model

Proportional Odds Model is used as a tool to model the ordinal nature of a dependent variable by defining the cumulative probabilities differently instead of considering the probability of an individual event. It considers the probability of that event and all events that are ordered before it. When response categories are ordered, logits can directly incorporate the ordering. The

cumulative probabilities are the probability that the response Y falls in category *i* or below, for each possible *i* the i^{th} cumulative probability is $pr(Y \le i) = p_1 + p_2 + ... + p_i$

The proportional odds model assumes that the cumulative logits can be represented as parallel linear functions of independent variables. That is, for each cumulative logit the parameters of the models are the same, except for the intercept. Consequently, according to the proportional odds assumption, odds ratio is the same for all categories of the response variable.

The PO model, however, has some appealing features. At first, it is invariant under several categories, as only the signs of the regression coefficients change. Secondly, it is invariant under collapsibility of the ordered categories, as the regression coefficients do not change when response categories are collapsed or the category definitions are changed. Thirdly, it produces the most easily interpretable regression coefficients, as $\exp(\beta)$ is the homogenous odds ratio over all cut-off points summarizing the effects of the explanatory factor X on the response Y in one single frequently used measure. Due to these reasons, the PO model is by far the most used regression model for ordinal data.

Let Y takes categorical response variable with c ordered categories and assume $pr(y = 1) is\ p_1, pr(y = 2) is\ p_2, ... pr(y = i) is\ p_i$ for i =1,…,c. Cumulative probability reflect the ordering, with $pr(y \le 1) \le pr(y \le 2) \le ... \le pr(y \le c) = 1$ and let the cumulative probability of the first c-1 of Y is $pr(y \le i) = \pi_i, i = 1,...,c-1.$

Then the odds of the first c-1 cumulative probabilities are:

$$odds(pr(y \le i)) = \frac{pr(y \le i)}{1 - pr(y \le i)} = \left\lfloor \frac{\pi_i}{1-\pi} \right\rfloor \qquad \text{i=1,…,c-1}$$

The proportional odds model models the log odds of the first c-1 cumulative probabilities as:

$$\log it[pr(y \le i)] = \log\left[\frac{pr(y \le i)}{1 - pr(y \le i)}\right] = \log\left\lfloor \frac{\pi_i}{1-\pi_i} \right\rfloor$$ and the relationship between the cumulative

logits of Y is: $\log\left\lfloor \frac{\pi_i}{1-\pi_i} \right\rfloor = \log\left\lfloor \frac{\pi_i}{\pi_{i+1+...+}\pi_C} \right\rfloor; i = 1,...,c-1.$

Consider a collection of p explanatory variables denoted by the vector $X^{'} = (X_1 + X_2, \ldots, Xp)$. The relationship between the predictor and response variables is not a linear function is logistic regression; instead, the logistic regression function is used, which is the logit transformation of π.

$$\pi_i = \frac{\exp\left(\alpha + \beta_1 X_1 + \ldots + \beta_p X_p\right)}{1 + \exp\left(\alpha_1 + \beta_1 X_1 + \ldots + \beta_p X_p\right)}$$

Then the logit or log-odds of having $pr(y \le i) = \pi_i$ is modeled as a linear function of the explanatory variables as:

$\log\left[\frac{pr(y \le i)}{1 - pr(y \le i)}\right] = \log\left[\frac{\pi_i}{1 - \pi_i}\right] = \alpha_i + \beta_1 X_1 + \ldots + \beta_p X_{p,}$ Which is equivalent with:

$\log\left[\frac{\pi_i}{1 - \pi_i}\right] = \alpha_i + \sum_{j=1}^{p} \beta_j X_j; 0 \le \pi_i \le 1;$ Therefore:

$\log it[pr(y \le i)] = \alpha_i + \sum_{j=1}^{p} \beta_j X_j \; i = 1, \ldots, c-1$ and $j = 1, \ldots, p$ this is called proportional odds model and it estimates simultaneously multiple equations of cumulative probability. The model assumes a linear relationship for each logit and parallel regression lines. In this model each logit has its own α_i term called the threshold value and their values do not depend on the values of the independent variable for a particular case. Logistic regression coefficients are indicates the direction and strength of the relationship between independent variable and the log odds of dependent variable. However, these logistic regression coefficients are a little bit more complicated to intuitively gauge, as they present the influence of a unit change in the independent variable on the log odds of the dependent variable. The influence determines the rate of increase or decrease in the log odds of dependent variable. This means that the effect of the independent variable is the same for different logit functions, that‟s also the reason why the model is called the proportional odds model.

3.7.5. Testing of parallel Lines

The assumption that all logit surfaces are parallel must be tested. Test of parallel lines helps to determine whether it is reasonable to assume that the values of the location parameters are

constant across categories of the response. The test of parallelism contains: –2 log-likelihood for the constrained model, the model that assumes the planes or surfaces are parallel and –2 log-likelihood for the General model, the model that assumes planes or surfaces are separated.

The chi-square statistic is the log-likelihood difference between the two models. If the lines or planes are parallel, the observed significance level for the change should be large, since the general model doesn‟t improve the fit very much and the parallel model is adequate. If there is evidence to reject the null hypothesis, it is possible that the link function selected is incorrect or that the relationships between the independent variables and logits are not the same for all logits.

3.7.6. Odds Ratio

The odds ratio is a value which measures the strength of effect of each independent variable in the model on the log odds of the dependent variable. The odds of some event happening is defined as the ratio of the number of occurrences to the number of non-occurrences. That is, the odds of the event *E* are given by:

$$odds(E) = \frac{pr(E)}{pr(notE)} = \frac{pr(E)}{1 - pr(E)}$$

The odds of the response are multiplied by e^{β} for every unit increment of X. That is, the odds at level x +1 equal the odds at X multiplied by e^{β} and odds less than one indicate the occurrence is less likely than non-occurrence.

3.7.7. Test of Overall Model fit

For the selected model before proceeding to examine the individual coefficients, the researcher should look at an overall test of the null hypothesis that the location coefficients for all of the variables in the model are 0. It can base on the change in –2 log-likelihood when the variables are added to a model that contains only the intercept. The change in likelihood function has a chi-square distribution even when there are cells with small observed and predicted counts. This value provides a measure of how well the model fits the data. The log likelihood statistic is analogous to the error sum of squares in multiple linear regressions. As such it is an indicator of how much unexplained information remains after fitting the model. The larger the value of the

log likelihood the more unexplained observations there are and a poorly fitting model. Therefore, a good model means a small value for −2LL. If a model fits perfectly, the likelihood is 1, and −2 × log 1=0.

3.7.8. Goodness of Fit Measures

A good-fitting model has several benefits. The structural form of the model describes the patterns of association and interaction. The sizes of the model parameters determine the strength and importance of the effects. Inferences about the parameters evaluate which explanatory variables affect the response variable *Y*, while controlling effects of possible confounding variables. Finally, the model‟s predicted values smooth the data and provide improved estimates of the mean of *Y* at possible explanatory variable values.

For logistic regression, the model coefficients are estimated by the maximum likelihood method and the likelihood equations are non-linear explicit function of unknown parameters. The ordinal logistic regression model is fitted to the observed responses using the maximum likelihood approach. In general, the method of maximum likelihood produces values of the unknown parameters that best match the predicted and observed probability values. Therefore, it usually used a very effective and well known Fisher scoring algorithm to obtain ML estimates. A model for logit $pr(y \le i)$ alone is ordinary logit model for a binary response in which categories 1 to *i* form one outcome and categories $i+1$ to *c* form a second outcome. This shows that *c* categories of response collapsed in to binary outcome. Again let $(y_{j1},..y_{jc})$ be binary indicators of the response for subject *j*.

