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**SUPPLIER INTEGRATION,  
GREEN SUSTAINABILITY INITIATIVES, AND  
FINANCIAL PERFORMANCES OF FASHION  
ENTERPRISES UNDER GLOBAL FINANCIAL CRISIS**

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**M.Phil**

**The Hong Kong Polytechnic University**

**2015**

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ENTERPRISES UNDER GLOBAL FINANCIAL CRISIS**

**LI WING YAN**

**A thesis submitted in partial fulfillment of the requirements for  
the degree of Master of Philosophy**

**September 2014**

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# Abstract

Supplier integration (SI) and green sustainability program (GSP) adoption are common in fashion supply chain management. It is widely believed that these practices would lead to competitive advantages of the enterprises, and help enhance their operational and financial performances.

The fashion industry is one of the sectors that are greatly influenced by the economic situation of the market. Any economic recession or disruption would significantly hurt the fashion enterprises' business performances.

Motivated by the importance of SI and GSPs in fashion supply chain management and the big impact of financial tsunami, this thesis empirically studied the effect of SI and GSP adoption on fashion enterprises' financial performances under the 2008 financial tsunami. A total of 90 fashion enterprises were selected from Thomson Reuters Knowledge database according to a list of criteria for this research. Content analysis and statistical methods were employed to collect and analyze data. In order to study the impact of the financial tsunami on business performance, this thesis explored the fashion enterprises' financial performances in 1) the pre-recession period, 2) the post-recession period, and 3) between these two periods of time. Besides, the relationship between SI of a fashion enterprise and its GSP adoption was also examined. As the fashion supply chain is complex and varies with different contextual factors, this study also examined the moderating effect brought by fashion content and revealed whether there would be

different findings for fashion enterprises which mainly sell “fashionable” from those sell “basic” products.

The findings of this study indicated that (1) both SI and GSP adoption were beneficial to fashion enterprises’ financial performances, especially after financial tsunami; and (2) fashion content did exert the moderating effect on the above relationships. Comparing between the “fashionable” group and the “basic” group, using SI and GSPs were effective for the “fashionable” group to improve its profit against financial tsunami but not for the “basic” group. This study also demonstrated that a high level of SI would encourage fashion enterprises to establish GSP. On the other hand, no mediating effect of GSP adoption was found on the relationship between SI and fashion enterprises’ financial outcomes. Based on these results, specific managerial recommendations were then given.

# List of Publications

## Journal Paper:

Li, W. Y., Choi, T. M., & Chow, P. S. (2014). Risk and benefits brought by formal sustainability programs on fashion enterprises under market disruption. *Resources, Conservation & Recycling*. DOI: 10.1016/j.resconrec.2014.08.005, in press.

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# Chapter 1 Introduction

## 1.1 Research background

In the literature, it was well argued that proper operations management helped enhance companies' competitiveness as well as survival ability during market disruption and economic recession (Juttner & Maklan, 2011). Over the past decades, amongst many managerial measures, supplier integration (SI) was one of the most critically important topics. It was commonly believed that companies no longer competed amongst themselves, but amongst their supply chains. Integrating with suppliers, therefore, was a crucial strategy to achieve a sustainable competitive edge in the industry.

In the literature, SI was believed by many scholars to be able to improve both operational and financial performances (Cao & Zhang, 2011; Droge, Jayaram & Vickery, 2004; Feng, Sun, Sohal & Wang, 2014). It enhanced flexibility, time to market and inventory management (Droge et al., 2004), which were all significantly important in the fashion industry. Suppliers who offered useful market knowledge allowed better production planning and scheduling for market growth in the long run (Swink, Narasimhan & Wang, 2007). Some researchers, however, had queries about the claimed benefits of SI, as collaborating with supplier also incurred costs of coordination, compromise and information assimilation (Das, Narasimhan & Talluri, 2006; Swink et al., 2007). A further and closer examination of SI in a specific industrial setting was therefore necessary.

Apart from SI, environmental sustainability, including green sourcing and management, was also a practice in operations management that helped improve companies' competitiveness. This was especially true for fashion apparel companies because the textiles and fashion industry has been well-recognized as a big source of pollutants which posed a great threat to the environment (Li, Zhao, Shi & Li, 2014). Thus, over the past decade, green sustainability programs (GSPs) have been implemented as a part of formal operations in many fashion enterprises with substantial resources allocated. The well-discussed benefits of GSP adoption included improving corporate reputation, gaining greater supports and investment from the public and the financial markets (Marom, 2006; Schuler & Cording, 2006). On the other hand, the literature has also revealed conflicting views on GSPs with regards to the investment for compliance with legislation about recycling, media exposure and green innovations (Dangelico & Pujari, 2010; Epstein & Roy, 2001; Michelin, 2011).

Fashion industry was one of the sectors that were greatly influenced by market economy. Any economic recession or fluctuation would heavily distress a fashion enterprise's financial performances (Pal, Torstensson & Mattila, 2014). Financial tsunami, which referred to the huge economic downturn and recession, created a lot of problems to the fashion industry, too. For instance, under the most recent global financial tsunami in 2008, fashion apparel manufacturers and retailers suffered. In the mainland China, hundreds of apparel manufacturers went bankrupt after the financial tsunami in 2008 (Shen, Choi, Wang & Lo, 2013). The global economy was then driven into the dark-age for that period of time. Pal et al. (2014) proposed that financial resource was one of the antecedents of

organizational resilience in economic crises. There were hence beliefs that both SI and GSP adoption were valuable measures in fashion supply chain management. However, none of them were cost-free; they might in fact consume considerable resources of a fashion enterprise.

Motivated by the importance of SI and GSP adoption and the huge influence of market disruption brought by the financial tsunami, this thesis research employed public data to empirically explore the financial performances of fashion enterprises with respect to SI and GSP adoption in the presence of the 2008 financial tsunami. As the fashion supply chain was complex and varied with different contextual factors, this study also examined the moderating effect brought by fashion content. Fashion content was a typical business feature in the fashion industry. Enterprises of different fashion contents would result in different product features and supply chain requirements (e.g., lead times and ordering practices), which in turn might influence the relationships among SI, GSP adoption, and fashion enterprises' financial performances. Therefore, this study also expected to reveal whether there would be different findings for fashion enterprises which mainly sold “fashionable” products from those focused on “basic” products. The specific objectives are stated in Section 1.2.

## **1.2 Research objectives**

To facilitate understanding of the approach of the study, the main research objectives are listed below in details:

- 1) To examine the main effect of SI on fashion enterprises' financial performances across different time periods and against financial tsunami in 2008.
- 2) To investigate the main effect of GSP adoption on fashion enterprises' financial performances across different time periods and against financial tsunami in 2008.
- 3) To explore the relationship between SI and GSP adoption of fashion enterprises and thus the indirect relationship between SI and fashion enterprises' financial performances via GPS adoption.
- 4) To discover the moderating effect of fashion content (fashionable versus basic) on the above relationships
- 5) To provide fashion enterprises with managerial insights and recommendations that are pertinent to SI and GSP management.

In view of the above objectives, a systematic search in Thomson Reuters Knowledge database was conducted to collect samples of fashion enterprises (which were publicly listed with their business performances and related data available online). In order to determine the extent of SI and GSP adoption of a fashion enterprise, content analysis was conducted to make valid inferences from the appearance of particular words or contents in textual materials such as those enterprises' annual reports and official websites (Hsieh & Shannon, 2005). This study focused on market disruption brought by the recent 2008 financial crisis, and examined fashion enterprises' business performances including net income, return on assets (ROA) and inventory turnover before and after market disruption (i.e. the 2008 financial tsunami) as well as the differences in performances

between the two phases. Finally, based on the results of the quantitative analysis, important managerial insights and recommendations were presented to provide better understanding on the effect of SI and GSP adoption on fashion enterprises' financial performances.

### **1.3 Research contribution**

This research was expected to contribute to both theoretical literature and practical managerial knowledge. On the theoretical side, this research filled in the gap of the literature on fashion supply chain and sustainability management in several ways. Despite the fact that a large body of literature had examined the effect of SI and green sustainability on fashion companies' operational and financial performances, this research was the first attempt to examine how SI and GSP adoption affected fashion enterprises' performances under market disruption, and the role played by the core business feature (fashionable versus basic). Besides, the relationship between SI and GSP adoption of fashion enterprises was also explored. On the practical side, the findings of this study generated important managerial insights to fashion enterprises and demonstrated to them on the potential benefits and drawbacks of engaging in SI and GSP adoption under financial crisis.

### **1.4 Thesis outlines**

The dissertation was organized as follows. Chapter 1 presented the research background, objectives, contribution and approaches. Chapter 2 comprehensively reviewed the related literature. In addition, the conceptual research model and hypotheses were proposed. Chapter 3 illustrated the data collection process and

research methodology. Chapter 4 showed the results and findings from the statistical analysis. Chapter 5 discussed the findings and developed implications. Finally, conclusion of the study with discussion on research limitations and future research directions were given in Chapter 6.

### **1.5 Chapter summary**

In this chapter, research background, objectives, contribution and thesis outlines were discussed. A detailed literature review would be presented in the next chapter.



## **Chapter 2 Literature Review**

The purpose of this chapter is to provide a better understanding of previous research in the related areas, as well as the rationale of the present study. The chapter is divided into 3 main parts. It begins with a review of literature on the concepts and related practices of supplier integration (SI) and their impact on supply chain performances. The studies on green sustainability program (GSP) adoption in the fashion industry and its impact are then presented, followed by discussion on the relationship between SI and GSP adoption. Research hypotheses and a conceptual model are presented in the last part of this chapter.

### **2.1 Supply chain integration (SCI)**

Supply chain integration has been emphasized by both academics and industrialists over the past decades. Upon a broad review on the literature, specific terms like joint-effort, integration, collaboration and coordination were used complementarily to describe the relationship between supply chain parties as these terms consisted of similar features (Kanda & Deshmukh, 2008).

Some supply chain integration definitions emphasized the flows of materials (Frohlich & Westbrook, 2001; Prajogo, Chowdhury, Yeung & Cheng, 2012); others focused more on the flows of information (Seggie, Kim & Cavusgil, 2006) and joint development (Feng & Wang, 2013; Zhang & Li, 2010). Synthesizing the literature, supply chain integration could be defined as the degree to which a company collaborated with its supply chain partners and jointly managed intra- and inter-firm processes (Zhao, Huo, Flynn & Yeung, 2008), which demanded

cohesiveness and coordination as an essential synergy (Das et al., 2006; Wagner, 2003). The goals of supply chain integration were to achieve efficient flows of materials, products, information and transaction and improve decisions making, so as to satisfy customers and enhance business performances (Bowersox, Closs, & Stank, 1999; Frohlich & Westbrook, 2001; Zhao et al., 2008).

The level of supply chain integration ranged from transaction-focused to highly integrated (Goffin, Lemke & Szejczewski, 2006), from regular meetings to supplier collaboration (Oh & Rhee, 2008), or from intra-firm based to inter-firm based (Schoenherr & Swink, 2012). It was well argued that organizations no longer competed amongst themselves, but amongst their supply chains. Supply chain integration, therefore, became a very critical strategy to build up competitive advantages in a market.

## **2.2 Dimensions of SCI**

Researchers had different views on the dimensions of supply chain integration. There were various studies on the relationships between SCI and operational and business performances (See Appendix I). Some authors investigated supply chain integration as a one dimensional construct (Armistead & Mapes, 1993; Marquez, Bianchi & Gupta, 2004; Rosenzweig, Roth & Dean, 2002) while others divided it into internal and external integration (Campbell & Sankaran, 2005; Droge et al., 2004; Morash & Clinton, 1998; Petersen, Handfield & Ragatz, 2005; Ragatz, Handfield & Petersen, 2002; Stank, Keller & Daugherty, 2001; Zailani & Rajagopal, 2005).

According to Flynn, Huo and Zhao (2010), when intra-firm departments and functions jointly worked together as an integrated part, it was recognized as internal integration; and when a company established a close and interactive relationship with supply chain partner outside the boundary, it was recognized as external integration. Some even took a wider perspective of supply chain integration, i.e. a multiple dimensional view (Droge et al., 2004; Gimenez & Ventura, 2005; Koufteros, Vonderembse & Jayaram, 2005; Narasimhan & Kim, 2002; Vickery, Jayaram, Droge, & Calantone, 2003), where external integration was further divided into customer and supplier integration (Flynn et al., 2010; Frohlich & Westbrook, 2001; Schoenherr & Swink, 2012). Customer integration involved core capabilities resulting from the interaction with customers, whereas supplier integration related to collaboration with suppliers (Bowersox et al., 1999).

Supplier integration in most research was defined as a range of organizational practices involving both the focal firm and its suppliers. SI practices included long-term partnerships (Cousins & Menguc, 2006), sharing information and knowledge (Danese, 2013; Huo, Qi, Wang & Jeff, 2013), co-development of supply chain activities and joint planning meetings (Swink et al., 2007), etc. The shared operational and managerial information as well as the joint efforts could generate mutual benefits to the supply chain partners (Das et al., 2006; Petersen et al., 2005; Swink et al., 2007). This thesis study focused on supplier integration and defined it as a state of synergy accomplished through a variety of integration practices among suppliers and fashion enterprises in order to improve supply chain efficiency and market performance.

### **2.3 The needs of supplier integration (SI) in fashion industry**

Donaldson (2001) believed that the environment in which an organization operates shaped its structures and processes. Companies should develop their structures and processes to cope with market challenges, so as to maximize market share and enhance performance. When the competition had progressed from the “company” basis to the “supply chain” basis, the levels of supply chain integration initiatives would also be changed. Supplier integration became a valuable and competitive asset (Das et al., 2006). There were several key characteristics mentioned in the literature that influenced the relationship between fashion companies and their suppliers. They are reviewed as follows.

