Supply Chain Integration on Customer Equity

Master Thesis

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Abstract

Customer equity is becoming popular in modern business literature and practice, however only very few studies have examined the effects of supply chain integration effectiveness and customer equity drivers on the customer equity.

The theory investigates the relationship between a firm's supply chain responsiveness and customer equity drivers towards customer equity, making contributions to the relevant literature. The theory states that the overall importance of customer equity to the value of a firm is unmistakable; the role of supply chain in serving the customers is drawing increasing more attention from scholars and managers. For empirical validation a survey was carried out among Philips Lighting GBU Led Lamps and Systems being as suppliers and customers. Using PLS path modeling, we observed that supply chain responsiveness, brand equity, relationship equity and value equity do influence the customer equity positively.

Theoretical and managerial implications are provided.

Keywords: Customer equity; Supply Chain integration; Customer equity drivers
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1. CHAPTER I - INTRODUCTION

The modern business environment has advanced the importance of intangible firm assets as a sustainable firm advantage. This includes customers and customer equity - customer equity drivers (value, brand, and relationship) - with much scholarly attention devoted to customer equity recently (e.g. Bruhn et al., 2008; Dong et al., 2007; Boo 2009; Bayón et al. 2002; Drèze 2008). Customer equity has been conceptualized in similar, yet slightly differing ways by many authors. Blattberg, Getz, Thomas (2001) describe customer equity as “dynamic, integrative marketing system that uses financial valuation techniques and data about customers to optimize the acquisition of, retention of, and selling of additional products to a firm’s customers, and that maximizes the value to the company of the customer relationship throughout its life cycle”. Villanueva, Hanssens (2007) incorporate the customer perspective, stating that “customer equity recognizes customers as the primary source of both current and future cash-flows”.

The overall importance of customer equity to the value of a firm is unmistakable. Extending the framework of the study of Kim and Cavusgil, 2009, this study explore the impact of a firm's supply chain responsiveness and customer equity drivers on customer equity (Gupta et al., 2004; Lemon et al., 2001; Rust et al., 2004a) a newly emerging construct in the marketing literature. Customer equity, which is most firms' ultimate goal, is driven dynamically by brand equity, value equity, and relationship equity of the firm.

Therefore, incorporating such equity variables together allow an investigation on how a firm's supply chain activities influence a firm's ultimate goal more dynamically. In this way the focus of the results would go beyond focusing on the brand, what the firm offers, to focusing on the customers, what the market is seeking.

However, studies that explore how a firm's supply chain characteristics affect its customer equity are sparse in the literature. While the role of supply chain in serving the customers is drawing
increasingly more attention from scholars and managers, supply chain activities as potential contributing factors of customer equity merit research attention. Supply chain activities play a crucial role in enhancing customer equity as such activities carried out in an efficient manner imply effective communications, and thus coordination among supply chain members regarding the market, brand and customer preferences, and eventually help respond to changes in the market and customers preferences ahead of the competing supply chain. The effective supply chain activities are likely to cultivate favorable attitude of the customers toward the brand enhancing its brand and customer equity (Kim and Cavusgil, 2009).

Thus, as an exploratory study on extending the framework of the study of Kim and Cavusgil, 2009, this study examines the relationships between specific characteristics of a firm's supply chain responds with customer equity. In particular, the impact of responsiveness in the supply chain on customer equity is being investigated. Drawing upon a dynamic capabilities framework (Teece and Pisano, 1994; Teece et al., 1997; Eisenhardt and Martin 2000), propose that interfirm systems integration and interfirm activity integration are antecedents of supply chain responsiveness. Together, these are intangible assets of the firm that positively impact customer equity, and ultimately firm performance. This study is unique in that it investigates the relationship between a firm's supply chain responsiveness and customer equity drivers towards customer equity, making contributions to the relevant literature. That is, it offers to the literature empirical evidence as to the role of a firm's supply chain activities in improving customer equity. Moreover, for the supply chain literature, this study relates a firm's supply chain activities to a key marketing tool, the customer of the firm. There have been hardly any researches done, so this study seeks for relevant information to contribute.

Against this background, the aim of the following research is to investigate:
“How a firm's supply chain responsiveness and customer equity drivers affect customer equity?”
Answering this problem statement is approached by a subset of related research questions:
1. What are supply chain responsiveness, brand, value and relationship equity orientation?
2. Which factors affect customer equity positively?
3. Do the factors affect customer equity positively?
The thesis is being divided into descriptive and an analytical part. The structure is as follows. *Chapter 2* introduces the elementary concepts of supply chain responsiveness, brand equity, value equity, relationship equity and customer equity orientation. The conceptual framework presents the variables which form the basis for the development of the conceptual model and the deduction of research propositions. The research methodology is explained in *Chapter 3*, *Chapters 4* elaborate on the findings and discussion of the results. Finally, *Chapter 5* draws conclusions, presents theoretical and managerial implications, limitations, and provides suggestions for further research.
2. CHAPTER II – LITERATURE REVIEW

2.1. Supply Chain integration

While researchers have conceptualized supply chain integration in various ways, in essence, "integration refers to the extent to which separate parties work together in a cooperative manner to arrive at mutually acceptable outcomes. Accordingly this definition encompasses constructs pertaining to the degree of cooperation, coordination, interaction and collaboration" (O'Leary-Kelly and Flores 2002, p. 226). As Pagell (2004) suggested, the majority of the research on integration addresses the positive relationship between integration and performance (e.g. Frohlich and Westbrook, 2001; Rodrigues et al., 2004; Stank et al., 2001), and there is a lack of study on the factors that enable and inhibit supply chain integration. Without a clear understanding of the effects of relevant factors, successful implementation of supply chain integration will remain a formidable challenge (Richey Jr. et al., 2009).