The likelihood function *L* is viewed as a function of β and α_i parameters. The parameters are estimated by maximizing the likelihood, or more usually, by maximizing the logarithm of the likelihood. The likelihood function is given by the equation:

$$L = \prod_{j=1}^{n}\left[\prod_{i=1}^{c}\pi_i(x_j)^{yij}\right] = \prod_{j=1}^{n}\left[\prod_{i=1}^{c}\left(p\left(y \le {}^{i}\!/\!_{x_j}\right)\right) - p\left(y \le i - {}^{1}\!/\!_{x_j}\right)^{yij}\right]$$

$$= \prod_{j=1}^{n} \left[\prod_{i=1}^{c} \left(\frac{\exp\left(\alpha_i + \beta' x_j\right)}{1+\exp\left(\alpha_i + \beta' x_j\right)} - \frac{\exp\left(\alpha_{i-1} + \beta' x_j\right)}{1+\exp\left(\alpha_{i-1} + \beta' x_j\right)} \right)^{y_{ij}} \right]$$

$$l(\beta^*) = \prod_{j=1}^{n} \left[\pi_1(x_j)^{y_{1j}} \pi_2(x_j)^{y_{2j}} x \ldots x \pi_c(x_j)^{y_{cj}} \right]$$

Here β^* use somewhat imprecisely to denote both the slope coefficients and intercept coefficients. It follows the log-likelihood function as:

$$L(\beta^*) = \sum_{j=i}^{n} Y_{1j} \ln\left[\pi_1(x_j)\right] + Y_{2j} \ln\left[\pi_2(x_j)\right] + \ldots + y_{cj} \ln\left[\pi_c(x_j)\right]$$

The maximum possible value of the likelihood for a given data set occurs if the model fits the data exactly. This occurs if observed counts are close with predicted. The difference between the log-likelihood functions for two models is a measure of how much one model improves the fit over the other. A special case of this was defined as the deviance. The deviance is defined as minus twice the log of the ratio of the likelihood for a model to the maximum likelihood. Deviance for model comparison is:

$D = -2\log\left[\frac{likelihood\ of\ the\ current\ \mathrm{mod}\,el}{likelihood\ of\ the\ saturated\ \mathrm{mod}\,el}\right]$, this simplify to:

$$D = -2\left[\log\left(likelihood\ of\ current\ \mathrm{mod}\,el\right) - \log\left(likelihood\ of\ saturated\ \mathrm{mod}\,el\right)\right]$$

$$\left\{\left(-2\log likelihood\ of\ current\ \mathrm{mod}\,el\right) - \left(-2\log likelihood\ of\ saturated\ \mathrm{mod}\,el\right)\right\}$$

The deviance can be shown that the likelihood of this saturated model is equal to 1 yielding a log-likelihood equal to 0. For a sample of n independent observations, the deviance for a model with *p* degrees of freedom (that is, *p* parameters estimated, including the threshold or constant) has $(n-p)$ degrees of freedom.

Since the deviance is effectively -2 times the log of the likelihood ratio, it has an asymptotic distribution that is chi-squared with degrees of freedom equal to $(n-p)$. This deviance is also used to construct a goodness-of-fit test for the model. The goodness of fit statistics for ordinal logistic regression has a form:

$$D = 2\sum \sum O_{ij} \log\left(\frac{O_{ij}}{E_{ij}}\right)$$

Likewise, the Pearson chi-square statistic also compares the model fit to the actual data, defined by:

$$X^2 = \sum\sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}};\ E_{ij}\ is\ the\ \exp ected\ value\ for\ the\ i^{th}\ observation.$$

Both goodness-of-fit statistics should be used only for models that have reasonably large expected values in each cell. If the model fits well, the observed and expected cell counts are similar, the value of each statistic is small, and the observed significance level is large. As usual large X^2 and D value provide the evidence of lack of fit. When the fit is poor, residuals and other diagnostic measure describes the influence of individual observation on the model fit and highlight reason for the inadequacy.

3.8. Validity and Reliability

3.8.1. Validity

The quality of research design can be defined in terms of validity of measurement instrument used in the research. The major types of validity are internal validity, external validity, construct validity and statistical conclusion validity.

Internal Validity

Internal validity, also called causality, examines whether the observed change in a dependent variable is indeed caused by a corresponding change in hypothesized independent variable, and not by variables extraneous to the research context. Causality requires three conditions: (1) co-variation of cause and effect (i.e., if cause happens, then effect also happens; and if cause does not happen, effect does not happen), (2) temporal precedence: cause must precede effect in time, (3) no plausible alternative explanation (or spurious correlation). Certain research designs, such as laboratory experiments, are strong in internal validity by virtue of their ability to manipulate the independent variable (cause) via a treatment and observe the effect (dependent variable) of that treatment after a certain point in time, while controlling for the effects of extraneous

variables. Other designs, such as field surveys, are poor in internal validity because of their inability to manipulate the independent variable (cause), and because cause and effect are measured at the same point in time which defeats temporal precedence making it equally likely that the expected effect might have influenced the expected cause rather than the reverse. Although higher in internal validity compared to other methods, laboratory experiments are, by no means, immune to threats of internal validity, and are susceptible to history, testing, instrumentation, regression, and other threats. Nonetheless, different research designs vary considerably in their respective level of internal validity. In this research, the researcher has tried to maximize internal validity by providing questions regarding major extraneous variables and thereby tried to control their effect on the dependent variable.

The other measure of internal validity is whether the finding is non-spurious or not. Non-spurious validity measures whether the finding in the research is theory based or not. A finding is spurious means it is false or it has no theory base in general. In this study, even though factors such as context and methodology have shaped the finding, the base finding is strongly supported by the existing theories in the area. The finding in this research is strongly supported by the reality in the context and the general theory in the field.

External Validity

External validity or generalizability refers to whether the observed associations can be generalized from the sample to the population (population validity), or to other people, organizations, contexts, or time (ecological validity). For instance, can results drawn from a sample of financial firms in the United States be generalized to the population of financial firms (population validity) or to other firms within the United States (ecological validity)? Survey research, where data is sourced from a wide variety of individuals, firms, or other units of analysis, tends to have broader generalizability than laboratory experiments where artificially contrived treatments and strong control over extraneous variables render the findings less generalizable to real-life settings where treatments and extraneous variables cannot be controlled. In this research, since the unit of analysis is individuals in organization, population validity is realized. So the finding is generalized to the population. But ecological generalization in this

context is impossible because the researcher cannot generalize to the context and other organizations gathering information from individuals.

Construct Validity

Construct validity examines how well a given measurement scale is measuring the theoretical construct that it is expected to measure. It can be classified as face validity and content validity. Face validity refers to the degree to which a test appears to measure what it purports to measure. Content validity is used when a researcher wants to find out if the entire content of the behavior/construct/area is represented in the test. It compares the test task with the content of the behavior. This is a logical method, not an empirical one. Many constructs used in social science research such as empathy, resistance to change, and organizational learning are difficult to define, much less measure. For instance, construct validity must assure that a measure of empathy is indeed measuring empathy and not compassion, which may be difficult since these constructs are somewhat similar in meaning. In this study, the researcher has tried to refer different literatures regarding the constructs used in the research and thereby worked to make the measurement all rounded and on target. So, all behaviors under the each construct are measured properly realizing the issue of construct validity.

Statistical Conclusion Validity

Statistical conclusion validity examines the extent to which conclusions derived using a statistical procedure is valid. For example, it examines whether the right statistical method was used for hypotheses testing, whether the variables used meet the assumptions of that statistical test (such as sample size or distributional requirements), and so forth. Because qualitative research designs do not employ statistical test, statistical conclusion validity is not applicable for such analysis. Since the current research is mixed (quantitative and qualitative) research it is worthy full to consider the issue of statistical conclusion validity. To realize this, the researcher has carefully selected methodology that fits with the nature of data used. So the statistical conclusion made in this study is reliable assuring statistical conclusion validity in the research.

3.8.2. Reliability

Reliability is the degree to which the measure of a construct is consistent or dependable. In other words, if the researcher use the same scale to measure the same construct multiple times, do he get pretty much the same result every time, assuming the underlying phenomenon is not changing? An example of an unreliable measurement is people guessing your weight. Quite likely, people will guess differently, the different measures will be inconsistent, and therefore, the "guessing" technique of measurement is unreliable. A more reliable measurement may be to use a weight scale, where you are likely to get the same value every time you step on the scale, unless your weight has actually changed between measurements. Note that reliability implies consistency but not accuracy. A measurement can be consistent while still it is measuring something wrong. So a reliable measure does not mean it is valid.

Reliability can be measured by using different methods. The most common of these are **split-half method** and **Cronbach's alpha**. **Split-half reliability** is a measure of consistency between two halves of a construct measure. For instance, if you have a ten-item measure of a given construct, randomly split those ten items into two sets of five (unequal halves are allowed if the total number of items is odd), and administer the entire instrument to a sample of respondents. Then, calculate the total score for each half for each respondent, and the correlation between the total scores in each half is a measure of split-half reliability. The longer is the instrument, the more likely it is that the two halves of the measure will be similar (since random errors are minimized as more items are added), and hence, this technique tends to systematically underestimate the reliability for longer instruments. Since the use of longer instruments is usual in social science, this method is less common to use. The other limitation of split-half reliability is, it gives less strong figure of consistency since it measures the correlation between the score of each half while internal consistency is more about correlation among each item under a construct.

Cronbach's alpha is a measure of internal consistency and it measures consistency between different items of the same construct. This is commonly used measure of consistency in social science research because of its strength and better fit with longer instruments. The current study has also applied this measure because of this and its general popularity in reliability measure.

Cronbach"s alpha, a reliability measure designed by Lee Cronbach in 1951, factors in scale size in reliability estimation, is calculated using the following formula: According to (Cronbach, 1951) to be reliable for a given measurement tool, the α value is expected to be at least (0.70) which is the minimum acceptable limit.

$$\alpha = \frac{K}{K-1}\left(\frac{1-\sum_{i}^{k}=1\sigma^{2}{}_{Y_i}}{\sigma^{2}{}_{X}}\right)$$

where *K* is the number of items in the measure, $\sigma^{2}{}_{X}$ is the variance (square of standard deviation) of the observed total scores, and $\sigma^{2}{}_{Y_i}$ is the observed variance for item i. The standardized Cronbach"s alpha can be computed using a simpler formula:

$$\alpha_{\text{standardized}} = \frac{K\bar{r}}{\left(1+(K-1)\bar{r}\right)}$$

Where *K* is the number of items, $\bar{r}$ is the average inter-item correlation, i.e., the mean of *K* (*K*-1)/2 coefficients in the upper triangular (or lower triangular) correlation matrix.