#### **2.3.1 Characteristics of fashion products**

A fashion product was often designed to capture the “mood of the moment”. Therefore it was usually saleable within a very short period of time, measured in months or even weeks (Christopher, Lowson, & Peck, 2004). The frequency of design launched was further accelerated by the trends of fast fashion. For instance, the fast fashion brand Zara selected around 11,000 items from almost 30,000 designs per year (Tokatli, 2007). Another characteristic of fashion products was the high level of customization required (Duray, Ward, Milligan & Berry, 2000). Mass customization aimed to satisfy customers’ need of uniqueness at a low cost near to that of mass production. Supplier integration enabled mass customization which in turn helped fashion enterprises to deliver superior values to their end customers (Yeung, Choi & Chiu, 2010).

Observe that conventional forecasting methods in the fashion industry were no longer adequate to meet the customer-driven demand. Instead, it required enterprises and their supply chain members moving to a higher level of integration for joint planning, scheduling and problem solving, so as to improve market responsiveness and performances (Christopher et al., 2004; Gunasekaran & Ngai, 2005). Integrating with supply chain partners could reduce lead time and deliver products to the market more effectively (Frohlich & Westbrook, 2001).

### **2.3.2 Characteristics and the level of competition of fashion market**

Some fashion retailers indicated that they had experienced high uncertainty compared to other industries as this sector was customer-driven (de Leeuw & Franco, 2009). Therefore, it was difficult to forecast the total demand within a short time period because of demand fluctuation (Christopher et al., 2004). Volume and specification uncertainty further increased the need for supply chain integration (Kouvelis & Milner, 2002; van Donk & van der Vaart, 2005). The nature of the volatility in the fashion industry and the need to achieve rapid response encouraged the establishment of supplier integration in order to attain superior responsiveness to market changes. For instance, sharing information between suppliers and buyers improved ordering flexibility (Swafford, Ghosh & Murthy, 2008) and reduced bullwhip effect (Dejonckheere, Disney, Lambrecht & Towill, 2004).

Besides, the fashion market was characterized by being highly competitive as there were considerable operations alternatives (Fisher, 1997). It was therefore hard to sustain competitive advantages in the market. Das et al. (2006) claimed

that co-generation of new knowledge with suppliers was important to resist imitation by competitors according the theory of *resource-based view (RBV)* of a firm.

### **2.3.3 Characteristics and capabilities of suppliers**

Experienced suppliers provided valuable information about materials and process capabilities in product development. Their technical expertise could bring significant advantages to enlarge product diversity (Koufteros, Cheng & Lai, 2007). Fashion companies desired to build up partnerships with suppliers who had better skills and capabilities, as well as passion in research and development (Goffin et al., 2006; von Corswant & Fredriksson, 2002). However, this initiative was inhibited by suppliers who lacked skills and capabilities (Leeuw & Franco, 2009). In addition, suppliers who shared resources in different supply chains limited the capability of integration, but timely and accurate information exchange allowed suppliers to increase the degree of flexibility in supply chain management (van Donk & van der Vaart, 2005).

### **2.4 Supplier-integrated practices**

Integrating suppliers into companies' business practices encouraged trust building amongst supply chain partners (Feng & Wang, 2013). As trust developed, supply chain members experienced reduced uncertainties about partners' actions. The opportunism level would decrease with the transaction costs of searching, negotiating and monitoring supply chain activities (Das et al., 2006).

The level of supplier integration could be regarded as the degree to which a company jointly worked with its supply chain partners (Mishra & Shah, 2009). In the literature, the items used to measure SI were different, but the common objective of supplier integration was to go beyond firm-level boundaries and coordinate business processes seamlessly, so as to improve efficiency and performances. For instance, Prajogo et al. (2012) applied a multi-dimensional perspective of supplier management including long-term relationship, supplier assessment and logistics integration, and investigated their impact on firms' performances. This thesis study identified those SI practices in the literature that were important in fashion supply chain management. Table 2.1 shows a summary of the important supplier integrated criteria in prior research.

**Table 2.1 Summary of the important SI practices in prior research**

<b>Supplier integrated criteria</b>	<b>Prior literature</b>
Use of information technology	Cousins and Menguc (2006) Das et al. (2006) Dejonckheere et al. (2004) Flynn et al. (2010) Huo et al. (2013) Kanda and Deshmukh (2008) Kehoe and Boughton (2001) Li, Ragu-Nathan, Ragu-Nathan and Subba-Rao (2006) Moberg, Cutler, Gross and Speh (2002) Paulraj and Chen (2007) Prajogo and Olhager (2012) Qrunfleh and Tarafdar (2014) Sanders (2005) Sheu, Yen and Chae (2006) Swafford et al. (2008) Swaminathan and Tayur (2003) Swink et al. (2007)
Long-term relationship	Cousins and Menguc (2006) Huo et al. (2013) Li et al. (2006) Najifi Tavani, Sharifi, Soleimanof and



	<p>Najmi (2013)</p> <p>Prajogo et al. (2012)</p>
<p>Joint goals setting and continuous improvement programs</p>	<p>Cousins and Menguc (2006)</p> <p>Das et al. (2006)</p> <p>Feng and Wang (2013)</p> <p>Huo et al. (2013)</p> <p>Li et al. (2006)</p> <p>Petersen et al. (2005)</p> <p>Prajogo et al. (2012)</p> <p>Sarker and Mohapatra (2006)</p> <p>Swink et al. (2007)</p>
<p>Joint product development</p>	<p>Cousins, Lawson, Petersen and Handfield (2011)</p> <p>Droge et al. (2004)</p> <p>Feng and Wang (2013)</p> <p>Feng et al. (2014)</p> <p>Flynn et al. (2010)</p> <p>Koufteros et al. (2007)</p> <p>Mishra and Shah (2009)</p> <p>Najifi Tavani et al. (2013)</p> <p>Petersen et al. (2005)</p> <p>Swink et al. (2007)</p> <p>Zhang and Li (2010)</p>

Production Flexibility	<p>Fry et al. (2007)</p> <p>Gunasekaran and Ngai (2005)</p> <p>Li et al. (2006)</p> <p>Saghiri and Hill (2014)</p> <p>Simatupang, Wright and Sridharan (2002)</p> <p>van Hoek, Vos and Commandeur (1999)</p> <p>Waller, Dabholkar and Gentry (2000)</p> <p>Yeung et al. (2010)</p>
Joint quality control program	<p>Brun and Moretto (2014)</p> <p>Choi and Rungtusanatham (1999)</p> <p>Landeros and Monczka (1989)</p> <p>Morgan and Hunt (1994)</p> <p>Romano and Vinelli (2001)</p>
Joint inventory management	<p>Chow, Choi, Cheng and Liu (2010)</p> <p>Fisher (1997)</p> <p>Kanda and Deshmukh (2008)</p> <p>Mihm (2010)</p> <p>Prajogo et al. (2012)</p> <p>Simatupang et al. (2002)</p> <p>Yao and Dresner (2008)</p>

#### **2.4.1 Use of IT**

Supply chain information sharing increased with the degree of international competition (Huo, Zhao & Zhou, 2014). IT alignment helped a firm's IT systems to work compatibly with those of its supply chain partners (Wu, Yeniyurt, Kim & Cavusgil, 2006). It contributed to a better platform for engaging in activities planning and problem-solving (Sheu et al., 2006). The literature endorsed the advantages of using IT in supply chain integration. On one hand, it allowed a high volume of information being exchanged between supply chain partners; on the other hand, it enabled firms to provide real-time supply chain information, including inventory level, production and delivery status (Prajogo & Olhager, 2012). It facilitated operations management in fashion supply chains including forecasting, sourcing, ordering and scheduling (Kehoe & Boughton, 2001; Swaminathan & Tayur, 2003; Paulraj & Chen, 2005).

As system integration could reduce technical barriers and incompatibility between firms, supply chain members could collaborate effectively (Byrd & Turner, 2001). For example, some supply chain communication systems had built-in functions for joint forecasting and planning among partners. Some researchers supported the use of IT infrastructure as it facilitated the development of close relationships among supply chain partners (Sanders, 2005). Seggie et al. (2006) acknowledged that the use of IT had a positive effect on improving brand values and financial performances. As supply chain activities had been fragmented and carried out by different supply chain members who were geographically dispersed, IT linkage allowed them to virtually work as a single entity to increase market responsiveness (Prajogo & Olhager, 2012). The commonly used IT, including

internet, electronic data interchange (EDI), enterprise resource planning (ERP) and supply chain optimization (SCO) software, allowed supply chain partners to rapidly exchange real-time information for tracking, planning, as well as problem addressing to optimize supply chain operations (Kanda & Deshmukh, 2008).

IT capability and information sharing were equally important in supply chain integration (Prajogo & Olhager, 2012). It was meaningless if partners were not willing to share critical supply chain information (Fawcett, Osterhaus, Magnan, Brau & McCarter, 2007). A higher level of supply chain integration encouraged better quality of strategic information exchange (Klein, Rai & Straub, 2007), and this was essential for business decision making (Li et al., 2006). For instance, point of sale history and inventory level status helped suppliers to do demand planning and replenishment more effectively, which in turn improved market responsiveness and performances (Flynn et al., 2010; Prajogo & Olhager, 2012).

Besides, firms in collaboration enhanced timely and accurate information exchange about customers, markets, and even competitors (Moberg, Cutler, Gross & Speh, 2002). In the fashion industry, information sharing for fashion trends, fabrics and other design elements (Mihm, 2010) was of paramount importance. Supply chain members kept each other informed about any changes that could affect the supply chain operations. Successful information exchange improved service levels (Li & Lin, 2006), and reduced the bullwhip effect (Dejonckheere et al., 2004) and operational costs in administration, ordering and inventory management (Wong, Lai & Cheng, 2011). And this applied to the operations of Adidas (Adidas group, 2012).

#### **2.4.2 Long-term relationship with suppliers**

Helper (1991) revealed that the trend of supply chain management was to build up a long-term relationship with suppliers rather than to just develop a short-term contract. A long-term relationship with suppliers was one of the antecedents of a firm's financial performance (Chen & Paulraj, 2004). In the highly competitive apparel market, long-term buyer-supplier relationship has several implications. First, it encouraged information and ideas exchange which helped build up an environment with lower opportunism. The socialized relationship and supplier development could help enhance supplier operational and communication performances (Cousins & Menguc, 2006). The long-term relationship with suppliers focused on enhancing relationship characteristics and created a win-win situation instead of an adversarial relationship (Paulraj & Chen, 2005). According to Prajogo et al. (2012), strategic long-term relationship with suppliers was positively related to a firm's delivery, flexibility and cost performance. Second, companies under a good relationship were more prepared for large investment in supply chain integration, including IT systems and real-time information exchange, (de Toni, 1999). Third, this was a requisite for other supplier management activities (Prajogo et al., 2012). It helped develop mutual trust which led to various collaborations and directly contributed to supply chain performances (Prajogo & Olhager, 2012). Besides, supply chain collaboration could reduce costs and enhance quality without investment of actual ownership (Carr & Pearson, 1999). Adidas Group claimed that its relationships with its partners were always long-term and exclusive in order to increase efficiency and protect research results (Adidas group, 2012).

### **2.4.3 Joint goals setting and continuous improvement programs**

According to Petersen et al. (2005), enterprises had the ultimate power in setting goals, but the participation of suppliers could help setting achievable goals. In the processes of goals setting or improvement programs, the product development team worked together with key suppliers to explore and determine the expectation and directions of the supplier integration efforts, in terms of cost, quality and scheduling. Goal congruence enhanced the supply chain partners' collaboration quality (Yan & Dooley, 2014). Suppliers could make use of their expertise in production to provide more realistic information on the tradeoffs between capabilities and goals. Suppliers with a high sense of responsibility further strengthened the impact of joint goals setting on operational effectiveness (Petersen et al., 2005). Besides, formal supplier evaluations and feedback systems were also the key attributes in supplier integration (Landeros & Monczka, 1989; Morgan & Hunt, 1994). Continuous assessments and improvement programs provided evaluation feedbacks to suppliers which helped clarify both parties' expectations and directions of future improvement (Krause, Scannell & Calantone, 2000).

Activities associated with goals setting and improvement programs included joint planning meetings, conferences and supplier assessments (Cousins & Menguc, 2006; Prajogo et al., 2012). These facilitated mutual understanding and provided opportunities for supply chain members to have clear communication channels for better performance evaluations, so as to improve supply chain integration and supplier performances (Cousins & Menguc, 2006). Joint goal setting and integration efforts further encouraged suppliers to participate in improvement

programs and trainings to improve production efficiency (Cousins and Menguc, 2006). Continuous monitoring and assessments of suppliers' performances could ensure and improve buyers' performances in terms of quality, cost and delivery (Prajogo et al., 2012; Sarker & Mohapatra, 2006). For example, Inditex has integrated with leading scientific and technological institutions to create tailor-made trainings and supportive programs for its supply chain members in achieving different specific objectives (Inditex, 2012).

#### **2.4.4 Joint product development**

Supplier partnering provided frameworks for strategic collaboration. Fashion enterprises worked continuously with their suppliers, encouraging them to involve early and providing the needed expertise and capabilities for new designs and styles (Richardson, 1996). Involving suppliers in the product development process allowed early identification of potential problems, such as contradictory specifications and unrealistic proposals (Mishra & Shah, 2009). Fashion designers, who had a better understanding on manufacturing capabilities, could keep a match between production capabilities and product designs (Droge et al., 2004). By ensuring the designs were workable with suppliers' existing capabilities and technologies, the product development process could be accelerated.

Joint working with suppliers in a new product development process also offered innovative and novel ideas for design and production (Bowonder, Dambal, Kumar & Shirodkar, 2010). This helped fashion companies to increase design efficiency and lower the design and development costs. For example, the close collaboration with J. C. Penney had allowed TAL to design products for it. TAL's design teams

came up with a new style, produced around 100,000 new shirts in a month and then delivered to around 50 J. C. Penney stores for marketing testing (Kahn, 2003). This helped fashion enterprises to broaden innovation search scope and reduce innovation search costs (Zhang & Li, 2010), as well as enhance productivity, speed, and product quality (Primo & Amundson, 2002; Ragatz et al., 2002).