2.1.1 Supply Chain Integration drivers

2.1.1.1. Internal drivers of supply chain integration

Internally, desire to improve firm performance through development of more effective and efficient trade relationships appears to be a critical driver of supply chain integration. Desire to improve refers to a firm's orientation on continuous improvement of its processes and performance. A firm's orientation may have significant impact on its selection of strategies and approaches to achieve specific goals. In other words, a firm's desire to improve may determine specific approaches the firm chooses to implement its strategies for the purpose of creating superior and continuous performance (see Gatignon and Xuereb 1997). While almost all firms claim that they intend to improve business performance over time, this construct measures the degree that a firm wants to improve its practices in certain areas (Richey Jr. et al., 2009).

Although most managers have realized the critical importance of supply chain integration, in reality, few companies have truly adopted and disseminated a formal SCM definition; and even fewer have meticulously mapped out their supply chains so that they know who their suppliers'
suppliers or customers' customers really are (Fawcett and Magnan, 2002). In contrast, when a firm truly understands the meaning of SCM, it is more likely to embrace a supply chain philosophy (Mentzer et al., 2001). Authors have argued that SCM as a management philosophy seeks synchronization and convergence of intrafirm and interfirm operational and strategic capability into a unified, compelling marketplace force (e.g. Mentzer et al., 2001; Ross, 1998). With a strong intention to improve (i.e. desire to improve), a firm is likely to consider supply chain integration as an effective approach to enhance business performance and achieve other goals. In other words, a firm's desire to improve has positive impact on its supply chain integration (Richey Jr. et al., 2009).

2.1.1.2. Environmental drivers of supply chain integration

The external environment a firm operates in also plays a critical role of the firm's adoption and implementation of supply chain integration. First, the fast-changing market demands require companies to integrate supply chain processes in order to be more responsive. Customers are demanding products consistently delivered faster and more reliably, which requires close coordination within the firm and with suppliers. For example, postponement as a type of popular supply chain strategy is largely facilitated by integration of various functional areas. As van Hoek (1998) suggested, when customer demands become less and less predictable, companies are more likely to implement supply chain integration to achieve postponement; because the relevance of delaying final manufacturing and shipment of goods increases. The shortening product life cycles also force firms to integrate both internal and external processes in order to better compete in the market. It is hard to imagine how a firm can be successful today with lengthy and fragmented processes (Richey Jr. et al., 2009).

Second, competition in the marketplace also plays an important role in integration implementation. Under high competitive intensity, the diffusion of new ideas and practices will be more rapid (Williams, 1994). Because companies need to allocate resources more effectively and efficiently in order to keep competitive parity or achieve competitive advantage (Hunt and Morgan, 1995), supply chain integration appears to be an excellent option.

Fourth, the shift of channel power to downstream also impacts the adoption of supply chain integration. Power is defined as the influence one-channel member has over another channel
member. Williams (1994) found that channel power has significant influence on adoption process of electronic data interchange (EDI), a type of supply chain integration practice. As another example, the radio frequency identification (RFID) initiative started by Wal-Mart pushes the upstream suppliers to quickly adopt the technology and integrate their processes with retailers such as Wal-Mart (Richey Jr. et al., 2009).

2.1.2. Supply Chain Integration barriers

Even though some factors are driving firms to improve SCM through integration, the reality is not optimistic (e.g. Fawcett and Magnan, 2002). In past literature managers have reported many difficulties in the process of implementing supply chain integration. However, the research on the effects of the barriers to supply chain integration is still lacking, which limits the ability to find effective solutions to these issues. Thus, it is worthwhile to investigate effects of these barriers to supply chain integration (Richey Jr. et al., 2009).

As discussed previously, factors influencing supply chain integration can be either internal or external. Although barriers to supply chain integration may also exist either within a firm or outside a firm, it is more meaningful to examine the barriers with an internal perspective; because these are the factors that a firm can directly control. Therefore, the current study focuses on investigating the internal mechanisms that pose as obstacles to supply chain integration.

Although integration's importance and benefits are widely recognized, the traditional functional management approach still impacts many managers' mindset and the decision-making processes. Bowersox et al. (2000) indicated that while purchasing, production, logistics, and marketing have worked independently to integrate within their own functions, there has been less progress made toward cross-functional integration. Managers spend a significant amount of resources navigating the “waters of their own harbor” (Fawcett and Magnan, 2002). A major reason for this lack of motivation toward integration is a fragmented planning system. Instead of striving for common goals, each functional area works for its own interest to achieve its own performance objectives. Disjointed performance measurement systems, a typical type of internal planning failure, lead different functional areas in various directions. For example, while the production department might heavily focuses on cutting the costs, the sales department might only strive for bigger sales volume, which will make supply chain integration an impossible
mission. Thus, van Hoek (2000) argued that because mechanisms for both internal and external integration can be found in the measurement and control of operations, it is important to develop integrative measures for the entire organization. In other words, internal planning failure is a major barrier to supply chain integration.

In today's environment, competition is among supply chains rather than among individual companies (Christopher, 2005). Therefore, firms must realize that integration does not happen in a vacuum and an external perspective is critical. This requires firms to have an effective information system to monitor external environment, including their customers, suppliers, and competitors, to make appropriate decisions regarding supply chain integration. First, firms need to monitor the changing customer needs and better manage business processes to create superior customer value. Marketing scholars have long argued that in order to be market oriented, firms must generate market intelligence pertaining to current and future customer needs, disseminate the intelligence across departments, and respond to it through functional coordination (e.g. Kohli and Jaworski, 1990; Slater and Narver, 1995). Second, firms should also benchmark other companies – competitors, suppliers, or customers. According to Camp (1989, p. 7), “benchmarking is the search for those best practices that will lead to superior performance of a company”. Because a firm's depth of knowledge is an important predictor of adoption of radical and incremental innovations, such exposure to external environment has been considered as a critical driver of the adoption of best practices, including supply chain integration (Daughtery et al., 1994). In another study, Jayaram et al. (2000) found that the effectiveness of a firm's information system infrastructure significantly improves the integration of its business processes. Without an effective external monitoring system, a firm will encounter difficulties in integrating its business processes to remain competitive in the marketplace. Stated differently, external monitoring failure is another important barrier to supply chain integration.