The summary of Cronbach"s alpha measure of constructs used in this research is given in the following table (Table 3.2). As it can be seen from the table (Table 3.2), all values are (>0.70), so that they are acceptable.

Table 3.2 Reliability statistics

S.NO	**Constructs**	**Cronbach's alpha**
1	Adaptive mass customization	0.736
2	Cosmetic mass customization	0.739
3	Collaborative mass customization	0.847
4	Transparent mass customization	0.718
5	Cost leadership strategy	0.704
6	Differentiation strategy	0.811

Chapter Four

Results and Discussions

In this chapter, data gained through questionnaire and interview is analyzed and the results are discussed as follows by using both descriptive and inferential statistics. The analysis and discussion of the data was made together for the two case companies because there was no as such significant difference between the responses given from the two. So it was not important to make separate analysis of each, other than consuming time and space.

4.1. Descriptive Statistics

Descriptive statistics is used to present central tendency measures of data and compare the responses given to each variable using bar chart.

4.1.1. Data Summary Statistics

The mean and standard deviation measures of all variables are summarized in the following table (Table 4.1).

Table 4.1. Data Summary Statistics

		Cost Leadership	Differentiation	Adaptive mass customization	Cosmetic mass customization	Collaborative mass customization	Transparent mass customization
N	Valid	127	127	127	127	127	127
	Missing	0	0	0	0	0	0
Mean		2.99	2.88	3.24	3.58	3.26	3.61
Std. Deviation		.988	.981	1.029	1.224	.994	1.107

As it can be observed from the above table (Table 4.1), regarding cost leadership, differentiation, adaptive mass customization and collaborative mass customization, on average respondents are at neutral (3*) agreement level. In case of cosmetic mass customization and transparent mass

customization, on average respondents are at agree (4*) level of agreement. Looking into the value of standard deviation, almost for all variables the responses of each respondent varies by (1*) from the average response.[1]

The responses given to each variable is summarized as follows by using bar chart:

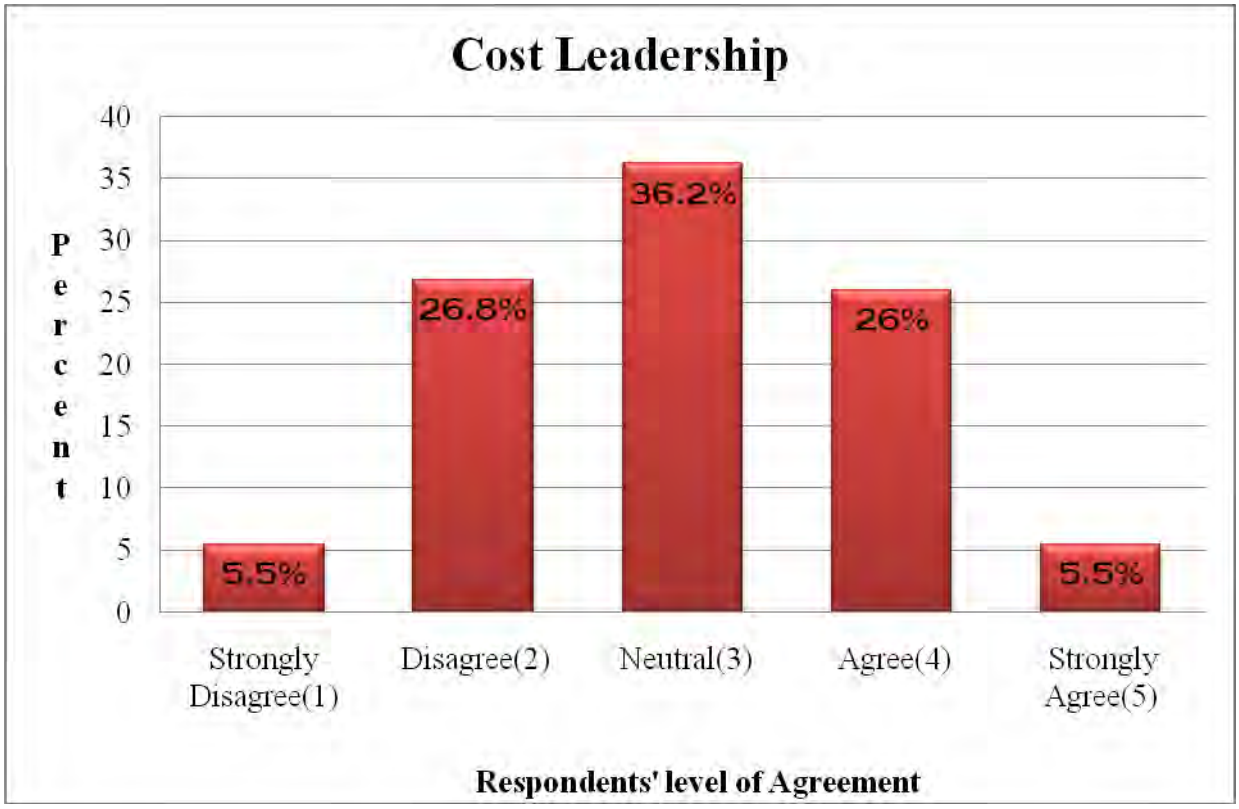

Figure 4.1: Responses given for Cost Leadership Strategy

As it can be seen from the above bar chart (Figure 4.1.), about (5.5%) of the total respondents responded that they strongly disagree with the application of cost leadership strategy in their company; about (26.8%) of them said that they disagree with the application of cost leadership in their company; about (36.2%) of them were neutral to the idea that said there is application of cost leadership strategy in their company; about (26%) of the respondents responded that they agree with the application of cost leadership strategy in their company. Finally, the remaining (5.5%) of them responded that they strongly agree with the idea that said there is application of

[1] The asterisk (*) implies that the value used there is rounded value.

cost leadership strategy in their company. So as one can observe from the figure, most of the respondents are neutral with the idea of cost leadership strategy in their company.

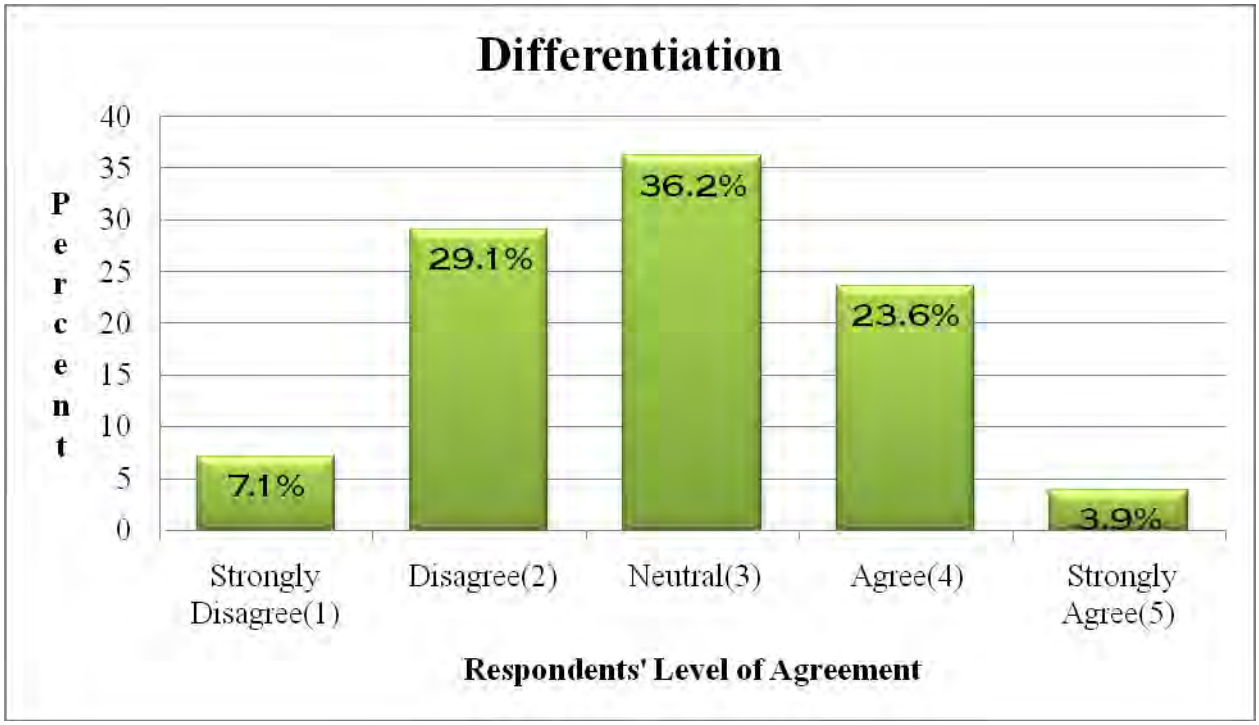

Figure 4.2: Responses given for Differentiation Strategy

As one can observe from the above bar chart (Figure 4.2), out of all respondents around (7.1%) of them said that they strongly disagree with the idea that said their company applies differentiation strategy; about (29.1%) of the total responded that they disagree with the idea; about (36.2%) of them are neutral to the idea according to their response to the provided questions; around (23.6%) of them responded that they agree with idea of existence of application of differentiation strategy in their company. Lastly, the remaining (3.9%) of the total respondents strongly disagree with the idea. Generally, it can be observed from the figure that most of the respondents are neutral to the idea of the application of differentiation strategy in their company.