On the other hand, involving suppliers in setting project-based technical performance objectives allowed effective decision making (Petersen et al., 2005). Fashion companies depended heavily on the suppliers' expertise. Integrating with suppliers enabled a company to successfully employ the suppliers' capabilities to improve their product development strategies (Cousins et al., 2011; Najafi Tavani et al., 2013). When suppliers were involved in product development, their technical expertise could provide valuable materials and process knowledge, thus product diversity was enhanced (Koufteros et al., 2007). Better knowledge regarding new technologies and process improvements could also enhance decision making within the scope of the new product development processes (Najafi Tavani et al., 2013).

The trends in fashion market not only focused on the design of an item, but also the technological function behind. To build up a sustainable competitive advantage which was difficult to be substituted, companies should pay more attention on brand value enhancement. For instance, Uniqlo had formed strategic partnership with the synthetic fiber manufacturers, Toray Industries, to develop new fiber and materials, and create a revolutionary product called "HEATTECH" (to wear thin, light clothing during cold winter). UNIQLO's brand image,



therefore, has been transformed from a low-priced brand to a brand of high-quality clothing made of functional and high-tech fabrics (Fast Retailing, 2012).

#### **2.4.5 Production flexibility**

The apparel industry was market-oriented and real-time demand driven. Also, customer preference and demands were always uncertain and unpredictable (Fisher, 1997). Product volume and mix flexibility, referred to the ability to change the levels and ranges of products within a given time period (Slack, 1987), were important in the fashion industry (Purvis, Gosling & Naim, 2014). To satisfy demands and prevent inventory obsolescence, suppliers were always requested to offer a high variation in product range, and support demand changes by cancelling orders and increasing small volume orders (Purvis et al., 2014). Therefore, production flexibility demanded a high level of supplier involvement, requiring supply chain members to be highly integrated and consider the mutual benefits at the supply chain level when addressing problems (Gunasekaran & Ngai, 2005).

Besides, fashion companies attained production postponement in order to respond quickly to market changes and satisfy demands with minimum stock-out or over stocking. Postponement was defined as “*a practice of moving forward one or more operations or activities (making, sourcing and delivering) to a much later point in the supply chain*” (Naylor, Naim & Berry, 1999; van Hoek & Voss, 1999). Common and undifferentiated modules were produced and stored in the semi-finished state. The final products would be assembled once the customer requirements were known (Salvador, Rungtusanatham & Forza, 2004).

In the case of Zara, neutral fabrics were stocked at the production facilities, which were dyed or printed quickly after the better selling colors were known (Fry et al., 2007). This kind of postponement strategy allowed better decisions on colors reflected by the market trends. Differentiating product at a much later point increased flexibility in product specifications development, which in turn improved market responsiveness and reduced supply chain cost (van Hoek et al., 1999; Waller et al., 2000).

In addition, production postponement also acted as a tool in mass customization. Customers enjoyed product uniqueness because of the individualized offerings (Yeung et al., 2010). NIKEiD (the mass customization program offered by Nike) had operated by linking its configuration systems with their manufacturing partners (Wilson, 1999). Yeung et al. (2010) attributed the success of Nike's mass customization program to its close partnerships with its suppliers. Furthermore, the recent research also showed that postponement strategies in product design and production were influenced by joint effort with suppliers (Saghiri & Hill, 2014).

#### **2.4.6 Joint quality control program**

Proper supply chain operations management required a high level of product quality at every parts of the supply network (Choi & Rungtusanatham, 1999). Romano and Vinelli (2001) revealed that a finished garment should be checked from both "commercial point of view" (i.e. visible defects) and "technical point of view" (i.e. important quality points determined by the designer that a garment must have). And there should be clear standards and quality points defined by

both suppliers and designers together to quantify and monitor the quality of the finished products.

Apart from the joint quality standard setting, frequent visits by brand managers and inspectors to suppliers' factories were also necessary. They provided an opportunity for both parties to meet and monitor the operational processes jointly (Romano & Vinelli, 2001). For example, UNIQLO's production managers visited partners' factories weekly to resolve any product issue with its suppliers. Production managers transferred customer concerns on quality to the production departments and made improvements together immediately (Fast Retailing, 2012). Brun and Moretto (2014) identified approaches for quality management implemented in the luxury fashion supply chain. For instance, Louis Vuitton employed a strong control for its suppliers to develop their processes for quality insurance. Their study also claimed that in order to minimize the tight and non-profitable certification, the role of the external supplier was important to help guarantee product quality.

#### **2.4.7 Joint inventory management**

Fashion business was always characterized by short selling period and high risk of markdown as well as product obsolescence. Thus, inventory management and logistic synchronization were the key issues which would significantly affect a fashion company's financial performance (Fisher, 1997; Simatupang et al., 2002). A well-coordinated flow of materials allowed firms to have seamless production process and develop just-in-time and other time-based competitive strategies (Fawcett, Stanley & Smith, 1997; Frohlich & Westbrook, 2001). The even flows

of materials and goods in supply chain process were also found to have a significant impact on cost, delivery and flexibility performances (Prajogo et al., 2012).

Continuous replenishment program and vendor-managed inventory (VMI) program had gained their popularity in the fashion industry. To better manage inventory level, fashion companies and suppliers shared inventory status information so that suppliers were allowed to monitor the point of sales and inventory level of fashion companies and then arranged production. In Zara, there was a sophisticated information system that estimated the demands for individual stores based on historical data and provided optimal inventory policies to maximize sales for the whole group. Its suppliers would then procure fabrics and components based on the demand forecasts provided by Zara and prepared for quick replenishment (Mihm, 2010).

Participation of suppliers in inventory management reduced inventory level, and at the same time ensured availability of products in stores (Yao & Dresner, 2008). For instance, with VMI program, retailers no longer placed orders with the manufacturers. Instead, the manufacturers did the inventory planning based on the shared information from the retailers and managed inventory level at the retail location. A typical example was the VMI program offered by TAL to J.C. Penney. TAL learnt about the retailer's sales patterns with the direct access to the retailer's point of sales data, and worked on the production planning accordingly. VMI helped reduce inventory levels and shorten replenishment cycles (Chow et al., 2010).

## **2.5 SI and financial performance**

Strategic supplier partnership has always been directly linked to organization benefits in terms of financial performances (Cao & Zhang, 2011; Feng & Wang, 2013; Li et al., 2006; Najafi Tavani, 2013; Rosenzweig et al., 2003). Frohlich and Westbrook (2001) suggested that a high SI level was positively associated with performance improvement. SI enhanced flexibility, time to market and inventory management. Lowering the costs in supply chain increased the profit ratios (Droge et al., 2004). SI encouraged suppliers to offer useful product knowledge that could lead to better market and product planning in the long run (Swink et al., 2007). Researchers often underlined the theory of *transaction cost economics (TCE)* to justify SI (Cao & Zhang, 2011; Das et al., 2006; Ireland & Webb, 2007; Ketchen & Hult, 2007). Transaction costs were the monitoring and negotiating costs that arose from bounded rationality and partners' opportunism (Kaufman, Wood & Theyel, 2000). They affected supply chain decisions such as the degree of outsourcing (Ketchen & Hult, 2007). In the scope of TCE, SI acted as an alternative which generally lowered uncertainties and opportunism levels, and increased the probability that partners would consider mutual benefits at supply chain level (Croom, 2001). It thus reduced transaction costs and resulted in superior performances (Cao & Zhang, 2011; Das et al., 2006).

Another supply chain theory, the *resource-based view (RBV)*, highlighted that a company's competitive advantages could be obtained through a collection of resources and capabilities accumulated within an organization or across a supply chain to outperform other competitors (Cousins & Menguc, 2006; Das et al., 2006; Rungtusanatham, Salvador, Forza & Choi, 2003). By owning rare resources and

outstanding competencies that were not imitable by competitors, companies would obtain a sustainable competitive advantage (Feng & Wang, 2013; Knudsen, 2003). RBV was applied to the studies of supply chain integration, emphasizing the activities of sharing resources and capabilities at the supply chain level that were difficult for competitors to imitate, thereby improving competitiveness (Jap, 2001; Schoenherr & Swink, 2012). SI, on one hand, could be a resource that complemented partners' capabilities; on the other hand, it also acted as a capability to acquire valuable resources (Rungtusanatham et al., 2003).

Trust developed between suppliers and the focal firm encouraged knowledge sharing and generating (Rungtusanatham et al., 2003). This capability was closely related to *knowledge-based views* which focused on the role of wisdom as an intangible asset to generate competitive advantages (Grant, 1996; Rungtusanatham et al., 2003). Knowledge transfer between supply chain agents improved their competences and facilitated co-creation of knowledge for formulating outstanding strategies (Sveiby, 2001).

Several mechanisms that mediated the relationships between SI and financial performances have been proposed. They were the competitive advantages built up from SI (Droge et al., 2004; Feng & Wang, 2013; Li et al., 2006; Swink et al., 2007). The competence gained in SI was a key resource to create competitive advantages, as supply chain partners could apply the context-specific knowledge to improve efficiencies, identify business opportunities and solve problems (Cao & Zhang, 2011; Chen, Daugherty & Landry, 2009; Schoenherr & Swink, 2012). SI enhanced market and business performances through developing new products

in a time- and cost- efficient way (Feng et al., 2014; Feng & Wang, 2013). Involving supplier into new product development enhanced design and financial outcomes (Carr & Pearson, 1999; Petersen et al., 2005) and reduced innovation search cost (Zhang & Li, 2010). SI led to fewer suppliers that helped reduce production costs through economies of scales and scope (Das et al., 2006). Higher levels of supply chain management improved quality, delivery dependability and cost performance which resulted in better financial performances (Li et al., 2006). In addition, integration of material and inventory flows helped establish a seamless supply chain which enabled companies to respond rapidly to the market demands and create best value for their customers (Prajogo & Olhager, 2012).

The strategic integration elements of a system were complementary and able to increase the marginal effectiveness of other components in the group (Swink, Narasimhan & Kim, 2005). Integration of material flow was enhanced by the existence of IT capability and information sharing between suppliers and focal firms. And information integration could be achieved when long-term relationship and trust were established (Projogo & Olhager, 2012). It has been proposed that implementing a wider range of supply chain integration elements was essential (Frohlich & Westbrook, 2001; Rosenzweig et al., 2003).

Supply chain collaboration facilitated production development and flexibility. However, this kind of collaboration could also increase costs of compromise and accommodation (Das et al., 2006). Some researchers, on the contrary, refuted the benefits of SI as those integration activities also involved investment including personal time, communication media and information systems (Swink et al.,

2007). Moreover, the needs to integrate intelligently required purchasing upgrades in terms of employee skills and capabilities, as they would take up more roles and responsibilities in the relationship (Das et al., 2006). Noted that some researchers found the relationships between SI and business and operational performances to be insignificant (Cousin & Menguc, 2006; Flynn et al., 2010) or even negative (Huo et al., 2013).

To measure performances of the supply chain was difficult. The difficulties included defining what and how to measure (Gunasekaran, Patel & Tirtiroglu, 2001). Firm performances reflected how well a firm achieved compared with their competitors (Li et al., 2006). Related literature was surveyed to identify valid constructs for measuring business performances. A number of studies measured organizational performances by using financial criteria including market share, growth of sales, profit margin, return on investment (ROI), return on equity (ROE), return on assets (ROA) and inventory turnover (Cao & Zhang, 2011; Das et al., 2006; Droge et al., 2004; Feng et al., 2014; Huo et al., 2013; Li et al., 2006; Mihm, 2010; Petersen et al., 2005; Swink et al., 2007).

In this study, the level of SI of a fashion enterprise was reflected by the numbers of supplier integrated practices in which it had participated. Direct linkage between fashion enterprises' SI levels and their financial performances was investigated. Based on the above review, a hypothesis was formulated as:

*H1a: The level of supplier integration of a fashion enterprise has a positive relationship with its financial performances.*



## **2.6 The moderating effect on SI - financial performances linkage**

Collaboration with suppliers was not always beneficial; it depended on various contextual factors, such as the level of uncertainty, the scope of cooperation, and the external and internal barriers of supply chain management (Ramaswami, Srivastava & Bhargava, 2009; Richey, Chen, Upreti, Fawcett & Adams, 2009; Wong, Boon-Itt & Wong, 2011). In this study, the moderating effect of fashion content was considered.

### **2.6.1 Fashion content**

Fashion products could be generally classified into “fashionable” (more trendy, colorful, with more volatile demand, etc.) and “basic” (less trendy, less colorful, with more stable demand, etc.)<sup>1</sup>. Fashion enterprises selling fashionable and those selling basic products would have very different approaches in the supply chain practices, as they had diverse standards in product development, time-to-produce, time-to-market, inventory management or even quality management, which affected coordination with their suppliers. Therefore the following hypothesis was constructed:

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<sup>1</sup> This classification of fashion company nature was similar to Choi, Liu, Tang and Yu (2011)'s in which “basic” referred to the easy, and informal wear, which could be the ones for sports or semi-sports types; the mass-market brands that mainly sell casual wear were an example. The “fashionable” one here meant the smart and modish style based fashion products. Usually, the trendy designer labels were categorized as “fashionable”.

*H1b: Fashion content moderates the relationship between the level of supplier integration and a fashion enterprise's financial performances.*

## **2.7 SI and financial performances against financial tsunami**

There was an influential and forceful financial tsunami in 2008 and the global economy had experienced an unfavorable time. The plunged global stock prices tumbled international trade and surged unemployment rates created significant threats to companies worldwide. In the mainland China, hundreds of apparel manufacturers went bankrupt after the financial tsunami in 2008 (Shen et al., 2013).

In the literature, a few studies examined the impact toward business operations brought by the financial tsunami. For example, Ho, Choy, Chung and Lam (2010) explored the impact of the financial tsunami to the Hong Kong small and medium enterprises (SMEs). They revealed strategies which were critical for the SMEs to adopt in the presence of financial tsunami. Blome and Schoenherr (2011) conducted a multi-case-study analysis for supply chain risk management in financial tsunami. They explored the problems based on the transaction cost economics theory in the framework of enterprise risk management. Juttner and Maklan (2011) empirically examined the relationship between (i) supply chain resilience and (ii) supply chain vulnerability and supply chain risk management in the presence of financial tsunami. They found that there was a positive impact of supply chain resilience's knowledge management on supply chain vulnerability. Under a highly uncertain environment, supplier integration enhanced delivery and production flexibility as they were sensitive to external input (Wong et al., 2011).