While it is important to understand the negative effects of internal planning and external monitoring on supply chain integration, it is also imperative to explore their impacts on the relationships between other integration drivers and firm performance. To be more specific, the current study identifies a firm's desire to improve and environment as key drivers of supply chain integration. However, how will the positive relationships between these drivers and firm performance be affected by the barriers to supply chain integration?
While intuition may lead managers to believe that integration drivers' impacts on firm performance will be lower when integration barriers are at a higher level, we propose that the moderating effects in the opposite direction – integration drivers' positive impacts on firm performance are stronger when integration barriers are at higher. As discussed previously, poor internal planning and external monitoring hinders the effective supply chain integration (see Jayaram et al., 2000; Slater and Narver, 1995). It thus can be expected that firm performance will suffer and be subprime when these barriers manifest at a high level. In other words, when integration barriers are present, a firm often does not perform well and is less competitive in the market. In such a case, the importance of integration drivers is magnified. First, when the firm has a strong desire to improve its performance, it is more likely to embrace a supply chain philosophy and implement supply chain integration (Mentzer et al., 2001). This kind of willingness will contribute to a more significant improvement in firm performance. Second, the push from suppliers, customers, and competitors will force a firm to change its existing practices and integrate business processes to remain competitive. Similarly, this will result in a more significant impact on firm performance (Richey Jr. et al., 2009).

2.2. Supply Chain activities

2.2.1. Interfirm activity integration

The ability for firms to manage a complex network of supply chain relationships has been a central subject of examination in the supply network management literature (Holmen et al., 2007). In the present study we focus on the integration across partners in the supply chain. We conceptualize interfirm activity integration as the extent to which supply chain partners are actually engaged in collaborative planning and forecasting (Bowersox et al., 1999). Interfirm activity integration can be enhanced only when supply chain partners are willing to attain common goals in the market together as a supply chain. It is not a simple process for firms to achieve activity integration with their supply chain partners. The firm that wishes to achieve this integration has to consciously change its business model to reach its goals with supply chain partners. No longer will it view each transaction as discrete, but rather each transaction will be viewed as part of a larger continuous transaction out of the supply chain relationship. In this way, firms will be able to achieve activity integration with their supply chain partners (Clark and Stoddard, 1996). This ability of a firm to integrate activities with its partners is a capability that
can be used to achieve competitive advantage as closely integrated partners can more effectively adjust their business plans and strategies collaboratively according to evolving market conditions (Philipsen and Damgaard, 2008).

2.2.2. Interfirm system integration

Interfirm systems integration in this study refers to the extent that a firm's supply chain communication system is ready and, therefore, able to support potential interfirm activity integration. Through such integration, firms are able to increase the effectiveness and efficiency in their interfirm collaborations (Malone et al., 1987). Interfirm system integration is not necessarily a sufficient condition but a necessary condition for efficient interfirm activity integration. The implementation of a high degree of interfirm system integration allows firms to reduce any technical barriers and incompatibilities that may impede communication between supply chain partners (Byrd and Turner, 2001; Kim et al., 2006). The implementation of a lower-level systems integration may allow supply chain partners to share a limited amount of proprietary information including sales and forecasts (Bowersox et al., 1999, 2002). The implementation of a minimal level of interfirm system integration is likely to involve just electronic order-fulfillment, which is the most fundamental interfirm activity between supply chain partners (Johnson, 1999).

2.2.3. Supply chain responsiveness

This study explores supply chain responsiveness at the supply chain partnership (i.e. both buyer and seller) level rather than the individual firm level. Consequently, supply chain responsiveness in this study is defined as the ability of the supply chain partnership to react to changes in the environment and market quickly and effectively (Kim et al., 2006). In the modern market, a quick and effective response via the supply chain is necessary for success (Rogers et al., 1993). A critical factor identified in the literature that leads to such a response is integration between supply chain partners (Clemons and Row, 1991, 1993; Roberts and Mackay, 1998; Thatcher and Oliver, 2001). Thus, interfirm systems integration and activities integration will enable the supply chain to successfully react to customer needs and market changes in a timely manner (Clemons and Row, 1992, 1993; Roberts and Mackay, 1998; Rogers et al., 1993). Likewise, a poor level of interfirm activity or system integration is likely to result in poor responsiveness of
the supply chain to market changes (Kim et al., 2009). Therefore, the following hypothesize is being formulate:

**H1. Supply chain responsiveness affects customer equity positively**

### 2.3. Customer equity

#### 2.3.1. Customer equity definition

Customer equity research is in a state of infancy but is developing quickly as researchers determine factors of importance in the relationships between key constructs (Hogan et al., 2002). Customer equity research is rooted in service marketing, relationship marketing, and brand management. Independently, customer equity can be viewed as a tool that can be used to justify the development and implementation of a variety of marketing strategies. Blattberg and Deighton's (1996) study showed how a firm should understand the value of their customer base to determine the optimal investment the firm should make into specific customers. For example, a potential customer may only have projected lifetime revenue of $1,000. If the price of acquiring and retaining the consumer is projected at $1,500, then the company would opt not to invest in that particular customer because the consumer represents a negative value to the company. This enables companies to maximize marketing dollars by investing in customers that provide a positive return on investment (Severt et al, 2008).