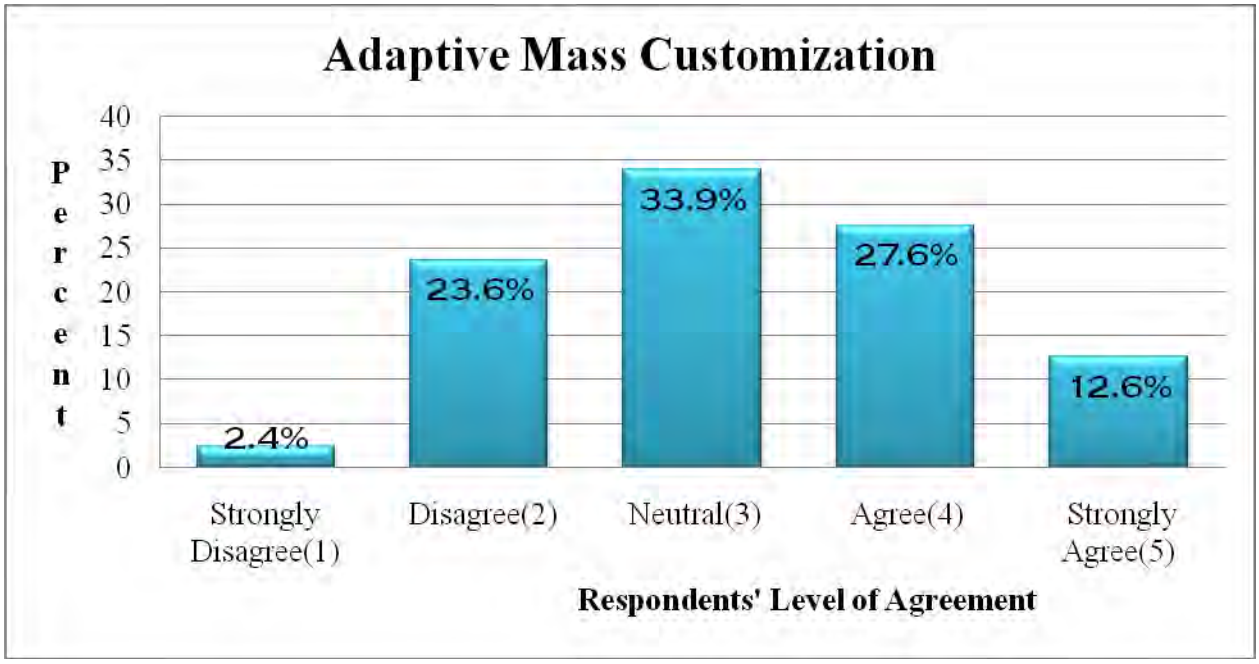

Figure 4.3: Responses given for Adaptive Mass Customization

As it is shown in the above bar chart (Figure 4.3), out of the total respondents about (2.4%) of them said that they strongly disagree with the idea that says their company applies adaptive mass customization as production and marketing approach; about (23.6%) of them responded that they disagree with the idea; around (33.9%) of them argued that they are neutral to the idea whether their company applies adaptive mass customization or not in production and marketing process; about (27.6%) of the total said that they agree with the idea and lastly about (12.6%) of them responded that they strongly disagree with the idea. Generally, it can be said that most of the respondents are neutral to the idea that said their company applies adaptive mass customization as production and marketing approach.

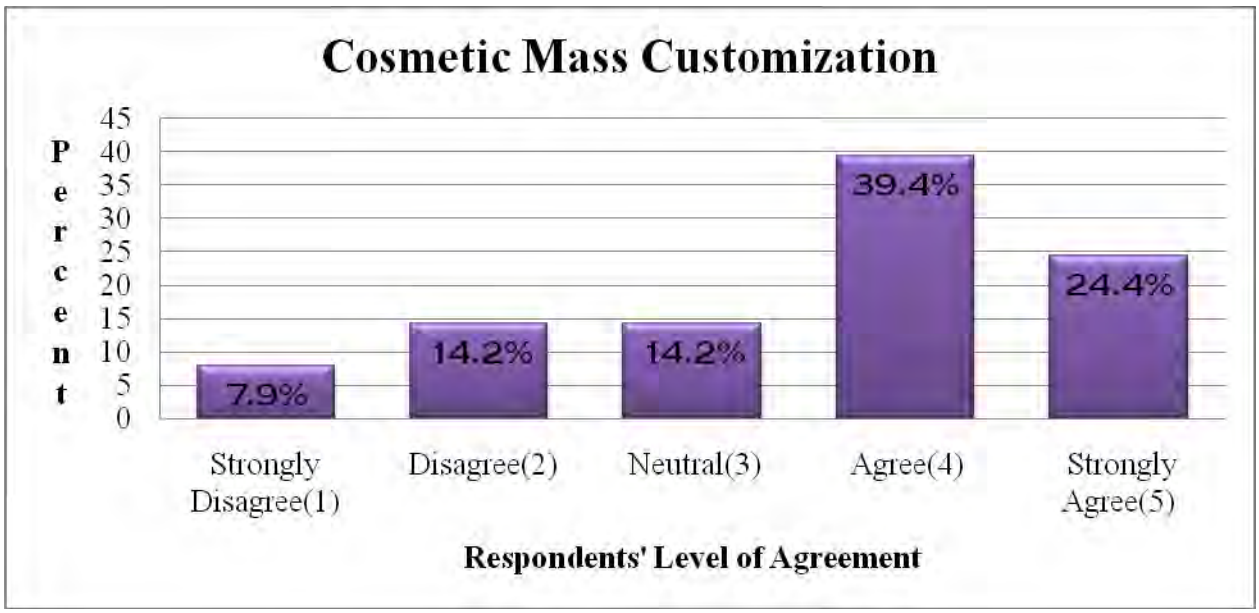

Figure 4.4: Responses given for Cosmetic Mass Customization

As one can observe from the above bar chart (Figure 4.4), out of the total respondents around (7.9%) of them responded that they strongly disagree with the idea that said their company applies cosmetic mass customization as production and marketing approach; about (14.2%) of them said that they disagree with idea and the other (14.2%) of the total responded that they are neutral towards the idea; about (39.4%) of them argued that they agree with the idea that their company applies cosmetic mass customization and finally, the remaining (24.4%) of the total respondents said that they strongly agree with the forwarded idea. In general it can be derived that most of the respondents agree with the idea that argues their company uses cosmetic mass customization as production and marketing approach.