Violetka, Ng and Chiang (2013) proposed that a stronger external partnership was important under economic uncertainty. Being agile and continuously reviewing supply chain enabled the companies to adjust quickly to changes under financial crisis (Hoberg & Alicke, 2013). From the above reviewed literature, it was obvious that the financial tsunami led to huge impact on business operations. And supply chain collaboration had enhanced supply chain visibility and flexibility to the risk and uncertainty against financial tsunami. Based on the above review, a hypothesis was formulated as:

*H2a: A high level of supplier integration helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.*

As company characteristics (including duration of product lifecycle and demand uncertainty) influenced supply chain risk management (Lavastre, Gunasekaran & Spalanzani, 2014), the moderating effect of fashion content was also taken into consideration. To examine whether fashion content would moderate the relationship between SI and financial performances against financial tsunami, another hypothesis was constructed as follows:

*H2b: Fashion content moderates the strengths of supplier integration to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.*

## **2.8 The concept of sustainability**

The concept of sustainability was defined as “*Being able to satisfy current needs without compromising the possibility for future generations to satisfy their own needs.*” (World commission on environment and development, 1987).

The recent conceptualization of sustainability recognized three important components, namely: economic growth, ethical equity and environmental protection (Bansal, 2002; de Brito, Carbone & Blanquart, 2008). In fashion supply chain management, the general concerns related to sustainability issue were as follows: In the perspective of economic growth, globalization of production caused relocation of manufacturing sites to the developing countries which negatively affected the traditional spinning and weaving industries in Europe (de Brito et al., 2008). In the perspective of social equity, the shortened product life cycles and ordering periods had increased the time pressure in manufacturing sites which resulted in employee abuse and unethical working practices (Barnes & Lea-Greenwood, 2006). In the perspective of environmental protection, the intense use of chemicals (such as dyes) and nature resources (such as water and land) were very demanding in the fashion supply chain (de Brito et al., 2008).

Many fashion companies were engaging in the “Five-R” sustainability programs (Ho & Choi, 2012). Kurapatskie and Darnall (2013) proposed that sustainability activities should be initiated to meet stakeholders’ expectations and integrated into the daily operations management. From that sense, proposals and studies on green practices had appeared in recent years. For instance, Sundarakani, de Souza, Goh, Wagner and Manikandan (2010) studied the carbon emission challenge by

investigating a green supply chain, and Choi (2013) proposed the implementation of carbon footprint tax to attract fashion retailers to source locally under a quick response program. In fact, sustainability involved issues related to the environment, society and economy. In this study, the focus was on environmental aspect in the fashion industry.

## **2.9 The needs of GSPs in the fashion market**

Adequate use of natural resources had become more important in a fashion supply chain because of its short product life cycle and the competitive pressure from its market (Chung & Wee, 2008). The textile sector had induced considerable environmental problems during the production process which marked by the intense use of chemicals and natural resources (Lakhal, Sidibé & H'Mida, 2008). Besides, the extended fashion supply chain imposed a heavy burden on the environment from the increased transportation mileage. This scenario was exacerbated by the time pressure on fashion industry orders, more shipments were delivered by air, and significantly increased carbon dioxide emission (Saicheua, Knox & Cooper, 2012). Therefore, pressures on fashion companies of being sustainable had come around from different areas including the public and media, eco-conscious customers, ethicist groups and the government.

### **2.9.1 Public and media**

Fashion companies experienced significant pressure on the demands for sustainability measures. Fashion enterprises like Nike, Levi Strauss and Adidas had been blamed for problems with environmental corruption in their supply

chains (Seuring & Muller, 2008). To rebuild reputation, these companies had to show interests in green supply chain management.

In the fashion industry, sustainability was treated as a philosophy which extended beyond basic legal compliance (Kunz & Garner, 2011). Fashion companies usually created their corporate social responsibility reports voluntarily to demonstrate the appropriateness of their behaviors with regard to the environment to the public and stakeholders in particular (Lozano & Huisingh, 2011).

### **2.9.2 Eco-conscious customers**

Fashion customers' preferences had become more complex. They were looking for values beyond styles, quality and price (Borland, 2004) and had psychological needs in building up ethical images (Niinimäki, 2010). Recent trends showed that sustainability was a way to reach environmentally conscious consumers and to enhance the overall brand images in developed countries (Faisal, 2010).

From the fashion business operations perspective, the growing number of environment-conscious consumers provided an important force to push fashion companies to implement environmental sustainability programs. Fashion enterprises had progressively promoted sustainable consumption by developing eco-fashion (Fletcher, 2008; Wong, Lai, Shang, Lu & Leung, 2012). There were also prior studies advocated fashion companies adopting green sustainability programs, such as integrating environmental management into the supply chain (Lai & Wong, 2012; Morrow & Rondinelli, 2002) and collecting customers' returned products for recycling (Lai & Wong, 2012).

### **2.9.3 Ethicist groups and the government**

In addition, the ethicist groups and the government showed interests in the corporate sustainability programs employed by fashion companies (Aguinis & Glavas, 2012; Delmas & Blass, 2010). For instance, China had developed its own environmental label which was certified by Australia and accepted in the international market (Chuan, 2005). Compliance with regulations and policies was one of the motivations of being sustainable (Dangelico & Pujari, 2010). During the past decades, there were different declarations for environmental protection, such as European Community directives on the restriction of the use of hazardous substances (RoHS) (Dangelico & Pujari, 2010). Besides, manufacturers experienced an increased institutional pressure from the government sustainability policy to improve internal green supply chain management (Zhu, Sarkis & Lai, 2013). To reduce energy consumption, the Chinese government had organized energy audits and forced manufacturers to re-engineer their technologies if they had consumed excessive energy (Zhu & Geng, 2013).

### **2.10 GSPs in fashion supply chains**

There were different types of GSPs in fashion supply chains, for example: (i) use of organic fibers (for example, organic cotton, wool and silk) (Chouinard & Brown, 1997); (ii) reuse and recycling of materials such as unwanted clothes; (iii) application of clean technologies within the supply chain (Nieminen, Linke, Tobler & Beke, 2007); (iv) acquisition of green certifications (for example, Global Organic Textile Standards, Eco-label and Global Reporting Initiative); (v) green product and process innovations which focused on energy minimization, material reduction and pollution prevention through the improvement of current green

products and processes or create a new one (Cheng & Shiu, 2012; Dangelico & Pujari, 2010), (vi) innovative green packing and (vii) clean transportation modes (Pal, 2014).

Fashion companies, like Marks and Spencer, Timberland, and Esprit, had all actively participated in various environmental related sustainability programs. Fast fashion brand, Zara, had committed itself to eliminate all the discharge of potentially hazardous chemicals from its production. It also started employing organic cotton to produce sustainable products. Another well-known fashion enterprise, Nike, established the “Considered Indexes” which enabled its product development teams to compare materials and make sustainable choices during the design phase (Nike, Inc., 2013). H&M had worked with Ginetex, the owner of the current global standard care labelling system, to develop “the Clevercare label” which introduced conscious wash and care instructions to its customers (H&M, 2013). H&M also worked on the project of “Clean Shipping”, providing standard tools for measuring the emission of greenhouse gases and fuel consumption (Pal, 2014). From the above reviewed studies, there was no doubt that environmental sustainability was a popular issue in the fashion industry.

### **2.11 GSP adoption and financial performance**

From business perspective, a fundamental question to explore was whether the company would perform better after establishing its own environmental sustainability programs. In fact, the performances of sustainability program could be measured by different standards such as “sustainability-social” index (SSI), and financial performances (Van Beurden & Gössling, 2008; Wu, 2006). The SSI



included disclosure of outcomes of pollution control and the corporate reputation rating. On the other hand, there were also studies considered the financial outcomes of GSP adoption, for example, market return, profitability related measures, cost and ROI. Both Marom (2006) and Wu (2006) proposed that there was a positive linkage between sustainability programs and financial performances. Ameer and Othman (2012) suggested that sustainable practices financially benefited companies in terms of sales growth, cash flows and ROA. Appendix II summarizes prior studies on the effect of environmental sustainability on various performances.

The social impact hypothesis assumed that satisfying stakeholders' expectations could increase a firm's financial performances. Several mechanisms that mediated the relationship were proposed, which included corporate reputation enhancement, business risk reduction, and better investment from financial markets (Marom, 2006; Preston & O'Bannon, 1997). Hart and Milstein (2003) developed a framework which rationalized many strategic approaches that firms could take to be more competitive through different market based sustainability activities. Epstein and Roy (2001) suggested that environmental sustainability programs could lead to cost reduction by reducing packaging and energy consumption, minimizing handling and facility costs and enhancing waste disposal and material management. For instance, a cleaning company in Pittsburgh replaced its old dry-cleaning equipment with new systems that could recycle perchloroethylene (PERC). The new equipment reduced the emissions and the use of PERC substantially. As a result, that company no longer had to apply for an environmental permit (US Environmental Protection Agency, 2011). Eco-design

and product recycling were accounted for a cost reduction of more than 30 percent (Hindo & Arndt, 2006). Moreover, Wong, Lai, Cheng and Lun (2012) suggested that asset recovery (such as material recycling and product remanufacturing) had a positive effect on financial performances by reducing disposal cost, inventory investment and handling cost. In addition, recent research also proposed that eco-process innovation had a positive effect on economic performances (Sezen & Çankaya, 2013).

However, the linkage between GSP adoption and financial performances was inconclusive. The trade-off hypothesis assumed that when a firm had increased its sustainability performance, it incurred some unnecessary costs and consequently reduced its profitability compared to firms that were not involved in sustainability (Preston & O'Bannon, 1997). Similarly, Epstein and Roy (2001) argued that GSPs might involve corporate and social costs, such as the expenses for compliance with legislation about recycling and pollution. Michelin (2011) suggested that media exposure was positively associated with sustainability disclosure, but the financial performances of a company were not associated with the extent of sustainability disclosure. In addition, Wong et al. (2012b) suggested product stewardship, including eco-design of product and packaging and use of low-impact materials, was insufficient to reduce costs in production and improve financial performances as it incurred costs and financial irrecoverable investments in early stages while process stewardship, including reduction of carbon emission and the use of recycling components, was important for financial performances as it was more noticeable to end users. A recent study proposed that costs of technology implementation could actually moderate the relationship between

sustainability efforts and a company's performances (Schrettle, Hinz, Scherrer-Rathje & Friedli, 2014).

Besides, researchers also investigated the association between brand image and green sustainability. Fashion enterprises benefited from green sustainability through attracting the environmentally conscious customers (Schuler & Cording, 2006). Lin, Yang and Liou (2009) further proposed that sustainability practices could act as an insurance policy to reduce the risk of damaging brand image in the long run even though sustainability programs did not necessarily increase profitability for the companies in the short term. There were also studies concerning the purchase behaviors of fashion customers as sustainability costs might shift to them. Some suggested that premium price discouraged fashion consumers' purchasing decision (Bratt, 1999). And Lee (2009) claimed that consumers were relatively environmentally aware but they expected the producers to take this responsibility; thus they were not willing to personally accept the additional costs or change their purchasing behaviors (de Brito et al., 2008). Chan and Wong (2012), however, reported that customers were open to environmental sustainability and willing to pay a premium price for eco-fashion.

The ways industrialists coped with the environments varied. Companies operated in different contexts had to deal with their distinct environmental and financial concerns (Chand & Fraser, 2006). There was an issue in many previous studies that only the perceived impacts of green practices on financial performances were considered whilst no actual financial numbers were measured. Therefore, the occurrence of positive or negative financial performances was not confirmed (see

Zhu & Sarkis, 2004). Researchers were looking for an economic and environmental win-win situation. Allwood, Laursen, de Rodriguez and Bocken (2006) proposed that sustainable activities, production and process re-engineering and economic performances should be well-balanced. As sustainable supply chain practices that helped in waste and energy reduction could eventually led to cost saving. This study focused on environmental sustainability in the fashion industry. Based on the literature works, a hypothesis was formulated as follows:

*H3a: Adoption of green sustainability program (GSP) by a fashion enterprise has a positive relationship with its financial performances.*

## **2.12 The moderating effect on GSP adoption - financial performances linkage**

Besides exploring whether a fashion enterprise's financial performances were related to its GSP adoption, a deeper investigation was preceded on whether fashion content (fashionable or basic) of a fashion enterprise would have a moderating effect on the relationship between GSP adoption and its financial performances.

### **2.12.1 Fashion content**

Fashion products could be generally classified as "fashionable" (more trendy, colorful, and with more volatile demand, etc.) and "basic" (less trendy, less colorful, and with more stable demand, etc.). Fashion had become a leisure activity, especially amongst the youths who sought innovations and looked for cheap and fashionable products. Such demand unpredictability was a phenomenon intensifying to younger ages, as they had increasing purchasing power in the

fashion market (Cook, 2004). On the other hand, there were a number of environment conscious consumers who emphasized performances beyond style and price (Borland, 2004) and preferred basic and slow fashion.

Considering the increasing demands of consumers for fashion products and the desires of fashion enterprises to obtain better financial results, Turker and Altuntas (2014) argued that the slow fashion concept was not widely recognized by fashion leaders. Given the sustainability challenges of fashion supply chains due to the expansion of their operations throughout the developing world, fashion companies tried to find new solutions and take other measures to remain sustainable yet still fast.