Other customer equity research has linked customer equity to the financial performance of a firm. Rust et al. (2004) focused on customer equity as a tool to evaluate marketing decisions. When managing marketing dollars, companies must determine how much of their budget should be spent on marketing efforts including advertising, promotions, and lead retrievals. The Rust et al. (2004) study suggests allocating marketing dollars based on maximizing customer equity. Using a customer equity approach allows marketing decisions to be based on their influence on customer equity, thus tradeoffs can be made to best affect the financial performance of the firm (Severt et al, 2008).

Within the return-on-marketing framework, Rust *et al.* (2001, p. 3) defined customer equity as “the sum of the discounted lifetimes values of all the firm's customers” and separated it into three components: value equity, brand equity, and relationship equity (Richards and Jones, 2008; Rust
et al., 2000). The framework's assumption is that a focal firm has one brand and one market, thus permitting the terms “firm” and “brand” to be used interchangeably. Given that Company X represents an automobile manufacturer and a brand, we consider the assumption sound for our purposes (Rosenbaum et al, 2009).

2.3.2. Customer equity drivers

Service marketing literature has established brand equity (BE), value equity (VE), and relationship equity (RE) as key constructs of customer equity (Rust et al., 2000, 2004, 2005). These constructs influence the change in customer equity and are referred to as “drivers” or determinants of customer equity. Each construct of customer equity consists of customer specific attributes that are referred to as “sub-drivers” (Severt et al, 2008).

2.3.2.1. Brand equity

Compared with value equity, brand equity is a more subjective, emotional, and experiential appraisal of a corporation or a brand (Lovelock and Wirtz, 2007) and is driven by images and personal meanings (Keller, 1998). Rust et al. (2001) point out that value equity taps into a customer's head, while brand equity addresses what lies in a customer's heart and soul (Aaker, 2002). Regardless of whether brand equity influences a consumer's mind or soul, it is positively linked to customer satisfaction, loyalty intentions, and positive customer attitudes toward a focal firm (Taylor et al., 2007). Although some researchers have considered value equity a subset of a larger brand equity dimension, we considered the two drivers separately to explore them in greater detail (Richards and Jones, 2008). Thus, in line with Rust et al. (2001), we view the antecedents of brand equity as brand awareness, brand attitude, and corporate ethics (Rosenbaum et al, 2009).

Brand equity is defined as: “the customer's subjective view of the organization and its offerings” (Rust et al., 2000, p. 55). Brand equity is important because customers may have an emotional tie to a service provider. For example, the tie may be to the image or reputation of the business. A customer's perceptions of a brand tend to be emotional and subjective. According to Keller (1993), customers who associate with a particular brand have positive brand equity, meaning they respond more to marketing activities when a brand is mentioned. Brand equity has also been
linked directly with a firm's financial performance as indicated in Kim and Kim's (2005) study which indicated that brand loyalty, perceived quality, and brand image are important components of customer-based brand equity (Severt et al, 2008).

**H2. Brand equity affects customer equity positively**

### 2.3.2.2. Value equity

Rust *et al.* (2001) deemed value equity as denoting a customer's objective assessment of the utility of a brand, based on his or her perception of benefits to costs. In other words, customers evaluate the resources they give up for the benefits they receive (Zeithaml, 1988). The literature demonstrates that both quality and price drive overall value (Teas and Agarwal, 2000), and Zeithaml (1988) argued that convenience, which includes time costs, search costs, and effort, further influences value. Notably, the value equity literature may possess a product bias because consumers perceive product quality differently than SERVQUAL (Zeithaml and Parasuraman, 2004; Zeithaml *et al.*, 2006). Nonetheless, drawing on the work of Rust *et al.* (2001), we arrived at quality, price (Teas and Agarwal, 2000), and convenience (Zeithaml, 1988) as value equity's primary drivers because Company X's customers most likely evaluate these drivers when considering a future automobile purchase from the firm (Rosenbaum *et al.*, 2009). Value equity represents the customer's objective evaluation and is defined as “the customer's objective assessment of the utility of a brand based on perceptions of what is given up for what is received” (Rust et al., 2004, p. 24). Value is important to all customers because their choice to select the product or service is influenced by their perception of the value the organization offers. (Severt et al, 2008).

Research in the area of customer's perceived value has defined three key sub-drivers of value to include: convenience, price, and quality (Gale, 1994; Parasuraman, 1997; Woodruff, 1997; Zeithaml, 1988).

- Convenience is judged based on the actions the company takes to reduce the cost and the effort a customer makes to do business with that provider. In the convention industry, proximity of the convention center to the airport may be an important element of convenience.
• Price represents what is given up by the customer (usually money and/or time) and plays an important role in the overall perceived value. The perceived value is important in the convention industry because everyone who attends pays a price to be there. Gorst et al. (1999) tested the relationship of perceived value and customer satisfaction within the context of a congress setting. The study results supported the hypotheses that customer satisfaction increased as perceived value increased (Gorst et al., 1999).

**H3. Value equity affects customer equity positively**

**2.3.2.3. Relationship equity**

Relationship-based equity involves the personal relationship elements that bond a customer to a brand beyond the customer's objective and subjective assessments of the brand (Rust et al., 2001; Rust and Zahorik, 1993). In other words, relationship equity represents a customer's response to corporate initiatives that try to build and maintain a base of committed customers for the organization (Zeithaml et al., 2006). These initiatives include corporate loyalty programs, special recognition and treatment, affinity programs, community-building programs, and knowledge-building efforts (e.g. personal selling relationships; McAlexander et al., 2002; Muniz and O'Guinn, 2001; Oliver, 1999; Richards and Jones, 2008; Rosenbaum et al., 2005). (Rosenbaum et al, 2009).