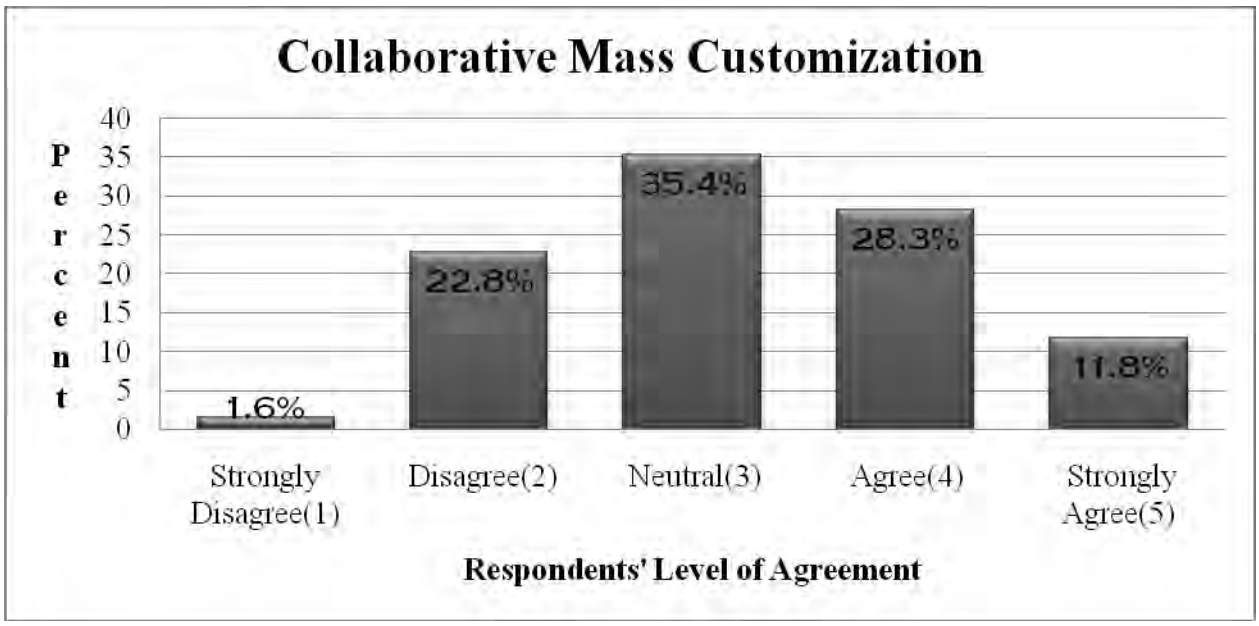

Figure 4.5: Responses given for Collaborative Mass Customization

As it can be observed from the above bar chart (Figure 4.5), from the total respondents of the study about (1.6%) of them responded that they strongly disagree with the idea that said their company uses collaborative mass customization as production and marketing approach; around (22.8%) of the total said that they disagree with this idea; about (35.4%) of them responded that they are neutral towards the idea; about (28.3%) of them argued that they agree with the idea that their company applies collaborative mass customization and lastly, the remaining (11.8%) of the respondents responded that they strongly agree with the idea. Finally, it can be said that majority of the respondents are neutral towards the idea that says their company applies collaborative mass customization as production and marketing approach.

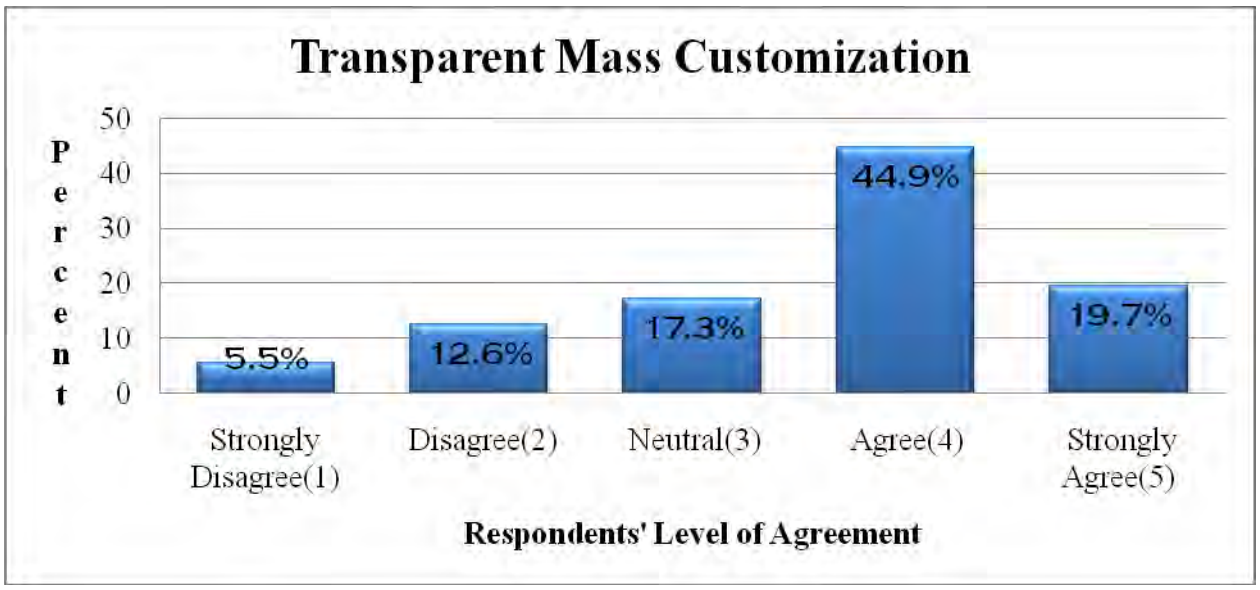

Figure 4.6: Responses given for Transparent Mass Customization

As it can be clearly seen from the above bar chart (Figure 4.6), out the total respondents approached about (5.5%) of them responded that they strongly disagree with the idea that said their company applies transparent mass customization as production and marketing approach; around (12.6%) of them said that they disagree with the this idea; about (17.3%) of the total said that they are neutral towards the idea; around (44.9%) of them responded that they agree with the idea that their company uses transparent mass customization as production and marketing approach and the remaining (19.7%) of the total respondents responded that they strongly agree with the idea. Generally, from the observation, it can be said that majority of the respondents agree with the idea that said their company applies transparent mass customization.

4.2. Inferential Statistics: The Effect of Mass Customization on Competitive Strategy

4.2.1. The Effect of Mass Customization on Cost Leadership strategy

The following table (Table 4.2) represents the first model that states the effect of mass customization on cost leadership strategy.

Table 4.2: Parameter Estimates: Ordinal Logistic Regression (Model I)

		Estimate	Std. Error	Wald	df	Sig.	Odds Ratio
Threshold	[Cost leadership = 1]	-5.179	.949	29.790	1	.000	.
	[Cost leadership = 2]	-2.722	.839	10.533	1	.001	.
	[Cost leadership = 3]	-.981	.810	1.465	1	.226	.
	[Cost leadership = 4]	1.207	.843	2.051	1	.152	.
Location	[Adaptive MC=1]	-4.919	1.408	12.209	1	.000	0.007
	[Adaptive MC=2]	-1.420	.647	4.824	1	.028	0.242
	[Adaptive MC=3]	-1.651	.602	7.516	1	.006	0.192
	[Adaptive MC=4]	-1.987	.611	10.572	1	.001	0.137
	[Adaptive MC=5]	0[a]	.	.	0	.	.
	[Cosmetic MC=1]	-1.390	.710	9.302	1	.003	0.249
	[Cosmetic MC=2]	-.302	.575	.277	1	.099*	0.739
	[Cosmetic MC=3]	-1.611	.582	10.102	1	.004	0.200
	[Cosmetic MC=4]	0.266	.441	8.364	1	.006	1.305
	[Cosmetic MC=5]	0[a]	.	.	0	.	.
	[Collaborative MC=1]	-.009	1.461	.000	1	.995*	0.991
	[Collaborative MC=2]	-.518	.660	4.615	1	.033	0.596
	[Collaborative MC=3]	-.424	.665	.405	1	.054*	0.654
	[Collaborative MC=4]	-.202	.635	13.101	1	.000	0.817
	[Collaborative MC=5]	0[a]	.	.	0	.	.
	[Transparent MC=1]	-.680	.843	.651	1	.420*	0.507
	[Transparent MC=2]	-1.210	.659	3.373	1	.006	0.298
	[Transparent MC=3]	.239	.565	9.178	1	.003	1.270
	[Transparent MC=4]	.358	.464	11.593	1	.001	1.430
	[Transparent MC=5]	0[a]	.	.	0	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

* The ordinal value is statistically insignificant.

As it can be seen from the above table (Table 4.2), for cosmetic mass customization the ordinal value with the strongly disagree ordinal category is statistically insignificant because its p-value is > 0.05. In the same manner for collaborative mass customization the values for categories strongly disagree and neutral are statistically insignificant because again the p-value of these categories is > 0.05. Lastly, for transparent mass customization, the ordinal category strongly disagree is statistically insignificant because still the p-value of this category is > 0.05.

4.2.1.1. Model fitting Information

Table 4.3: Model fitting information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	311.785			
Final	287.143	24.643	16	.076

Link function: Logit.

To check whether the model fits well or not the researcher has used p-value (sig.) and usually the model fits when p-value is > 0.05. As it can be seen from the above table (Table 4.3) the p-value is (0.076) which is greater than (0.05). So the current model is suitable for the data and appropriate to be used. It can be also checked from chi-square distribution, for $\alpha = 0.05$ there is $X^2_{0.05}(16) = 26.296$. So since the calculated value (24.643) is less than the tabulated value (26.296) the researcher failed to reject the null hypothesis. This again implies that the model is adequate for the data.

4.2.1.2. Goodness of Fit Test

Table 4.4: Goodness of fit test

	Chi-Square	df	Sig.
Pearson	314.66	344	.87
Deviance	339.39	344	.56

Link function: Logit.

The check the fit of the model the researcher can also use goodness of fit test. And the popular measures that SPSS produces for ordinal data are Pearson and Deviance measure and both of them follows chi-square distribution. The fit is said to be good if p-value (sig.) is > 0.05. As it can be observed from the above table (Table 4.4), p-values for both Pearson and Deviance are >

0.05. So it can be said that the model fit is good. The researcher can also compare the calculated value with tabulated value of chi-square distribution to check the goodness of fit. For $X^{2}_{0.05}(344) = 388.251$. So the tabulated value of chi-square (388.251) is greater than the calculated values which are (314.66) and (339.39) respectively for Pearson and Deviance from the above table (Table 4.4). Therefore, the researcher failed to reject the null hypothesis. This implies that the fit of the model is good.