While there were growing environmental concerns amongst consumers and society, the risks involved in supply chain operations were increased and started threatening fashion enterprises' reputations and financial returns. Therefore, most companies (especially the more fashionable ones) in the fashion industry had started focusing on green sustainability management (Turker & Altuntas, 2014). In such approach, fashionable enterprises could retain fashion conscious customers; whilst at the same time attract eco-conscious customers. In order to develop sustainability, fashion enterprises had taken different measures and communicated these through their sustainability reports (see H&M, 2013; Nike, inc., 2013). Accordingly, a hypothesis was developed as follows:

*H3b: Fashion content moderates the relationship between adoption of green sustainability program (GSP) and a fashion enterprise's financial performances.*

### **2.13 GSP adoption and financial performances against financial tsunami**

Xiao (2010) explored the welfare change of China's cotton supply chain during the recent financial tsunami via an equilibrium displacement model analysis. The author believed that the financial tsunami did have a significant impact on China's cotton industry; in particular, the farmers suffered a much bigger loss than estimated. Pal et al. (2014) investigated how the recent two financial crises affected the Swedish textile-related SMEs. They examined different antecedents of organizational resilience in the financial crises. From the above reviewed literature, it was obvious that the financial tsunami led to huge impact to fashion business operations. This study also focused on exploring the impact brought by the financial crisis on companies in the textiles and clothing industry, but the focal points and objectives were different.

The financial tsunami had been one of the toughest challenges in the fashion market because customers' purchasing motivation and power dropped after recession. Fashion enterprises suffered from the low demand. As mentioned previously, fashion customers' responsible lifestyle was linked with the symbolic feeling of advantage, therefore, purchasing from a company emphasizing sustainability could enhance their personal identity (Niinimäki, 2010). Therefore, GSP adoption might be treated as a competitive advantage which helped fashion enterprises to differentiate from others. Based on the above literature, a hypothesis was developed in the following:

*H4a: Adoption of green sustainability program (GSP) by a fashion enterprise helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.*

Besides, the moderating effect of fashion content was also taken into consideration. To investigate whether fashion content of a fashion enterprise would moderate the relationship between GSP adoption and its financial performances against financial tsunami, the following hypothesis was constructed:

*H4b: Fashion content moderates the strengths of green sustainability program (GSP) to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.*

#### **2.14 SI and GSP adoption**

In the fashion industry, sustainability needed the involvement of and collaboration between supply chain partners (Caniato, Caridi, Crippa & Moretto, 2012). Gualandris, Golini and Kalchschmidt (2014) studied the relationship between supply management practices, sustainable supply chain management and companies' environmental and social sustainability. They found that companies integrated with suppliers enabled to outperform their competitors on sustainability issue. Turker and Altuntas (2014) also suggested that companies should particularly focus on integrating suppliers into their systems to encourage the adoption of sustainability approaches effectively.

There were several reasons supporting the impact of supplier integration on GSP adoption. First of all, consolidated partnering policies and integration procedures were better suited to accommodate sustainability goals (Bowen, Cousins, Lamming & Farukt, 2001). By sharing information and improving coordination with suppliers, companies could optimize their inbound transportation flows and reduce by-products generation (e.g., packaging and pollutes) (Plambeck, 2007). According to Pagell, Krumwiede and Sheu (2007), lighter packaging from the suppliers meant fewer disposals for the buyer firms.

Besides, continuous efforts in building up trustful relationships with suppliers and identifying suppliers' know-how encouraged the deployment of sustainable supply chain (Gualandris et al., 2014). Supplier integration allowed sharing of the key resources, technologies and risks, which encouraged early involvement of suppliers toward sustainability (Jiang, 2009). Hajmohammad, Vachon, Klassen, and Gavronski (2013) demonstrated that intensive interaction with suppliers helped a company to absorb external knowledge, so as to improve its capability in developing innovative green technologies.

In addition, company could resolve environmental problems together with their suppliers by implementing mechanisms at corporate level as supporting suppliers' operations would indirectly increase sustainability performance of the implementing organization (Awaysheh & Klassen, 2010). Collaborating with suppliers accelerated the improvement of a company's sustainability performances. Supplier environmental assessments often involved joint problem-solving sessions, in order to reduce the environmental impact in



production (Vachon & Klassen, 2008). Firms could reduce waste by supervising their suppliers to improve capabilities for better efficiency and quality (Gimenez, Sierra & Rodon, 2012; Pagell et al., 2007). Based on the above review, a hypothesis was formulated as:

*H5a: The level of SI of a fashion enterprise has a positive relationship with its adoption of GSP.*

Besides, the moderating effect of fashion content on the above relationship was also considered. Thus, the following hypothesis was constructed:

*H5b: Fashion content moderates the relationship between SI level and GSP adoption of a fashion enterprise.*

## **2.15 Structural path model: direct versus indirect paths**

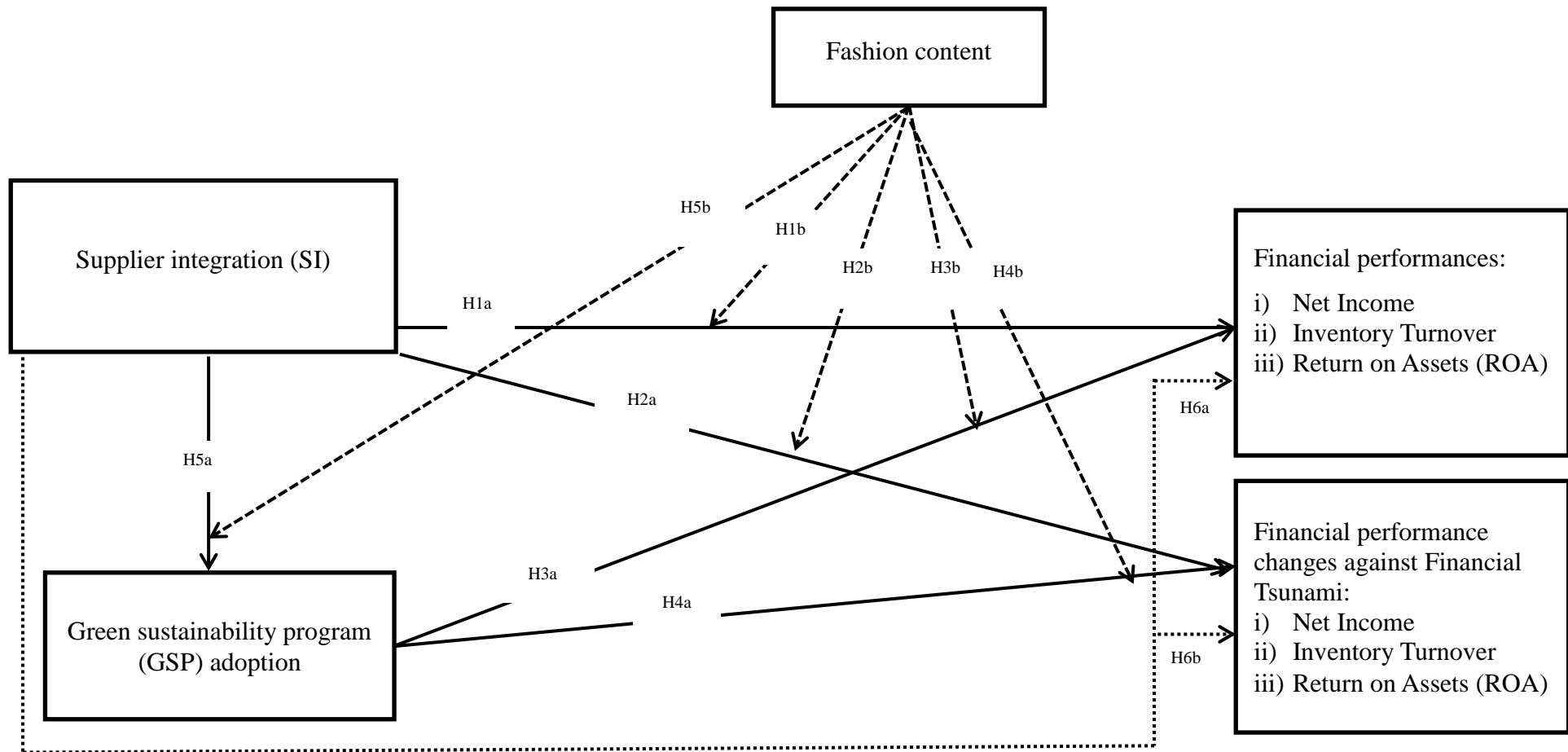
Up to now, the “big picture” has emerged and the research hypotheses model could be described by the following three relationships, namely, (i) the relationship between SI and a fashion enterprise’s financial performances (direct path); (ii) the relationship between GSP adoption and a fashion enterprise’s financial performances; and (iii) the relationship between SI and GSP adoption of a fashion enterprise. Therefore, a further question was whether SI would influence a fashion enterprise’s financial performances indirectly via the adoption of GSP (i.e., whether the mediating effect of GSP adoption on the linkage between SI and a fashion enterprise’s financial performances exists). Therefore, two hypotheses were constructed as follows:

*H6a: The relationship between SI and a fashion enterprise's financial performances is mediated by its GSP adoption.*

*H6b: The relationship between SI and a fashion enterprise's financial performances against financial tsunami is mediated by its GSP adoption.*

## **2.16 Chapter summary**

The literature related to this study was reviewed in this chapter. Six hypotheses were developed based on the past research works in order to address the current research objectives. Figure 2.1 showed the conceptual model of this study and the summary of hypotheses was presented in Table 2.2.



**Figure 2.1 Conceptual model** (Remarks: —→ Direct effect; - - - - -→ Moderating effect; ······→ Mediating effect)

**Table 2.2 Summary table of hypotheses**

<b>Hypotheses</b>	
<b>Effect of Supplier integration (SI) level</b>	
H1a	The level of supplier integration of a fashion enterprise has a positive relationship with its financial performances.
H1b	Fashion content moderates the relationship between the level of supplier integration and a fashion enterprise's financial performances.
H2a	A high level of supplier integration helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.
H2b	Fashion content moderates the strengths of supplier integration to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.
<b>Effect of green sustainability program (GSP) adoption</b>	
H3a	Adoption of green sustainability program (GSP) by a fashion enterprise has a positive relationship with its financial performances.
H3b	Fashion content moderates the relationship between adoption of green sustainability program (GSP) and a fashion enterprise's financial performances.
H4a	Adoption of green sustainability program (GSP) by a fashion enterprise helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.
H4b	Fashion content moderates the strengths of green sustainability program (GSP) to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

<b>Relationship between SI and GSP adoption</b>	
H5a	The level of SI of a fashion enterprise has a positive relationship with its adoption of GSP.
H5b	Fashion content of a fashion enterprise moderates its relationship between SI level and GSP adoption.
<b>Mediating effect of GSP adoption</b>	
H6a	The relationship between SI and a fashion enterprise's financial performances is mediated by the GSP adoption.
H6b	The relationship between SI and a fashion enterprise's financial performances against financial tsunami is mediated by the GSP adoption.

## **Chapter 3 Methodology**

The purpose of this dissertation was to study the effect of SI and GSP adaptation on fashion enterprises' financial performances in different time periods and against financial tsunami, as well as the relationship between SI level and GSP adoption. The moderating effect of fashion content and the mediating effect of GSP adoption were also investigated so as to give a better understanding on the above relationships. This chapter describes the research methodology for the study, including the approaches used to collect data, the sampling method and the data analysis techniques.

### **3.1 Source of data**

Secondary public data analysis was used in this study. It referred to the gathering and re-analysis of information that was relevant to the research questions. The purpose was to answer the original research question with the better statistical methods or new research questions with the old data (Glass, 1976). Literature, company annual reports, financial announcements and all related documents were the secondary data used in this study.

#### **3.1.1 Literature review**

In this study, literature review has been conducted to provide relevant background information for the research topic. The focus of the literature review included the development SI and GSP, the needs of SI and GSP in fashion market and the effect of SI and GSP adoption on different perspectives. Besides, the contextual factors in the fashion supply chain and the impact of financial crisis were also

reviewed. Academic journals and reference books were the major sources of the literature. After gathering the relevant information, a comprehensive literature review was presented, followed by construction of hypotheses and a conceptual model.

### **3.1.2 Content analysis**

In order to determine the extent of SI and GSP adoption, content analysis was used to make valid inferences from the appearance of particular words or content in the textual material (Hsieh & Shannon, 2005). Similar to Bhalla, Sodhi and Son (2008) and Turker and Altuntas (2014), fashion enterprises' websites, annual reports and announcements were reviewed and interpreted with particular intention of exploring the supplier integrated practices and green sustainability programs adopted by the fashion enterprises, so as to determine whether those information matched the framework of this study. To be specific, relevant texts and phrases were examined and conceptualized to reveal the existence or not of various practices in the fashion enterprises through the use of some specific words, concepts and themes. For SI, the relevant texts included "establishing long-term relationship with manufacturer", "implementing ERP system linked with suppliers" and "developing fiber and materials jointly with manufacturer," etc. For GSP adoption, the relevant texts included "following chemical safety guidelines", "making changes to packaging to save waste from going landfills" and "improving current and adopting new resource saving technologies" etc.

### **3.2 Sampling method**

The samples of fashion enterprises for this study were selected from the database of Thomson Reuters Knowledge according to the below criteria: 1) all fashion enterprises were found under the category of textile / apparel (customer products); 2) they were all publicly listed fashion enterprises; 3) they had their own fashion retail brands; 4) they all had their financial data available online for the period of 2006-2012; and 5) apart from financial data, their annual reports contained materials related to their business operations and relevant materials for this study. Limited by the time frame of the study, the data source was confined to the top 300 fashion enterprises appeared in the database, and finally 90 fashion enterprises were found to be fitted the above criteria and thus selected. According to a rule of thumb for sample size,  $N > 50 + 8k$ , (where  $N$ = number of cases;  $k$ = number of independent variables) (Green, 1991), the minimum  $N$  for the current study should be 74 as there were three independent variables. From this perspective, the sample of the selected 90 fashion enterprises was believed to be qualified to generate reliable statistic results.

### **3.3 Research variables and measurements**

This study was to examine the effect of SI level and GSP adoption on a fashion enterprise's financial performances and the moderating effect of fashion content on the above relationships. The dependent and independent variables were identified based on the research hypotheses. Details of these variables were discussed in following subsections.