Relationship equity is defined as, “the tendency of the customer to stick with the brand above and beyond objective and subjective assessment” (Rust et al., 2005, p. 25). Relationship equity is important because it focuses on establishing a connection between the business and the customer. Relationship equity refers to a choice made by consumers when they patronize a business based on the connection they feel to the organization. For many years, theory and practice in the field of marketing has taken a change toward relationship marketing (Morgan and Hunt, 1994). The basic principle behind relationship marketing is the creation and maintenance of a long-term relationship between an organization and their customers. In the past, many businesses survived on transactional relationships but in today's service driven economy, organizations are focusing on building relationships with their customers in hopes of retaining them longer (Severt et al, 2008).
**H4. Relationship equity affects customer equity positively**

**2.3.3. Outcomes of customer equity**

The firm level outcome of this study is market performance. Market performance is being conceptualized as a firm's sales growth, market share, and market development, following the conceptualization of Venkatraman and Ramanujam (1986) and Kim et al. (2005). While customer equity measures the subjective performance of the firm beyond the utility that the brand, value, relationship offers to customers, customers tend to stay more with the brand resulting in enhanced firm market performance particularly with additional value the brand offers (Hsieh, 2004; Leone et al., 2006). Such additional values often allow premium price and repeated purchasing for the owning firm (Beverland et al., 2007). Strong brands provide a high level of quality and performance, and effectively communicate the benefits and value of a product and service (Kotler and Pfoertsch, 2007). Sloot et al. (2005) report that customers tend to postpone their purchase or even switch retailers to buy a product when high brand equity is associated with it, implying that high brand equity leads to enhanced market performance (Kim and Kim, 2004). Therefore, we contend that a high level of customer and brand equity will help a firm increase its sales and market share, and help it develop new markets, enhancing a firm's market performance (Hsieh, 2004; Leone et al., 2006).

**2.4. Research framework**

The research propositions are summarized in the preliminary theoretical framework of Daekwan Kim and Erin Cavusgil are extended and presented in figure 1. Further details on the empirical study conducted to validate the framework will be provided in the next section.
Figure 1 Conceptual model
3. CHAPTER III - METHODOLOGY AND RESEARCH DESIGN

3.1. Research methodology

A survey research study was chosen as the research methodology in order to gain better understanding about the phenomena and effect on customer equity and validate the conceptual model.

In order to test the stated hypotheses this study uses an online questionnaire that was developed from various sources. For this study, we have used existing questionings scales from the literature. We defined the domain of each construct and searched the extant literature for appropriate scales.

The measures for the supply chain responsiveness were adapted from Bello and Gilliland (1997) and McGinnis and Kohn (1990). For supply chain responsiveness, the necessary adjustments were made from the firm to the supply chain partnership level. We adopted scales for brand equity, relationship equity and value equity from Rust et al (2001,2004).

3.2. Population and sample

This was a research with respondents working for Philips Electronics B.V. in the Netherlands. Philips is a diversified Health and Well-being company, focused on improving people’s lives through timely innovations. In the Netherlands, Philips employs approximately 13,000 people.

This particular organization was chosen due to following reason: affinity to the organization developed working in one of the business units of lighting sector in Eindhoven; business units has the ultimate target – to be number one in LED market share with delighting the market with the right Led products.

The subjects of the research were supply chain responsiveness, brand equity, value equity and relationship equity positive effect on the customer equity. The sampling units for this research were team leaders / managers/ employees of Philip Lighting GBU LED Lamps & Systems.
3.3. Data collection and processing

In accordance with the research objectives, a written questionnaire has been used, gathering information from a number of respondents.

The survey procedure has included two mailings:

1. The written approval has been received from the management on the GBU LLS to carry on with the survey
2. The e-mail has been send out to the respondents. Included with the e-mail was a URL link to the survey

Using a member list of the employees/customers of GBU LLS we sent a preliminary request for participation of 124 employees/customers via e-mail. One employee declined to participate due to the limitations of working time inside the GBU LLS. A reminder was sent out after just over a week. Respondents had ten working days time to participate. In total, 104 people completed the questionnaire 102 usable responses were generated resulting in a response rate of over 82.3 per cent.

For the Questionnaire a 5-point Likert Scale (ranging from strongly disagree – strongly agree) is used.

3.4. Measurement model

The measurement model primarily analyzes the relationship between manifest (observed or measured) and latent (unobservable constructs) variables and aims to validate reliability and validity of the proposed model. This ensures that the researcher has reliable and valid measures of constructs before attempting to draw conclusions about the nature of the construct relationships (Dunn, Seaker, and Waller (1994).

Firstly the measurement model is being analyzed. Reflective measurement model is being assessed with regard to their reliability and validity. The first criterion checked is internal consistency reliability. The traditional criterion for internal consistency is Cronbach’s a (Cronbach,1951), which provides an estimate for the reliability based on the indicator intercorrelations.
Secondly, for the assessment of validity the convergent validity is being examined. Convergent validity signifies that a set of indicators represents one and the same underlying construct, which can be demonstrated through their unidimensionality. Fornell and Larcker (1981) suggest using the average variance extracted (AVE) as a criterion of convergent validity. An AVE value indicates more than 0.5 values. That presents sufficient convergent validity, meaning that a latent variable is able to explain more than half of the variance of its indicators on average (e.g., Götz, Liehr-Gobbers, & Krafft, 2009).

After reliability and validity of the measurement model have been assessed, the structural model is evaluated. In this context, a partial least square (PLS) regression is performed to determine the significance of the proposed paths between the latent variables.
4. CHAPTER IV – RESULTS

4.1 Responds and demographics

After invitations were sent out to target audience within the company and posted online, data was gathered for a period of two weeks. In this study 124 questionnaires were emailed to team leaders / managers/ employees of Philip Lighting GBU LED Lamps & Systems LSPs (205 employees globally, 2Mnl euro turnover 2010). 102 usable responses were received (response rate of 82,3%). A distribution of the respondents can be found in Figure 3 and 4.