4.2.1.3. Test of Parallel Lines

Table 4.5: Test of parallel lines

Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	287.143			
General	222.892[b]	64.251[c]	48	.058

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain

Test of parallel lines assesses whether the assumption of all categories having the same parameters is reasonable or not, i.e. whether one set of coefficients for all categories is appropriate. The researcher wants the p-value (sig.) for the general in the table above (Table 4.5) to be > 0.05. As one can see from the table (Table 4.5) the p-value is (0.058) which is > 0.05. So again it can be said that the current model is suitable for the data.

4.2.2. The Effect of Mass Customization on Differentiation Strategy

The following table (Table 4.6) represents the second model that states the effect of mass customization on differentiation strategy.

Table 4.6: Parameter Estimates: Ordinal Logistic Regression (Model II)

		Estimate	Std. Error	Wald	df	Sig.	Odds Ratio
Threshold	[Differentiation = 1]	-4.247	.907	21.907	1	.000	.
	[Differentiation = 2]	-1.992	.820	5.896	1	.015	.
	[Differentiation = 3]	-.217	.801	.074	1	.786	.
	[Differentiation = 4]	2.214	.903	6.016	1	.014	.
Location	[Adaptive MC=1]	.772	1.346	.329	1	.566*	2.165
	[Adaptive MC=2]	-.588	.636	9.853	1	.006	0.555
	[Adaptive MC=3]	-1.182	.593	3.971	1	.046	0.307
	[Adaptive MC=4]	-.566	.589	6.924	1	.007	0.568
	[Adaptive MC=5]	0[a]	.	.	0	.	.
	[Cosmetic MC=1]	-.768	.711	11.168	1	.000	0.464
	[Cosmetic MC=2]	-1.046	.585	13.197	1	.004	0.351
	[Cosmetic MC=3]	-.330	.579	10.326	1	.008	0.719
	[Cosmetic MC=4]	.217	.442	12.242	1	.003	1.242
	[Cosmetic MC=5]	0[a]	.	.	0	.	.
	[Collaborative MC=1]	.136	1.462	.009	1	.926*	1.146
	[Collaborative MC=2]	.313	.658	.226	1	.634*	3.717
	[Collaborative MC=3]	-.746	.666	12.255	1	.003	0.474
	[Collaborative MC=4]	-.494	.635	10.605	1	.007	0.610
	[Collaborative MC=5]	0[a]	.	.	0	.	.
	[Transparent MC=1]	-.161	.834	11.037	1	.007	0.851
	[Transparent MC=2]	-1.484	.663	5.012	1	.025	0.227
	[Transparent MC=3]	.021	.566	20.001	1	.000	1.021
	[Transparent MC=4]	.059	.464	9.016	1	.009	1.061
	[Transparent MC=5]	0[a]	.	.	0	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

* The ordinal value is statistically insignificant.

As one can observe from the above table (Table 4.6), for adaptive mass customization the value for category one (1) which is strongly disagree is statistically insignificant because its p-value is > 0.05. In the same manner for collaborative mass customization the values for ordinal categories; strongly disagree and disagree are statistically insignificant because again the p-value for these categories is > 0.05.

4.2.2.1. Model Fitting Information

Table 4.7: Model fitting information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	306.325			
Final	279.157	24.99	16	.070

Link function: Logit.

To check the model fit of the data, the researcher can use the p-value (sig.) in the above table (Table 4.7). To say the model fits the data the p-value (sig.) of the final model should be > 0.05. As one can see from the table the p-value (sig.) is (0.070) which is > 0.05. So it can be said that the model is suitable for the data. In addition to this, the researcher can also compare the statistic value of chi-square with the tabulated value to check the model fit. If the calculated value is less than the tabulated value it can be said that the model fits the data and the researcher do not reject the null hypothesis. For $X^{2}_{0.05}(16) = 26.296$. So from this it can be seen that the tabulated chi-square value (26.296) is greater than the calculated chi-square value (24.99). So the researcher failed to reject the null hypothesis. This implies that the model is adequate to be used for the data.

4.2.2.2. The Goodness of Fit Test

Table 4.8: The Goodness of Fit Measures

	Chi-Square	df	Sig.
Pearson	334.663	344	.631
Deviance	246.097	344	1.000

Link function: Logit.

Again to check goodness of fit of the model the researcher can use the P-value (sig.) in the above table (Table 4.8). The common measures of goodness of fit for ordinal data are Pearson and Deviance measures. For the fit of the model to be good the p-value (sig.) should be > 0.05. As one can observe from the above table (Table 4.8), the p-values for both measures are > 0.05

which are (0.631) and (1.000) respectively for Pearson and deviance. This shows that the fit of the model is good and the model is suitable for the data. Again the researcher can check the table value of the chi-square and compare is with the statistic value. For $X^2_{0.05}(344) = 388.251$. So since the table value (388.251) is greater than the statistic value for both Pearson and deviance which are (334.663) and (246.097) respectively the researcher cannot reject the null hypothesis. This again implies that the fit of the model is good and the model is adequate to be used for the data.

4.2.2.3. Test of Parallel Lines

Table 4.9: Test of Parallel Lines

Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	279.157			
General	219.735[b]	59.422[c]	48	.125

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

The test of parallel lines assesses whether the assumption of all categories having the same parameters is reasonable or not, i.e. whether one set of coefficients for all the categories is appropriate. The researcher wants the p-value (sig.) for the General in the above table (Table 4.9) to be > 0.05. As it can be seen from the table (Table 4.9) the p-value is (0.125) which is > 0.05. So again it can be said that the current model is suitable for the data.

Now the coefficients can be checked to know the effect of each predictor variable on response variables by using the models. This is briefly discussed in the following paragraphs.

4.3. Discussions of Results

As one can see from (Table 4.2), there is negative relationship between adaptive mass customization and cost leadership strategy. All categorical outcomes of adaptive mass customization are negatively related to the higher ordinal category of cost leadership strategy. A unit increase in the first category of adaptive mass customization results in 0.993 (OR = 0.007) decrease in the odds of being in the higher category of the ordinal outcome. In the same manner, a unit increase in the second category of adaptive mass customization results in 0.758 (OR = 0.242) decrease in the odds of being in the higher category of the ordinal outcome. On the other hand, a unit increase in the third category of adaptive mass customization results in 0.808 (OR = 0.192) decrease in the odds of being in the higher category of the ordinal outcome. Lastly, a unit increase in the fourth category of adaptive mass customization results in 0.863 (OR = 0.137) decrease in the odds of being in the higher category of the ordinal outcome. So the researcher rejected hypothesis 3.

In the same table (Table 4.2), the first and third categories of cosmetic mass customization are negatively related to the higher ordinal category of cost leadership strategy. On the other hand, the fourth category is positively related and the second category is statistically insignificant predictor. From this, a unit increase in the first category of cosmetic mass customization results in 0.751 (OR = 0.249) decrease in the odds of being in the higher category of the ordinal outcome. In connection with this, a unit increase in the third category of cosmetic mass customization results in 0.800 (OR = 0.200) decrease in the odds of being in the higher category of the ordinal outcome. Finally, a unit increase in the fourth category of cosmetic mass customization results in 0.305 (OR = 1.305) increase in the odds of being in the higher category of the ordinal outcome. Therefore, the general output leads to the rejection of hypothesis 7.

When it comes to collaborative mass customization given in the same table (Table 4.2), the second and fourth categories are negatively related to the higher ordinal category of cost leadership strategy. The remaining first and third categories are statistically insignificant predictors. As it can be seen, a unit increase in the second category of collaborative mass customization results in 0.404 (OR = 0.596) decrease in the odds of being in the higher category of the ordinal outcome. On the other hand, a unit increase in the fourth category of collaborative

mass customization results in 0.183 (OR = 0.817) decrease in the odds of being in the higher category of the ordinal outcome. Having this, the researcher rejected hypothesis 1.

Last but not least, looking into the table (Table 4.2), the first category of transparent mass customization is statistically insignificant predictor and the second one is negatively related to the higher ordinal category of cost leadership strategy. The remaining third and fourth categories are positively related to the higher ordinal category of cost leadership strategy. From this, a unit increase in the second category of transparent mass customization results in 0.702 (OR = 0.298) decrease in the odds of being in the higher category of the ordinal outcome. Next to this, a unit increase in the third category of transparent mass customization results in 0.270 (OR = 1.270) increase in the odds of being in the higher category of the ordinal outcome. Lastly, a unit increase in the fourth category of transparent mass customization results in 0.430 (OR = 1.430) increase in the odds of being in the higher category of the ordinal outcome. So looking into the majority of output, the researcher accepted hypothesis 5.