### **3.3.1 Dependent variable- financial performances**

All financial data of the fashion enterprises employed in this study came from their published annual reports and Thomson Reuters Knowledge database. The financial performances examined in this study included net income, inventory turnover and ROA. According to Ho et al. (2010) and Wen, Chen and Chen (2008), financial measures could be divided into several dimensions. Net income reflected the profitability of a company; inventory turnover reflected the operational efficiency; and ROA reflected the business efficiency (the ability to manage a company's asset). Owing to the scope of this study and availability of the data, the performance data sets over 2006-2012 were collected, and further segmented into the following three time periods<sup>2</sup> for detailed analysis: 2006-2007; 2009-2010 and 2011-2012. As this study also investigated the effect of SI and GSP adoption on fashion enterprises' financial performances against financial tsunami in 2008, the fashion enterprises' financial performance difference between 2006-2007 and 2009-2010, and the difference between 2006-2007 and 2011-2012 were also examined. To enhance presentation, comparison between 2006-2007 and 2009-2010 was named Scenario 1, and that between 2006-2007 and 2011-2012 was named Scenario 2. Both Scenarios 1 and 2 were included in the analysis because of the probably different accounting habits of the listed enterprises. For

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<sup>2</sup> This study examined the effect of SI and GSP adoption on fashion enterprises' fashion performances before and after financial tsunami in 2008, and Year 2008 was treated as the cutting point to separate the pre- and post-crisis periods. Considering that the financial performances of fashion enterprises in Year 2008 were a mixed result of pre- and post- financial crisis, the data in Year 2008 was hence excluded in the analysis.

example, in some cases, the effect of the financial tsunami may not be shown under Scenario 1 but under Scenario 2 because of the possible financial leverage adopted by the related enterprises. Thus, for enterprises which intended to report relatively “good figures” in their annual reports, they might do so by putting some debts to the future, etc. However, this “postponement” could not be done forever and enterprises which tried not to report the debts earlier in 2009-2010 had to reveal the result in 2011-2012. Thus, both Scenarios 1 and 2 were employed in the analysis to include this probable occurrence.

### **3.3.2 Independent variables**

#### **3.3.2.1 Level of SI**

Referring to Chapter 2, seven marked supplier integrated practices were identified and proposed in this study. They were “use of IT”, “long-term relationship with suppliers”, “joint goal setting and continuous improvement programs”, “joint product development”, “production flexibility”, “joint quality control program” and “joint inventory management”. The level of SI was indicated by the number of supplier integrated practices employed by a fashion enterprise. Therefore, the level of SI in this study was ranged from 0-7.

#### **3.3.2.2 GSP adoption**

A fashion enterprise might implement various green sustainability programs and activities in different aspects to eliminate environmental pollution. This study focused on all GSPs that considered the three key environmental dimensions throughout the fashion supply chains: energy minimization, material reduction and pollution prevention (Dangelico & Pujari, 2010). Fashion enterprises’

websites, annual reports and announcements were reviewed and interpreted with the particular intention of exploring all different GSPs adopted by the fashion enterprises. Those practices included applying innovative production process to reduce the use of chemical and resources, following ISO 14000 environmental management series and chemical safety guidelines and inhibiting inappropriate environmental practices in supplier's factories, etc. Similar to Lo and Sheu (2007), a dummy variable was created to indicate whether a fashion enterprise had adopted any GSPs. Specifically, the dummy variable was assigned to 1 if the fashion enterprise did adopt some kinds of GSPs; otherwise it was 0, that meant no GSP adopted by the fashion enterprise.

### **3.3.3 Moderator-fashion content**

Referring to Chapter 2, fashion enterprises were divided into “basic” and “fashionable” groups according to the fashion content of their products. “Basic” referred to the easy and informal wear, which could be the ones for sports or semi-sports types. The “fashionable” one here meant the smart and modish prevailing style based fashion products (Choi et al., 2011). In reality, it was possible that a fashion enterprise contained both “fashionable” and “basic” products. In such case, the classification of fashion content was based on the fashion enterprise's flagship products and income structure (i.e. major source of revenue). For example, if 70% of the enterprise's revenue came from the “fashionable” division and the rest came from “sports” or “basic” division, then that enterprise was classified as “fashionable” group. Another dummy variable was employed to indicate the fashion content of the fashion enterprise where 0 meant its products belong to the “basic” type and 1 meant “fashionable” type.

### **3.4 Data analysis techniques**

After content analysis and coding has been completed, all data were entered into the software SPSS (Statistical Package for the Social Science) for statistical analysis. With the aids of SPSS, all statistical manipulation was calculated and analyzed. Apart from the descriptive statistics, hierarchical moderated regression (HMR), hierarchical logistic regression and Sobel test were conducted for hypothesis testing.

#### **3.4.1 Hierarchical moderated regression (HMR)**

Regression analysis was one of the most frequently applied and useful approaches to examine the cause and effect relationships between variables (Ghauri & Gronhaug, 2005). Dependent variable was the variable to be predicted and estimated (i.e. the effect) while independent variable was the basis for the estimation (i.e. the cause). In this study, dependent variables included “net income”, “inventory turnover” and “ROA” of the fashion enterprises in different time periods (2006-07, 2009-10 and 2011-12) and also the changes of these measurements against financial tsunami (Scenarios 1 and 2). The independent variables consisted of “SI level”, “GSP adoption” and “fashion content” of the fashion enterprises.

Hierarchical moderated regression (HMR) was employed in this study. Suggested by Stone and Hollenbeck (1989) and Evans (1991) and used by Droge et al. (2004), Richey et al. (2009), Flynn et al. (2010), and Najafi Tavani et al. (2013), it was used to investigate the moderating effect on the relationship between a predictor and a dependent variable (Hooley & Hussey, 1999). The

analysis specified three levels of regression analysis. Model 1 ( $Y = b_0 + b_1X$ ) was used to investigate the main effect of the predictor (i.e. X) on the dependent variable (i.e. Y). Therefore Model 1 of HMR was used to test Hypotheses 1a, 2a, 3a and 4a in this study in order to investigate the direct relationship between the SI level and a fashion enterprise's financial performances (H1a and H2a) and the direct relationship between GSP adoption and a fashion enterprise's financial performances (H3a and H4a).

Model 1 was re-estimated after (i) adding a possible moderator (i.e. Z) to generate Model 2 ( $Y = b_0 + b_1X + b_2Z$ ) and (ii) the interactive term of the independent and moderating variables (i.e. XZ) to form Model 3 ( $Y = b_0 + b_1X + b_2Z + b_3XZ$ ). Changes in  $R^2$  and the coefficient of the cross product (XZ) were assessed to determine the predictive power of the model added and the significance of moderating effect (Daugherty, Myers & Richey, 2002; Hooley & Hussey, 1999). By analyzing the results of Models 2 and 3, the moderating effect of fashion content on the above direct relationships was examined (Hypotheses 1b, 2b, 3b and 4b).

It was in general difficult to interpret the pattern of moderation just from the output data of the models (Jose, 2013). Therefore, to have a better picture of the theoretical meaning of the obtained statistical interaction, an Excel-based ModGraph program proposed by Jose (2013) was used. It allowed entering statistical information from multiple regression analysis to compute the equations for the graphical display of the statistical interactions, which was named as ModGraph (Holmbeck, 2002; Jose, 2012). In this study, categorical moderator

was investigated, thus the ModGraphs presented in this thesis displayed the main effect (SI level or GSP adoption) along the X-axis, and the moderating variable (fashion content) was depicted with two lines designated as the two groups separately (see Chapter 4, Sections 4.2.2, 4.2.4 and 4.3.4).

### **3.4.2 Hierarchical logistic regression**

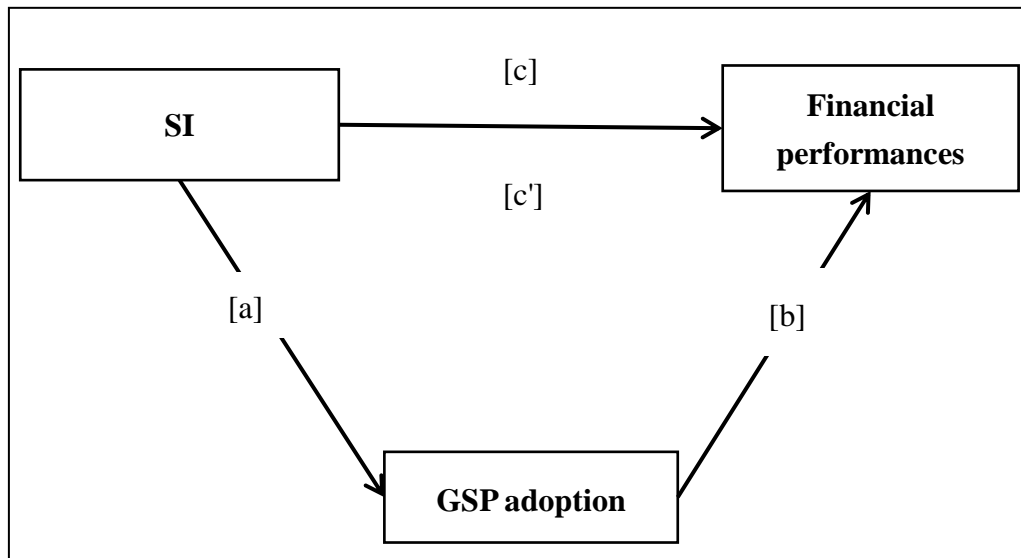
Logistic regression was used to predict the probability of an event based on the values of a set of independent variables (Ghauri & Gronhaug, 2005). It was suitable for models where the dependent variables were dichotomous (Hosmer, Lemeshow & Sturdivant, 2000). In logistic regression, the probability of the observed results estimated by the parameters was known as the likelihood and it was customary to use -2 Log likelihood (-2LL) to measure how well the estimated model fitted for the data. A good model was the one with a high likelihood of the observed result, which was then translated into a small value of -2LL (Norusis, 2008). Hierarchical regression was selected in this study; it was a multi-level regression where independent variables were entered in two or more stages in order to investigate both the direct and moderating effects of the independent variables. The change in the -2LL (i.e. model chi-square and block chi-square) was used to determine how the predictive power of a model changed when additional parameters were added (Norusis, 2008). Model chi-square measured the difference between -2LL for the model with only constant and that of the current model while block chi-square was the change in -2LL between successive entry blocks during model building (Norusis, 2008). Nagelkerke  $R^2$  was similar to  $R^2$  in a linear regression model which determined how well the variation in the dependent variable was explained by the model (Norusis, 2008).

This study applied hierarchical logistic regression technique to test Hypotheses 5a and 5b in order to investigate the relationship between the SI level and the GSP adoption of fashion enterprises and the moderating effect of fashion content on that relationship (Chapter 4, Section 4.4).

### **3.4.3 Sobel test**

Sobel test was a statistical test to indicate significance of the size of the indirect effect (mediation) which was measured by Sobel's z-value (Jose, 2012; Sobel, 1982). In the case of simple mediation, the Sobel test was conducted to compare the strength of the indirect effect of a predictor on the dependent variable to verify the null hypothesis that the indirect effect equaled zero (Preacher & Hayes, 2004). That is, a test of the amount of the basic relationship went through the independent path from independent variable to mediator to dependent variable (Jose, 2012). Besides, before conducting Sobel test, three preconditions for mediation were tested (Baron & Kenny, 1986). They were (i) the significant relationship between SI and fashion enterprises' financial performances (Chapter 4, Section 4.2); (ii) the significant relationship between SI and GSP adoption of the fashion enterprises (Chapter 4, Section 4.4) and (iii) the significant relationship between GSP adoption and fashion enterprises' financial performances when SI was also included in the regression model (Chapter 4, Section 4.5). Afterwards, Sobel test was used to test Hypotheses 6a and 6b in order to investigate the strength of the indirect effect of SI on financial performances via GSP adoption of a fashion enterprise, that is, the path of SI- to- GSP adoption- to- financial performances (Chapter 4, Section 4.5). MedGraphs

(mediational triangles) were presented to further illustrate the relationship of the independent variable, mediator and dependent variable (Jose, 2012).



**Figure 3.1 A sample of MedGraph**

According to Figure 3.1, [a] was the coefficient for SI-to-GSP adoption relationship while [b] was the coefficient for GSP adoption-to-financial performances relationship. The total effect (i.e. the coefficient for the SI-to-financial performance relationship: [c]), was divided into two components: direct and indirect effects. The direct effect [c'] was the coefficient for SI-to-financial performances relationship after inclusion of the GSP adoption (the mediating variable) whereas the indirect effect was the total effect minus the direct effect ([c]-[c']) (Jose, 2012). The coefficient for the SI-to-financial performances relationship [c] would reduce to [c'] in the mediated model to represent that there was an indirect path in the model which had reduced the strength of the basic relationship (Baron & Kenny, 1986). The indirect/total ratio varied from 0 to 1 and expressed how much of the original basic relationship was



explained by the indirect effect (Jose, 2012). In this study, Medgraphs were used to illustrate the mediated relationship among SI, GSP adoption and fashion enterprises' financial performances (Chapter 4, Section 4.5).

### **3.5 Chapter summary**

In this chapter, the rationale for the choices of data sources, data collection methods, and statistical analysis were presented. Findings from the data analysis would be presented and discussed in the next chapter.

## **Chapter 4 Data Analysis and Findings**

This chapter presents the findings from the analysis of the collected data. The sequences of the data analysis are presented as follows:

- (i) Descriptive statistics of the investigated fashion enterprises
- (ii) The relationship between SI and fashion enterprises' financial performances and the moderating effect of fashion content.
- (iii) The relationship between GSP adoption and fashion enterprises' financial performances and the moderating effect of fashion content
- (iv) The relationship between SI and GSP adoption of the fashion enterprise
- (v) The indirect effect of SI on fashion enterprises' financial performances via GSP adoption

### **4.1. Descriptive statistics**

This section reports the descriptive data of the fashion enterprises.