Figure 3. Respondents responsibility areas within the company

Figure 4. Respondents’ authority levels within the company

With regard to the responsibility areas, as measured by the number of employees, respondents consist of a mix of different disciplines (Figure 3). Looking at the job descriptions of the respondents among others, 15% respondents have the managing function.
4.2. Measurement properties

PLS path modeling does not provide any global goodness-of-fit criterion. As a consequence, Chin (1998) has put forward a catalog of criteria to assess partial model structures. A systematic application of these criteria is a two-step process, encompassing (1) the assessment of the outer model and (2) the assessment of the inner model. It only makes sense to evaluate the inner path model estimates when the calculated latent variable scores show evidence of sufficient reliability and validity. Given the small sample sizes (N = 102), the use of PLS path modeling is appropriate and being efficiently used for the small sample sizes.

First, the measurement model is being analyzed. Reflective measurement model is being assessed with regard to their reliability and validity. The first criterion checked is internal consistency reliability. The traditional criterion for internal consistency is Cronbach’s a (Cronbach, 1951), which provides an estimate for the reliability based on the indicator intercorrelations. The alpha coefficient for the items is more than 0.7, suggesting that the items within the group has recorded relatively high internal consistency and have positive views.

For the assessment of validity the convergent validity is being examined. Convergent validity signifies that a set of indicators represents one and the same underlying construct, which can be demonstrated through their unidimensionality. Fornell and Larcker (1981) suggest using the average variance extracted (AVE) as a criterion of convergent validity. An AVE value indicates more than 0.5 values. That presents sufficient convergent validity, meaning that a latent variable is able to explain more than half of the variance of its indicators on average (e.g., Götz, Liehr-Gobbers, & Krafft, 2009).

Inspection of the individual item loadings presented in Appendix indicates that all items, except 4, have load higher than 0.50 ($p > .05$) on their respective construct, thereby providing support for a high degree of individual item reliability (Hulland, 1999; White et al., 2003). The loading of two of the items of brand equity, one of the value equity and one of the customer equity is not significant ($p > .05$). Therefore, these items are deleted and not being taken into model. All items and factor loadings can be found in the appendix A.

Overall, the results for the measurement model are satisfactory and are suggested to proceed with the evaluation of the structural models.
TABLE 1

Descriptive Statistics on Factor Level

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain responsiveness</td>
<td>0.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brand equity</td>
<td>0.15*</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value equity</td>
<td>0.54**</td>
<td>0.33**</td>
<td>0.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship equity</td>
<td>0.15</td>
<td>0.25*</td>
<td>0.42**</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>Customer equity</td>
<td>0.12</td>
<td>0.45**</td>
<td>0.47**</td>
<td>-0.16</td>
<td>0.50</td>
</tr>
</tbody>
</table>

The numbers on the diagonal represent the square roots of the AVEs.
* Significant at p < .05 (two tailed test)
** Significant at p < .01 (two tailed test)

4.3. Hypothesis testing

After reliable and valid outer model estimations, evaluation is being done for the inner path model by evaluating the results from the partial least square regression, using smartPLS.

The essential criterion for this assessment is the coefficient of determination (R²) of the endogenous latent variables. The coefficient of determination has a range from low 0.15 for the value equity to a high of 0.32 of relationship equity (Table 2). According to Chin (1998), the values are moderate. The theoretical underpinnings and demonstrate that the model is capable to explain the endogenous latent variables.

The individual path coefficients of the PLS structural model are being interpreted as standardized beta coefficients of ordinary least squares regressions. In order to determine the confidence intervals of the path coefficients and statistical inference, resampling techniques such as bootstrapping of 500 has been used (cf. Tenenhaus et al., 2005).

The results are based on the information of 102 respondents. In all 4 relationships are statistically significant. In Table 2 we present the results of our analyses of the structural models. Hypothesis 1 stated that supply chain responsiveness positively effects customer equity. This hypothesis is supported: a significant positive relationship exists. We hypothesized that brand equity increase the customer equity positively (hypothesis 2). This hypothesis is supported. We found a positive effect of value on customer equity, thereby supporting hypothesis 3. Finally, hypothesis 4 stated
that relationship equity does affect the customer equity positively. This hypothesis is also supported.

**TABLE 2**

<table>
<thead>
<tr>
<th></th>
<th>Results structural model</th>
<th>Coefficient</th>
<th>t values</th>
<th>p values</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SC Responsiveness -&gt; Customer equity</td>
<td>0.23</td>
<td>2.51</td>
<td>&lt;0.01</td>
<td>Supported H1</td>
</tr>
<tr>
<td>2</td>
<td>Brand equity -&gt; Customer equity</td>
<td>0.53</td>
<td>2.82</td>
<td>&lt;0.01</td>
<td>Supported H2</td>
</tr>
<tr>
<td>3</td>
<td>Value equity -&gt; Customer equity</td>
<td>0.24</td>
<td>2.08</td>
<td>&lt;0.04</td>
<td>Supported H3</td>
</tr>
<tr>
<td>4</td>
<td>Relationship -&gt; Customer equity</td>
<td>0.34</td>
<td>3.25</td>
<td>&lt;0.01</td>
<td>Supported H4</td>
</tr>
<tr>
<td></td>
<td>R Square</td>
<td></td>
<td></td>
<td>0.32</td>
<td></td>
</tr>
</tbody>
</table>

*Note: All hypothesis supported. The hypothesis is rejected if p > 0.05*
5. CHAPTER V – DISCUSSION

5.1. Findings and contribution

The findings presented in this study support findings from earlier research that customer equity is one of the main drivers service marketing, relationship marketing, and brand management and supply chain. As Blattberg and Deighton's (1996) study showed, a firm should understand the value of their customer base to determine the optimal investment the firm should make into specific customers.