When it comes to the second model (Table 4.6), except the first category; which is statistically insignificant predictor, the remaining categories of adaptive mass customization are negatively related to the higher ordinal category of differentiation strategy. From this it can be seen that, a unit increase in the second category of adaptive mass customization results in 0.445 (OR = 0.555) decrease in the odds of being in the higher category of the ordinal outcome. On the other hand, a unit increase in the third category of adaptive mass customization results in 0.693 (OR = 0.307) decrease in the odds of being in the higher category of the ordinal outcome. Finally, a unit increase in the fourth category of adaptive mass customization results in 0.432 (OR = 0.568) decrease in the odds of being in the higher category of the ordinal outcome. Depending on this, the researcher rejected hypothesis 4.

In case of cosmetic mass customization in the same table (Table 4.6), except the fourth one, all other categories are negatively related to the higher ordinal category of differentiation strategy. The fourth category is positively related to the higher ordinal category of differentiation strategy. From the table, a unit increase in the first category of cosmetic mass customization results in 0.536 (OR = 0.464) decrease in the odds of being in the higher category of the ordinal outcome. Next to this, a unit increase in the second category of cosmetic mass customization results in 0.649 (OR = 0.351) decrease in the odds of being in the higher category of the ordinal outcome.

In connection with this, a unit increase in the third category of cosmetic mass customization results in 0.281 (OR = 0.719) decrease in the odds of being in the higher category of the ordinal outcome. Finally, a unit increase in the fourth category of cosmetic mass customization results in 0.242 (OR = 1.242) increase in the odds of being in the higher category of the ordinal outcome. So the general view of the output leads to the rejection of hypothesis 8.

Referring to the same table (Table 4.6), the first two categories of collaborative mass customization are statistically insignificant predictors. On the other hand, the third and the fourth categories are negatively related to the higher ordinal category of differentiation strategy. From this, a unit increase in the third category of collaborative mass customization results in 0.526 (OR = 0.474) decrease in the odds of being in the higher category of the ordinal outcome. Similarly, a unit increase in the fourth category of collaborative mass customization results in 0.390 (OR = 0.610) decrease in the odds of being in the higher category of the ordinal outcome. As a result of this, the researcher rejected hypothesis 2.

Lastly, referring to the table (Table 4.6), the first two categories of transparent mass customization are negatively related to the higher ordinal category of differentiation strategy. On the other hand, the third and the fourth categories are positively related to the higher ordinal category of differentiation strategy. As it can be read from the odds ratio section, a unit increase in the first category of transparent mass customization results in 0.149 (OR = 0.851) decrease in the odds of being in the higher category of the ordinal outcome. In connection with this, a unit increase in the second category of transparent mass customization results in 0.773 (OR = 0.227) decrease in the odds of being in the higher category of the ordinal outcome. For the third category, a unit increase in the transparent mass customization results in 0.021 (OR = 1.021) increase in the odds of being in the higher category of the ordinal outcome. Lastly, a unit increase in the fourth category of transparent mass customization results in 0.061 (OR = 1.061) increase in the odds of being in the higher category of the ordinal outcome. Therefore, the general output concludes the acceptance of hypothesis 6.

The data gained through interview conducted with production managers from both companies has also strongly supported the above finding. The managers‟ response to the question about the mass customization approach they use in their company was mostly related to transparent mass customization. That means, they use indirect customers‟ information to deliver what they require

from their company. The managers responded that their company is trying to use transparent mass customization together with competitive strategies such as cost leadership and differentiation. They have also told the researcher as cost leadership is the dominant competitive strategy in their company. In general, the respondents‟ reaction to both questionnaire and interview implies the cost effectiveness of mass customization in general and transparent mass customization in particular.

Generally, except the case for transparent mass customization, almost for all other mass customization approaches, the result of this study shows the negative relationship between mass customization and competitive strategy. In case of transparent mass customization, the result shows positive connection between the higher ordinal categories and the higher ordinal category of the response variables. This shows that as the agreement with the existence of transparent mass customization increases the probability that is falls in the higher ordinal category of competitive strategy also increases. So with this exception, the finding on the current study contradicts with the finding of the research done in china (by Qi, Yinan, et al, 2008) on the same title; which has concluded the positive link between mass customization and competitive strategy. This may be due the difference in the methodology used and the context in which the research has been done. In case of methodology, the research done in the china used an econometric method which is known as simultaneous equation modeling and the current study has used the ordinal logistic regression model. In addition to this, the variables used to operationalize mass customization are also different in the two studies. This difference in methodology may pose its own effect on the findings. The other and the big issue here is the issue of research context. Obviously, there is big economy and technology gap between china and Ethiopia. China is categorized under one of the developed countries which are fast growing in terms of economy and other infrastructures. Taking the case of Ethiopia, she is one of the developing countries in the world and her economic and technology development is slow compared to china. As it is already discussed in the literature part of this paper, mass customization is the newly emerging production and marketing technology. Having this, the implementation of this technology in Ethiopia compared to developed countries such as china is obviously low. This means, developing countries such as Ethiopia faces more difficulty than developed countries in breaking the paradox between competitive strategy (cost leadership and differentiation) and mass customization. This is the big reason why the findings in the two studies are contradicting.

Chapter Five

Conclusions and Recommendations

5.1. Conclusions

This paper has analyzed the effect of mass customization on the competitive strategy in the case of Addis Ababa Tannery S.C. and Tikur Abbay Shoe S.C. by using Ordinal logistic regression model. Depending on the findings of the study and the discussions the findings, the following conclusions have been made by the researcher.

- There is negative relationship between adaptive mass customization and cost leadership strategy. This means that when the categorical outcome of adaptive mass customization increases the probability that it falls in the higher ordinal category of response variable is very less.
- Except the fourth ordinal category, all other ordinal categories of cosmetic mass customization are negatively related to cost leadership strategy. As the ordinal category of cosmetic mass customization increases the probability that it falls in the higher ordinal category of the response variable is less compared to the probability that it will not.
- Collaborative mass customization is negatively related to cost leadership strategy. It is less probable that as collaborative mass customization increases it will fall in the higher ordinal category of response variable.
- Except the second ordinal category, it can be concluded that as the ordinal category of transparent mass customization increases it is most probable that it will fall in the higher category of cost leadership strategy (response variable).
- There is negative relationship between adaptive mass customization and differentiation strategy. This means, as the ordinal category of adaptive mass customization increases it is less probable that it falls in the higher ordinal category of the response variable.

- Except the fourth category, for all other ordinal categories as the ordinal category of cosmetic mass customization increases the probability that it falls in the higher category of differentiation strategy (response variable) decreases. All in all, it can be concluded that, as the ordinal category of cosmetic mass customization increases the probability that it falls in the higher category of response variable is less compared to that it will not.

- Looking into the significant predictors, collaborative mass customization is negatively related to differentiation strategy. That means, an increase in the collaborative mass customization results in less probability that it falls in the higher ordinal category of response variable.

- There is positive relationship between the higher ordinal categories of transparent mass customization and differentiation strategy. Except for the second category, as the ordinal category of transparent mass customization increases the probability that if falls in the higher ordinal category of differentiation strategy also increases. It can be concluded that, an increase in transparent mass customization results in high probability that it will fall in the higher ordinal category of differentiation strategy (response variable).

- Last but not least, even though the linkage between most of mass customization approaches and competitive strategies is negative, the existing positive linkage is stronger between mass customization (transparent mass customization) and cost leadership strategy than between mass customization (transparent mass customization) and differentiation strategy. From this it can be concluded that mass customization, particularly transparent mass customization is cost effective approach to be used in manufacturing companies such as Addis Ababa Tannery S.C and Tikur Abbay Shoe S.C.

5.2. Recommendations

On the basis of the findings gained in this study, the following major recommendations were forwarded on the issue of applying mass customization together with competitive strategies such cost leadership and differentiation.

- As it can be seen from the findings, most of the relationship between mass customization and competitive strategy is negative implying the negative effect of mass customization on the competitive strategy in the considered companies. But in today‟s world, to be competitive in both global and domestic markets it is must for the two to work together in the same company. So, it is recommended that these companies should find ways of implementing both through effectively applying mass customization in attaining their competitive advantages.

- The finding in this study shows that, almost the only mass customization approach that has positive effect on the competitive strategies is transparent mass customization. Evaluating this approach from customers‟ involvement point of view, it is less compared to other approaches such as collaborative mass customization and adaptive mass customization. Now days, the more successful market is the one in which the involvement of customers is highly considered. So these companies again should take into account the issue of customer participation in the production and marketing activities in selecting their appropriate mass customization approach.

- Last but obviously not least, the finding of this study is limited to the issue of few Ethiopian manufacturing companies. So, it is recommended for future researchers to look in to the effect of mass customization on competitive strategy taking large sample size so that the generalization of the findings can work in the broad context. The use of cross-sectional data in this study has also limited the findings. So the future researchers in the possible condition can use longitudinal data and more validate the findings.