#### **4.1.1 Green sustainability program**

Amongst the 90 fashion enterprises, 36 established green sustainability programs whilst the rest (54) did not, which constituted 40 % and 60 % of the total, respectively.

#### **4.1.2 Fashion content**

Amongst the 90 fashion enterprises, 57 (63%) of them were classified as having “basic” fashion content; whereas the rest 33 (37%) were having “fashionable” content based on the classification criteria by Choi et al. (2011).

#### **4.1.3 Correlations between practices, fashion content and financial performances**

The bivariate correlation results between SI, GSP adoption, fashion content (FC), and financial performances of the fashion enterprises are shown in Table 4.1. Both SI and GSP adoption had no significant relationship with fashion content. Therefore, multicollinearity was unlikely to occur (Tabachnick & Fidell, 2007). Besides, SI and GSP adoption were statistically correlated with many fashion enterprises' financial performances which indicated that the predictors were properly correlated with the dependent variables for examination through linear regressions to be reliably undertaken.

**Table 4.1 Correlation between SI, GSP adoption, fashion content and fashion enterprises' financial performances**

	Correlation coefficients																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<b>Practices</b>																		
1. SI	1																	
2. GSP	.211*	1																
<b>Moderator</b>																		
3. FC	-.001	.038	1															
<b>Financial Performance</b>																		
4. Netincome 11-12	.286**	.296**	.173	1														
5. Netincome 09-10	.273**	.292**	.148	.974**	1													
6. Netincome 06-07	.292**	.320**	.150	.968**	.977**	1												
7. IT11-12	.205	-.072	-.301**	-.010	.028	.028	1											
8. IT09-10	.280**	.075	-.131	.196	.247*	.230*	.200	1										
9. IT06-07	.064	-.076	-.008	-.065	-.042	-.048	.417**	.380**	1									
10. ROA11-12	-.116	-.044	-.087	.072	.060	.004	-.093	-.008	-.007	1								
11. ROA09-10	.217*	.135	-.053	.167	.218*	.199	.226*	.316**	.121	-.509**	1							

12. ROA06-07	.169	.083	.091	.037	.053	.089	.129	.136	.046	-.901**	.782**	1						
13. Net income Scenario 2	.241*	.222*	.188	.923**	.847**	.796**	-.068	.118	-.082	.167	.097	-.048	1					
14. Net income Scenario 1	.149	.139	.106	.740**	.804**	.660**	.020	.231*	-.015	.202	.215*	-.064	.768**	1				
15. IT Scenario 2	.025	.050	-.130	.066	.059	.066	.006	-.325**	-.906**	-.035	-.028	.010	.058	.025	1			
16. IT Scenario 1	.067	.119	-.055	.165	.166	.164	-.352**	.078	-.893**	.004	.024	.016	.145	.128	.819**	1		
17. ROA Scenario 2	-.164	-.079	-.092	-.023	-.038	-.078	-.126	-.120	-.041	.924**	-.755**	-.998**	.065	.083	-.013	-.014	1	
18. ROA Scenario 1	-.160	-.076	-.103	-.023	-.035	-.076	-.117	-.115	-.038	.918**	-.742**	-.998**	.061	.090	-.013	-.015	.999**	1

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

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

## **4.2 Level of SI and fashion enterprises' financial performances**

Referring to Chapter 2, seven marked supplier integrated practices were chosen to reflect the levels of SI in this study. They were “use of IT”, “long-term relationship with suppliers”, “joint goal setting and continuous improvement programs”, “joint product development”, “production flexibility”, “joint quality control program” and “joint inventory management”.

This section examined the effect of SI on fashion enterprises' financial performances in terms of net income, inventory turnover and ROA. Different conditions were considered, including (i) the direct relationship between level of SI and a fashion enterprise's financial performances, (ii) the moderating effect of fashion content on the relationship between level of SI and a fashion enterprise's financial performances, (iii) the direct relationship between level of SI and a fashion enterprise's financial performances against financial tsunami and (iv) the moderating effect of fashion content on the relationship between level of SI and a fashion enterprise's financial performances against financial tsunami.

### **Hypothesis testing**

HMR was conducted to test Hypotheses 1-2. They were:

H1a: The level of supplier integration of a fashion enterprise has a positive relationship with its financial performances.

H1b: Fashion content moderates the relationship between the level of supplier integration and a fashion enterprise's financial performances.

H2a: A high level of supplier integration helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

H2b: Fashion content moderates the strengths of supplier integration to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

#### **4.2.1 Hypothesis 1a testing- the direct effect of SI level**

In the first move, the direct effect of level of SI (i.e. the number of SI practices deployed by a fashion enterprise) on its financial performances during three different periods (2006-2007, 2009-2010 and 2011-2012) were investigated.

H1a: The level of supplier integration of a fashion enterprise has a positive relationship with its financial performances.

The regression results for fashion enterprises' financial performances on their levels of SI are summarized in Tables 4.2-4.4.

**Table 4.2 Regression results for fashion enterprises' net income on their levels of SI**

Dependent variables		Net income		
Model	Independent variables	11-12	09-10	06-07
<b>1</b>	<b>Supplier Integration (SI)</b>	0.286**	0.273**	0.292**
	<b>F</b>	7.833**	7.078**	8.189**
	<b>R<sup>2</sup></b>	0.082**	0.074**	0.085**
<b>2</b>	<b>Supplier Integration (SI)</b>	0.286**	0.273**	0.292**
	<b>Fashion Content (FC)</b>	0.174	0.149	0.150
	<b>F</b>	5.479**	4.648*	5.245**
	<b>ΔR<sup>2</sup></b>	0.030	0.022	0.022
<b>3</b>	<b>Supplier Integration (SI)</b>	0.084	0.102	0.112
	<b>Fashion Content (FC)</b>	-0.269	-0.224	-0.244
	<b>SI X FC</b>	0.553**	0.466*	0.492*
	<b>F</b>	6.341**	4.889**	5.558**
	<b>ΔR<sup>2</sup></b>	0.069**	0.049*	0.055*

- *The ΔR<sup>2</sup> was calculated using the F-test*
- *Standardized coefficients are shown in the table*
- *\*p<0.05, \*\*p<0.01*



**Table 4.3 Regression results for fashion enterprises' inventory turnover on their levels of SI**

Dependent variables		Inventory Turnover		
Model	Independent variables	11-12	09-10	06-07
<b>1</b>	<b>Supplier Integration (SI)</b>	0.205 <sup>#</sup>	0.280**	0.064
	<b>F</b>	3.851 <sup>#</sup>	7.467**	0.362
	<b>R<sup>2</sup></b>	0.042 <sup>#</sup>	0.078**	0.004
<b>2</b>	<b>Supplier Integration (SI)</b>	0.204*	0.280**	0.064
	<b>Fashion Content (FC)</b>	-0.300**	-0.130	-0.008
	<b>F</b>	6.623**	4.578*	0.182
	<b>ΔR<sup>2</sup></b>	0.090**	0.017	0.000
<b>3</b>	<b>Supplier Integration (SI)</b>	0.307*	0.294*	0.093
	<b>Fashion Content (FC)</b>	-0.076	-0.098	0.055
	<b>SI X FC</b>	-0.280	-0.041	-0.079
	<b>F</b>	5.055**	3.030*	0.161
	<b>ΔR<sup>2</sup></b>	0.018	0.000	0.001

- *The ΔR<sup>2</sup> was calculated using the F-test*
- *Standardized coefficients are shown in the table*
- *\*p<0.05, \*\*p<0.01, # p=0.053*

**Table 4.4 Regression results for fashion enterprises' ROA on their levels of SI**

Dependent variables		ROA		
Model	Independent variables	11-12	09-10	06-07
<b>1</b>	<b>Supplier Integration (SI)</b>	-0.116	0.217*	0.169
	<b>F</b>	1.207	4.365*	2.584
	<b>R<sup>2</sup></b>	0.014	0.047*	0.029
<b>2</b>	<b>Supplier Integration (SI)</b>	-0.116	0.217*	0.169
	<b>Fashion Content (FC)</b>	-0.088	-0.053	0.092
	<b>F</b>	0.942	2.290	1.667
	<b>ΔR<sup>2</sup></b>	0.008	0.003	0.008
<b>3</b>	<b>Supplier Integration (SI)</b>	-0.185	0.385**	0.303*
	<b>Fashion Content (FC)</b>	-0.237	0.315	0.385
	<b>SI X FC</b>	0.186	-0.459*	-0.366
	<b>F</b>	0.858	3.106*	2.067
	<b>ΔR<sup>2</sup></b>	0.008	0.048*	0.030

- The  $\Delta R^2$  was calculated using the F-test
- Standardized coefficients are shown in the table
- \* $p < 0.05$ , \*\* $p < 0.01$

(i) Net income

In the first step of hierarchical multiple regressions, SI was entered. Model 1 of Table 4.2 was statistically significant in all three time periods: 2006-07 (F=8.189;  $p < 0.01$ ), 2009-10 (F=7.078;  $p < 0.01$ ) and 2011-12 (F=7.833;  $p < 0.01$ ) which explained 8.5%, 7.4% and 8.2% of the variance ( $R^2$ ) in the fashion enterprises' net income respectively. Thus, there were *significant direct relationships between SI*

and fashion enterprises' net income in 2006-07 ( $\beta=0.292$ ), 2009-10 ( $\beta=0.273$ ) and 2011-12 ( $\beta=0.286$ ).

(ii) Inventory turnover

Model 1 of Table 4.3 was statistically significant in period 2009-10 ( $F=7.467$ ;  $p<0.01$ ) and marginally significant in period 2011-12 ( $F=3.851$ ;  $p=0.053$ ) which explained 7.8% and 4.2% of the variance ( $R^2$ ) in the fashion enterprises' inventory turnover respectively. Therefore, *significant direct relationships between SI and fashion enterprises' inventory turnover in 2009-10 ( $\beta=0.280$ ) and 2011-12 ( $\beta=0.205$ ) were identified.*

(iii) ROA

Model 1 of Table 4.4 was statistically significant in period 2009-10 ( $F=4.365$ ;  $p<0.05$ ) only, which explained 4.7% of the variance ( $R^2$ ) in the fashion enterprises' ROA. Thus, there was a *significant direct relationship between SI and fashion enterprises' ROA in 2009-10 ( $\beta=0.217$ ).*

Summarizing the results above, the higher the level of SI of a fashion enterprise had, the better was its financial performances. This finding was especially prominent in the post financial tsunami periods. Therefore, *H1a was supported.*

#### **4.2.2 Hypothesis 1b testing- the moderating effect of fashion content**

The second move was to assess the relationship between the two-way interaction (SI x fashion content) and fashion enterprises' financial performances, in order to determine whether there would be the moderating effect of fashion content (see

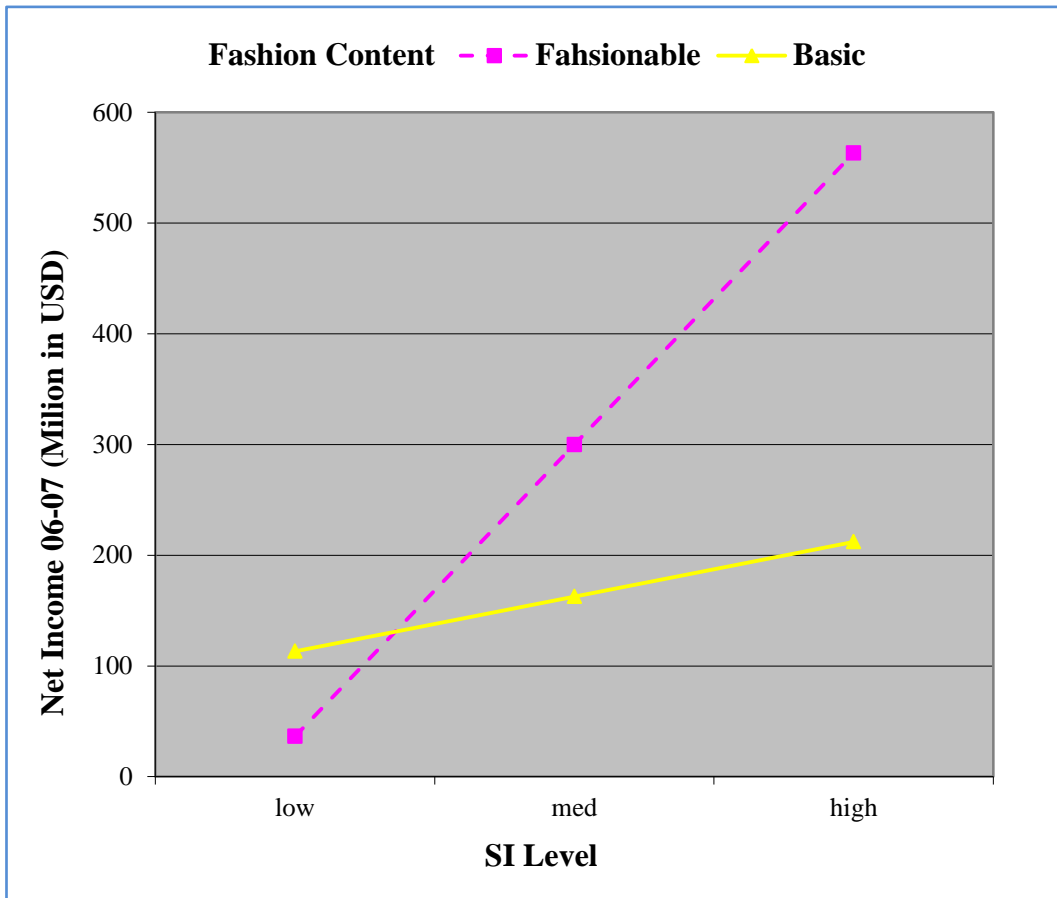
Models 2 and 3 of Tables 4.2-4.4). To have a better understanding of the moderating effect, graphical displays- ModGraphs were used for the presentation of significant statistical interactions (Jose, 2013).

H1b: Fashion content moderates the relationship between the level of supplier integration and a fashion enterprise's financial performances.