Based on the existing literature a conceptual model was developed containing four hypotheses. Using PLS path modeling, this model was tested and four hypotheses were supported.

The results of the research provide valuable insights into the effects of customer equity elements. Existing studies have mainly focused on the impact of a firm's supply chain integration and responsiveness on customer equity. Customer equity, which is most firms' ultimate goal, is driven dynamically by brand equity, value equity, and relationship equity of the firm. Our study have incorporating such equity variables together that allow an investigation on how a firm's supply chain activities influence a firm's ultimate goal more dynamically. In this way the focus of the results has gone beyond focusing on the brand, what the firm offers, to focusing on the customers, what the market is seeking.

In the literature supply chain responsiveness is defined as the ability of the supply chain partnership to react to changes in the environment and market quickly and effectively (Kim et al., 2006). In the modern market, a quick and effective response via the supply chain is necessary for success (Rogers et al., 1993). Due to the fact that in the literature supply chain responds is identified as one of the most important drivers in relation to positive customer equity within the supply chain, this conducted survey in the area of lighting enables this. Customers perceive quick and effective responds as a positive factor to influence the customer equity. The findings of this study show that from a customer’s equity perspective, supply chain responsiveness is supported. Though, the quick and effective time to the market is one of the most important factors for the market success, the done research supports the hypothesis for the chosen company. Compared to the competitors, the supply chain does respond as quick and effective to the customer needs and to changing customer strategies and is being supported as the key element in the global market.
In addition, customer equity is being positively influenced by the well known brand, that is being supported by strong ethical standards and strong emotional connection towards the user. The study also shows that brand equity is a more subjective, emotional, and experiential appraisal of a corporation (Lovelock and Wirtz, 2007). The following criteria’s such as customer awareness, paying attention to information shared, well known brand, operating within ethical standards, having strong image and having a customer that is being emotionally connected to the brand, affect customer equity positively. Less influence on the customer equity has sponsoring activities and advertisements sent to the end users.  

Another strong positive influence is provided by value equity that supports best value in relationship to the best price available. The results also show that value equity is being expressed as customer’s evaluation of the resources they give up for the benefits they receive. Supporting this statement, the overall quality of the products as the competitiveness of the products prices affects strongly customer equity. Relationship equity is another element within customer equity that represents a customer's response to corporate initiatives that try to build and maintain a base of committed customers for the organization (Zeithaml et al., 2006). The relationship equity has the strongest positive influence to the customer. Based on the results of this study these initiatives include corporate loyalty programs, special recognition and treatment, community-building programs, relationship and knowledge-building efforts that highly and positively influence the customer equity. Clearly, investments into relationship equity are perceived as beneficial towards happy end customer. To conclude, relationship equity throughout the supply chain is reported as main driver in the customer equity. Supply chain responsiveness, relationship equity, value and brand equity perceived as the positive drivers toward customer equity and eventually towards the positive market improvements. This conclusion can also be drawn upon the literature and is confirmed by the performed survey. The perception for customers on the importance of customer equity drivers is as significant as from the supply chain responds.

### 5.2. Managerial implications

Our study has following managerial implications for managers. According to Villanueva, Hanssens (2007) it is critical to incorporate the customer perspective, stating that customer equity recognizes customers as the primary source of both current and future cash-flows.
Effective company performance and increased market value can only be achieved when organizations successfully develop and manage customer equity drivers. Our study gives valuable insights into the importance of these drivers and their influence.

Managerial attention is necessary for the awareness of the risks of not having the correct supply chain responsiveness in place that translates into positive customer equity outcome. They also should urge the need to promote supply chain responsiveness and customer equity drivers globally to increase the value of the customer equity, competitiveness and eventually market performance. Customers with a desire to build up tight relational bonds are very sensitive to supply chain responds and this should be improved and accordingly reacted by letting the supply chain focuses on retrieving the necessary feedback from the customer on the supply chain responsiveness.

With regard to the academe community, results validate the impact of a firm's supply chain responsiveness and customer equity drivers on customer equity (Gupta et al., 2004; Lemon et al., 2001; Rust et al., 2004a), which is most firms' ultimate goal and is driven dynamically by brand equity, value equity, and relationship equity of the firm. Furthermore, this investigates the relationship between a firm's supply chain responsiveness and customer equity drivers towards customer equity, making contributions to the relevant literature. That is, it offers to the literature empirical evidence as to the role of a firm's supply chain activities in improving customer equity. Moreover, for the supply chain literature, this study relates a firm's supply chain activities to a key marketing tool, the customer of the firm. There have been hardly any researches done, so this study seeks for relevant information to contribute.

5.3. Limitations and directions for future research

This research has few important limitations. More research is needed to address some limitations of this study. First, this study is conducted on a limited sample size and the composition of the samples. We use rather small samples were used to test our model. Although PLS path modeling is appropriate for evaluation of small samples sizes; recommendation is to use larger samples in future research to increase validity and reliability. Furthermore, the survey is done by one global business unit and the future research could have roll out in the different globally operating
business units as the results can be generalized. However the results could differ accordingly and would help to retrieve more general conclusions.

A second limitation is the cross BG’s orientated with the longer time orientated feedback. Thus the final model could benefit from being tested in a longitudinal approach. In that way it can be determined the importance of the customer equity drivers aspects and supply chain responsiveness changes throughout the relationship towards customer equity and its positive impact evaluation.