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APPENDICES

Appendix I: Questionnaire

Addis Ababa University

College of Business & Economics

Department of Management

MBA Program

Questionnaire to be filled by Professional Employees

I am graduating class MBA (Masters of Business Administration) student of 2013 at Addis Ababa University. Currently, i am conducting my thesis entitled **the effect of mass customization on competitive strategy**. Thus, you are being requested to participate in a survey to provide your organization with mass customization related information that will help to improve the working environment of the organization. Participation in this survey is voluntary and no individual data will be reported. If you are unsure or do not know the answer, leave the answer blank. Please indicate your response to each statement by putting √ symbol under the response you selected. Please try to be as objective as you can when you give response to each statement. Whatever information you give me is strictly confidential and could be used for academic purpose only. **I would like to thank you in advance for your indispensable cooperation.**

<u>Instruction</u>: Please, put the sign of √ in front of each statement under the level of agreement you preferred.

1. Mass Customization Related Questions

S. NO	STATEMENTS	Level of Agreement				
		Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
1	Your company applies standard products to all customers rather than producing different products for different customers.					
2	Your company produces standard goods that can be modified to suit each customer‟s needs after purchase.					
3	Your company design products based on the general standard rather than on customer order.					
4	Your company produces flexible standard products which can fit the needs of each customer when they use it.					
5	Mass customization in your company takes place more around the distribution stage of production process.					
6	Your company provides the same products differently to different customers rather than producing different product for different customers.					
7	Your company produces the same products and packages them differently to meet the needs of each customer.					
8	Your company focuses on the visual aspect of the product rather than producing different products for different customers.					
9	Your company focuses on providing additional services to customers than producing tailored products for each of them.					

10	Mass customization in your company takes place more around assembly stage of production process.					
11	Your company invites customers to the manufacturing site and asks them to specify the design of the product they need to be produced for them.					
12	In manufacturing, your company uses „make to order" strategy.					
13	In your company, the whole manufacturing process takes place in cooperation with customers by use of direct contact with them.					
14	Your company produces different products for each and every customer.					
15	In your company, customers are directly involved in the production process from the very design stage of production					
16	Your company produces products by predicting customers" preferences without contacting them personally.					
17	Your company uses observable behaviors of customers to produce products that fit their needs.					
18	Your company uses indirect deep customer behavior investigation to know the type of product they prefer and produce accordingly.					
19	To produce tailor-made products, your company tries to relate production process to customers" information.					
20	In production process, your company tries to customize products to customers from the very design stage but this is done without direct knowledge of customers					

2. Cost Leadership Strategy Related Questions

S.NO	STATEMENTS	Level of Agreement				
		Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
1	Your company focuses on minimizing operation cost and production of low cost products					
2	The main target of your company is price-sensitive consumers					
3	In manufacturing process, your company spreads fixed cost over large number of units of products, resulting in a lower unit cost					
4	Your company focuses on production of large volume of standardized products					
5	You company uses high level expertise in manufacturing process engineering and efficient distribution channels that lead to low cost production					
6	Your company charges relatively low price for its products as a result of low cost of production					

3. Differentiation Strategy Related Questions

S. NO	STATEMENTS	Level of Agreement				
		Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
1	Your company offers unique products to its customers compared to competitors					
2	Your company practices differentiation on variety of product characteristics					
3	Your company uses single product characteristic to produce and offer differentiated products to customers					
4	Your company competes more on non-price factors such as distribution strategy and promotional variables					
5	In your company, customers are attached to differentiating attributes of products and there is no as such treat of substitutes					

Thank you Once Again for Your Cooperation!!

Appendix II: Interview Questions

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

MBA PROGRAM

Interview Questions to be answered by Production Manager

1. What type of mass customization approach does your company apply in the manufacturing process?
2. Do you think that the mass customization approach currently used by your company is cost effective in manufacturing?
3. Do you think that the mass customization approach which is under use by your company helps the company to produce differentiated products compared to competitor"s products?

Thank you for your cooperation!!

Appendix III: SPSS Output for Ordinal Logistic Regression Analysis

Statistics: Data Summary

		Cost Leadership	Differentiation	Adaptive mass customization	Cosmetic mass customization	Collaborative mass customization	Transparent mass customization
N	Valid	127	127	127	127	127	127
	Missing	0	0	0	0	0	0
Mean		2.99	2.88	3.24	3.58	3.26	3.61
Std. Deviation		.988	.981	1.029	1.224	.994	1.107

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	311.785			
Final	287.143	24.643	16	.076

Link function: Logit.

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	314.66	344	.87
Deviance	339.39	344	.56

Link function: Logit.

Parameter Estimates: Ordinal Logistic Regression (Model I)

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Cost leadership = 1]	-5.179	.949	29.790	1	.000	-7.038	-3.319
	[Cost leadership = 2]	-2.722	.839	10.533	1	.001	-4.366	-1.078
	[Cost leadership = 3]	-.981	.810	1.465	1	.226	-2.569	.608
	[Cost leadership = 4]	1.207	.843	2.051	1	.152	-.445	2.859
Location	[Adaptive MC=1]	-4.919	1.408	12.209	1	.000	-7.678	-2.160
	[Adaptive MC=2]	-1.420	.647	4.824	1	.028	-2.688	-.153
	[Adaptive MC=3]	-1.651	.602	7.516	1	.006	-2.831	-.471
	[Adaptive MC=4]	-1.987	.611	10.572	1	.001	-3.185	-.789
	[Adaptive MC=5]	0[a]	.	.	0	.	.	.
	[Cosmetic MC=1]	-1.390	.710	9.302	1	.003	-1.782	1.002
	[Cosmetic MC=2]	-.302	.575	.277	1	.099*	-1.429	.824
	[Cosmetic MC=3]	-1.611	.582	10.102	1	.004	-1.751	.530
	[Cosmetic MC=4]	0.266	.441	8.364	1	.006	-.599	1.131
	[Cosmetic MC=5]	0[a]	.	.	0	.	.	.
	[Collaborative MC=1]	-.009	1.461	.000	1	.995*	-2.872	2.855
	[Collaborative MC=2]	-.518	.660	4.615	1	.033	-1.812	.777
	[Collaborative MC=3]	-.424	.665	.405	1	.054*	-1.728	.881
	[Collaborative MC=4]	-.202	.635	13.101	1	.000	-1.446	1.042
	[Collaborative MC=5]	0[a]	.	.	0	.	.	.
	[Transparent MC=1]	-.680	.843	.651	1	.420*	-2.332	.972
	[Transparent MC=2]	-1.210	.659	3.373	1	.006	-2.501	.081
	[Transparent MC=3]	.239	.565	9.178	1	.003	-.869	1.346
	[Transparent MC=4]	.358	.464	11.593	1	.001	-.553	1.268
	[Transparent MC=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

* The ordinal value is statistically insignificant.

Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	287.143			
General	222.892[b]	64.251[c]	48	.058

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	306.325			
Final	279.157	24.99	16	.070

Link function: Logit.

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	334.663	344	.631
Deviance	246.097	344	1.000

Link function: Logit.

Parameter Estimates: Ordinal Logistic Regression (Model II)

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Differentiation = 1]	-4.247	.907	21.907	1	.000	-6.026	-2.469
	[Differentiation = 2]	-1.992	.820	5.896	1	.015	-3.599	-.384
	[Differentiation = 3]	-.217	.801	.074	1	.786	-1.788	1.353
	[Differentiation = 4]	2.214	.903	6.016	1	.014	.445	3.983
Location	[Adaptive MC=1]	.772	1.346	.329	1	.566*	-1.866	3.410
	[Adaptive MC=2]	-.588	.636	9.853	1	.006	-1.835	.659
	[Adaptive MC=3]	-1.182	.593	3.971	1	.046	-2.345	-.019
	[Adaptive MC=4]	-.566	.589	6.924	1	.007	-1.720	.588
	[Adaptive MC=5]	0[a]	.	.	0	.	.	.
	[Cosmetic MC=1]	-.768	.711	11.168	1	.000	-2.162	.625
	[Cosmetic MC=2]	-1.046	.585	13.197	1	.004	-2.192	.101
	[Cosmetic MC=3]	-.330	.579	10.326	1	.008	-1.465	.804
	[Cosmetic MC=4]	.217	.442	12.242	1	.003	-.649	1.083
	[Cosmetic MC=5]	0[a]	.	.	0	.	.	.
	[Collaborative MC=1]	.136	1.462	.009	1	.926*	-2.730	3.003
	[Collaborative MC=2]	.313	.658	.226	1	.634*	-.978	1.604
	[Collaborative MC=3]	-.746	.666	12.255	1	.003	-2.052	.559
	[Collaborative MC=4]	-.494	.635	10.605	1	.007	-1.738	.751
	[Collaborative MC=5]	0[a]	.	.	0	.	.	.
	[Transparent MC=1]	-.161	.834	11.037	1	.007	-1.796	1.474
	[Transparent MC=2]	-1.484	.663	5.012	1	.025	-2.783	-.185
	[Transparent MC=3]	.021	.566	20.001	1	.000	-1.088	1.129
	[Transparent MC=4]	.059	.464	9.016	1	.009	-.850	.967
	[Transparent MC=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

* The ordinal value is statistically insignificant.

Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	279.157			
General	219.735[b]	59.422[c]	48	.125

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.