Finally, the following suggestions for the future research. First, we suggest the development of an extended model. Future model can develop a more comprehensive model by taking into account other constructs like communication, effectiveness and speed that influence the customer equity and its variables. An important extension of the current research work would be to study the customer’s equity on the relation towards the total market performance and try to create a model in order to quantify the performance improvement. Second, the attention should be raised for supply chain responsiveness. We observed that is has an important positive effect to the customer but how it should develop and what criteria should be leading to have the positive impact sustainable. Third, further research is needed with regards to scale development and testing of the consequences in this model. The outcome of the customer equity on the relation between supply chain responsiveness and customer equity driver’s improvement can also be taken to the next level.
REFERENCES


Kotler, P., Pfoertsch, W. (2007), "Being known or being one of many? The need for brand


Philipsen, K., Damgaard, T. (2008), 'Suppliers' opportunity enactment through the development


APPENDIX

Appendix A Descriptive Statistics on Item Level

Descriptive Statistics on Item Level

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>ST Dev</th>
<th>Factor loadings</th>
<th>AVE*</th>
<th>Cronbachs Alpha *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain responsiveness</td>
<td>0.60</td>
<td>0.50</td>
<td>0.96</td>
<td>0.58</td>
<td>0.76</td>
</tr>
<tr>
<td>Compared with other competitors, supply chain of Philips responds more quickly and effectively to changing customer needs</td>
<td>0.60</td>
<td>0.50</td>
<td>0.96</td>
<td>0.58</td>
<td>0.76</td>
</tr>
<tr>
<td>Compared with other competitors, supply chain of your company responds more quickly and effectively to changing competitor strategies</td>
<td>0.48</td>
<td>0.47</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In most of global markets, supply chain of your company is competing effectively.</td>
<td>0.30</td>
<td>0.54</td>
<td>0.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In customer awareness my company is the industry leader</td>
<td>0.55</td>
<td>0.30</td>
<td>0.68</td>
<td>0.45</td>
<td>0.80</td>
</tr>
<tr>
<td>I often notice and pay attention to information that my company sends me</td>
<td>0.45</td>
<td>0.31</td>
<td>0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My company is well known as a good corporate citizen in Netherlands</td>
<td>0.06</td>
<td>0.38</td>
<td>-0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My company is an active sponsor of community events in Netherlands</td>
<td>0.46</td>
<td>0.29</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel strong emotional connection to my company’s brand</td>
<td>0.50</td>
<td>0.29</td>
<td>0.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would you rate the overall quality of your company products</td>
<td>0.24</td>
<td>0.46</td>
<td>0.62</td>
<td>0.56</td>
<td>0.72</td>
</tr>
<tr>
<td>How would you rate the competiveness of your company’s product</td>
<td>0.13</td>
<td>0.62</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How would you rate the availability of required your company’s product</td>
<td>0.32</td>
<td>0.61</td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I receive preferential service from my company because I am a loyal customer</td>
<td>0.50</td>
<td>0.30</td>
<td>0.60</td>
<td>0.54</td>
<td>0.87</td>
</tr>
<tr>
<td>My company knows a lot information about me</td>
<td>0.52</td>
<td>0.27</td>
<td>0.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My company recognizes me as being special</td>
<td>0.57</td>
<td>0.42</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have a high level of trust in my company</td>
<td>0.57</td>
<td>0.27</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel that I have a close relationship to my company</td>
<td>0.58</td>
<td>0.39</td>
<td>0.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>My first impression is that my company’s brand is appealing</td>
<td>0.46</td>
<td>0.48</td>
<td>0.76</td>
<td>0.50</td>
<td>0.79</td>
</tr>
<tr>
<td>Customer equity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If my company’s introduces a new product, I want to try it out</td>
<td>0.07</td>
<td>0.43</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would suggest the my company’s brand to my friend/relatives</td>
<td>0.61</td>
<td>0.40</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The items with a factor loading below 0.5 (in italics) were deleted and not used in the final scale
* Cronbachs Alpha and AVE scores represent the scores after removing the items with factor loadings below 0.5

Appendix B
Dear Survey Participant,

Thank you for participating in this study of supply chain integration on customer equity. It should only take about 10 minutes to complete this questionnaire. Your cooperation and contribution for this study is greatly appreciated.

Questionnaire

1. Supply Chain responsiveness
   (5 = strongly agree 1 = strongly disagree)
   Compared with other competitors, supply chain of your company responds more quickly and effectively to changing customer needs
   Compared with other competitors, supply chain of your company responds more quickly and effectively to changing competitor strategies
   In most of global markets, supply chain of your company is competing effectively.

2. Brand equity
   (5 = strongly agree 1 = strongly disagree)
   In customer awareness my company is the industry leader
   My company is well known as a good corporate citizen in Netherlands
   My company is an active sponsor of community events in Netherlands
   I feel strong emotional connection to my company’s brand

3. Value equity
   How would you rate the overall quality of your company products (5 = very high quality, 1 = very low quality)
   How would you rate the competitiveness of the your company’s product prices (5 = very high quality, 1 = very low quality)
   How would you rate the availability of required your company’s product (5 = very high 1 = very low)

4. Relationship equity
I receive preferential service from my company because I am a loyal customer
My company knows a lot information about me
My company recognizes me as being special
I have a high level of trust in my company
I feel that I have a close relationship to my company

5. Customer equity

(5= strongly agree 1 = strongly disagree)
My first impression is that my company’s brand is appealing
If my company’s introduces a new product, I want to try it out
I would suggest the my company’s brand to my friend/relatives

6. General
What is your education level?
- WO, HBO
- Other
Which part of Philips team do you belong to?
- GBU LED Lamps and Systems
- Corporate Purchasing
- Consumer Lighting
- Other
What are your responsibility areas within the company?
- Supply Chain
- Purchasing
- Innovation
- Industrial
- Quality
- Marketing
What is your authority level within the company?
- Team Leader
- Manager
- Director
- Senior
- Other