(i) Net income

After entry of the moderator (fashion content) in Model 2, the change of predictive power from Model 1 to Model 2 was insignificant in all three periods: 2006-07 ( $\Delta R^2=0.022$ ,  $p>0.05$ ), 2009-10 ( $\Delta R^2=0.022$ ,  $p>0.05$ ) and 2011-12 ( $\Delta R^2=0.030$ ,  $p>0.05$ ). In the final model (Model 3), only *the interactive term (SI x FC) was significant: 2006-07 ( $\beta=0.492$ ,  $p<0.05$ ), 2009-10 ( $\beta=0.466$ ,  $p<0.05$ ) and 2011-12 ( $\beta=0.553$ ,  $p<0.01$ )*. Therefore, *fashion content had a significant moderating effect on the relationships between supplier integration and a fashion enterprise's net income in all pre- and post- financial crisis periods*. Fashion content, according to the results, was a pure moderator, which moderated the form of the relationship between SI and net income through its interaction with SI, but did not feature a main effect itself (insignificant beta of fashion content in Model 3) (Hooley & Hussey,1999).

Findings from the further analysis suggested that the relationship between supplier integration and net income were particularly strong for the group of “fashionable” enterprises in all time periods (see Figures 4.1-4.3).



**Figure 4.1 ModGraph showing the moderating effect of fashion content on the SI-net income (06-07) relationship**

**Table 4.5 Simple slope analysis for ModGraph 4.1 output**

Net income 06-07	Fashion content	
	Fashionable	Basic
Simple slopes	171.549	23.188
t-value	2.376*	0.580

\* $p < 0.05$

Figure 4.1 shows that “fashionable” group manifested a steeper slope between SI and net income in period 06-07 than “basic” group did. The larger the value for the simple slope, the higher the correlation between SI and net income in 06-07.

Simple slope analysis (Jose, 2012) yielded the result that “fashionable” group manifested a significant positive slope, (171.549,  $p < 0.05$ ); whereas “basic” group evidenced an insignificant slope (see Table 4.5). These results suggested that the “fashionable” group’s net income in 06-07 was significantly related to its differential use of supplier integration while there was no significant correlation between SI and net income in 2006-07 for the “basic” group. Furthermore, the largest difference in net income between the two groups occurred under the condition of high supplier integration whereas both groups’ net income was similar under the condition of low supplier integration.



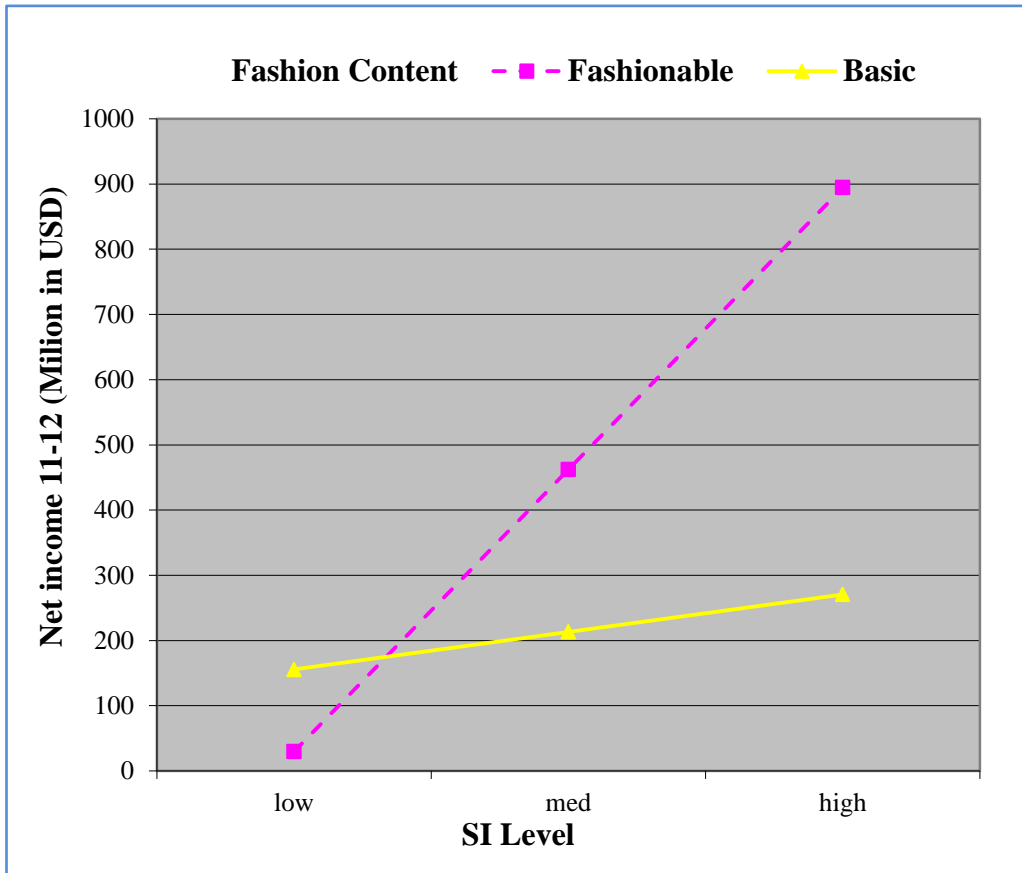
**Figure 4.2 ModGraph showing the moderating effect of fashion content on the SI-net income (09-10) relationship**

**Table 4.6 Simple slope analysis for ModGraph 4.2 output**

Net income 09-10	Fashion content	
	Fashionable	Basic
Simple slopes	204.205	37.260
t-value	3.434**	0.814

\*\* $p < 0.01$

Similar to Figure 4.1, Figure 4.2 also shows that “fashionable” group manifested a steeper slope between SI and net income in period 09-10 than “basic” group did. Simple slope analysis yielded the result that “fashionable” group manifested a significant positive slope, (204.205,  $p < 0.01$ ) whereas “basic” group evidenced an insignificant slope (see Table 4.6). These results suggested *that “fashionable” group’s net income in 09-10 was significantly related to its differential use of supplier integration while there was no significant correlation between SI and net income for the “basic” group.* Furthermore, the largest difference in net income between two groups occurred under the condition of high supplier integration whereas both groups’ net income was similar under the condition of low supplier integration.



**Figure 4.3 ModGraph showing the moderating effect of fashion content on the SI-net income (11-12) relationship**

**Table 4.7 Simple slope analysis for ModGraph 4.3 output**

Net income 11-12	Fashion content	
	Fashionable	Basic
Simple slopes	283.358	37.709
t-value	3.925**	0.679

\*\* $p < 0.01$

Figure 4.3 shows that “fashionable” group manifested a steeper slope between SI and net income in period 11-12 than “basic” group did. Simple slope analysis yielded the result that “fashionable” group manifested a significant positive slope,



(283.358,  $p < 0.01$ ) whereas “basic” group evidenced an insignificant slope (see Table 4.7). These results suggested that *“fashionable” group’s net income in 11-12 was significantly related to its differential use of supplier integration while there was no significant correlation between SI and net income for the “basic” group*. Furthermore, the largest difference in net income between two groups occurred under the condition of high supplier integration whereas both groups’ net income was similar under the condition of low supplier integration.

(ii) Inventory turnover

According to Model 3 in Table 4.3, although the F statistics for time periods 09-10 ( $F=3.030$ ,  $p < 0.05$ ) and 11-12 ( $F=5.055$ ,  $p < 0.01$ ) were significant, the additional term added little predictive power to the model (Flynn et al., 2010): 2009-2010 ( $\Delta R^2 = 0.000$ ,  $p > 0.05$ ) and 2011-2012 ( $\Delta R^2 = 0.018$ ,  $p > 0.05$ ), and the standardized coefficients of the interaction term  $SI \times FC$  in both periods were insignificant. Therefore, there was no statistically significant evidence for the existence of the moderating effect of fashion content on the relationship between SI and fashion enterprises’ inventory turnover.

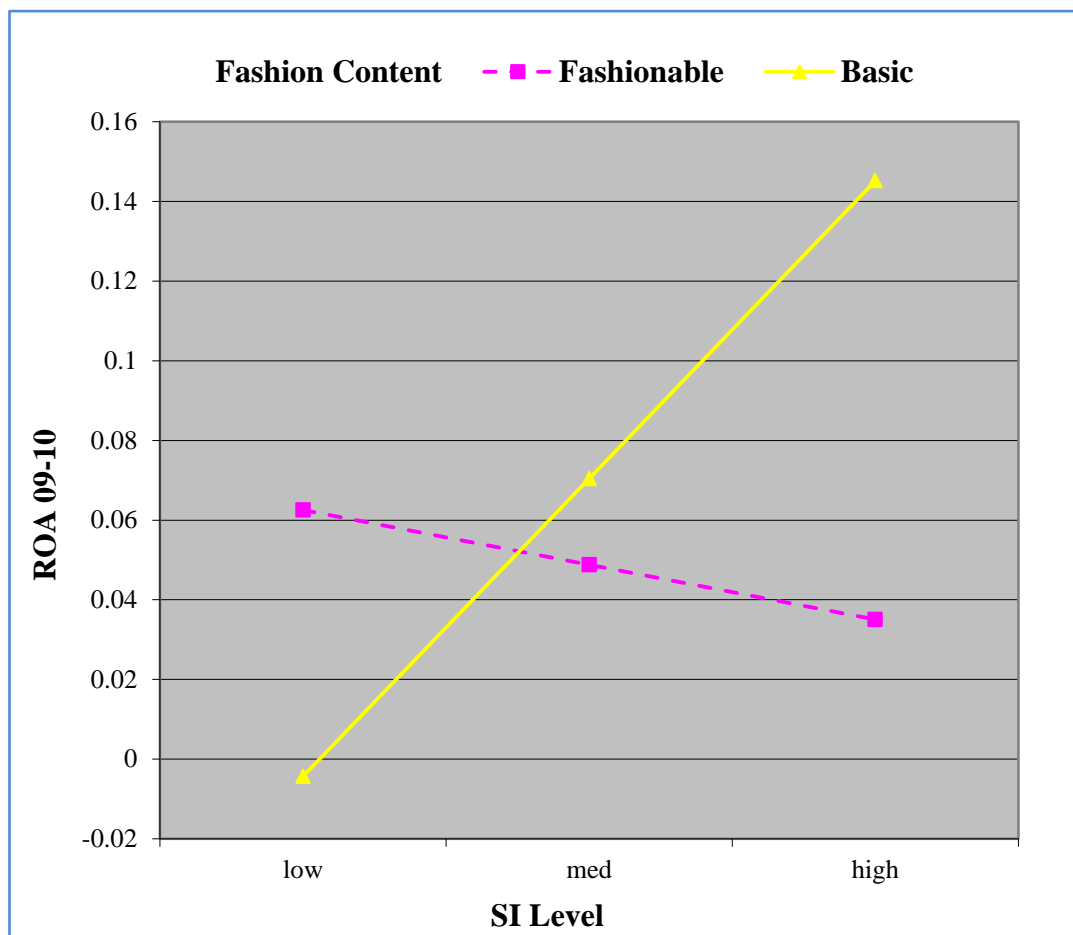
(iii) ROA

After entry of the moderator (fashion content) in Model 2, the change of predictive power from Model 1 to Model 2 was insignificant in all three periods: 2006-07 ( $\Delta R = 0.008$ ,  $p > 0.05$ ), 2009-10 ( $\Delta R^2 = 0.003$ ,  $p > 0.05$ ) and 2011-12 ( $\Delta R^2 = 0.008$ ,  $p > 0.05$ ). In the final model (Model 3), *only the interactive term (SI x FC) in 2009-2010 ( $\beta = -0.459$ ,  $p < 0.05$ ) was significant and increased the predictive power of Model 3 ( $\Delta R^2 = 0.048$ ,  $p < 0.05$ )*. This indicated that *fashion*

*content had a significant moderating effect on the relationship between supplier integration and a fashion enterprise's ROA in post- financial crisis period.*

Fashion content, according to the results, was also a pure moderator.

Findings from the further analysis suggested that the relationship between supplier integration and ROA after financial tsunami was particularly strong for the group of “basic” enterprises (see Figure 4.4).



**Figure 4.4 ModGraph showing the moderating effect of fashion content on the SI-ROA (09-10) relationship**

**Table 4.8 Simple slope analysis for ModGraph 4.4 output**

ROA 09-10	Fashion content	
	Fashionable	Basic
Simple slopes	-0.009	0.049
t-value	-0.334	2.955**

\*\* $p < 0.01$

Figure 4.4 also shows that “basic” group manifested a steeper slope between SI and ROA in period 09-10 than “fashionable” group did. Simple slope analysis yielded the result that “basic” group manifested a significant positive slope, (2.955,  $p < 0.01$ ); whereas “fashionable” group evidenced an insignificant slope (see Table 4.8). These results suggested that *“basic” group’s ROA in 09-10 was significantly related to its differential use of supplier integration while no significant correlation between SI and ROA was observed for the “fashionable” group.*

To summarize, the relationships between SI level and fashion enterprises’ net income and ROA were moderated by fashion content in many cases. Thus, *H1b was partially supported* and it was interesting to note that the relationship between SI level and net income was strengthened in “fashionable” group; while the relationship between SI level and ROA was strengthened in “basic” group. Such observations would be discussed in details in the next chapter.

#### **4.2.3 Hypothesis 2a testing- the direct effect of SI level against financial tsunami**

This section focuses on the direct effect of the level of SI on a fashion enterprise’s financial performances against financial tsunami. To achieve this, the differences

in the various financial measures of the fashion enterprises between periods 06-07 and 09-10 (referred as Scenario 1) and between periods 06-07 and 11-12 (referred as Scenario 2) were investigated.

H2a: A high level of supplier integration helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

The regression results for the differences in the fashion enterprises' financial performances before and after financial tsunami on their levels of supplier integration are summarized in Tables 4.9-4.11.

**Table 4.9 Regression results for fashion enterprises' change in net income before and after financial tsunami on their level of SI**

Dependent variables:		Net income	
Model	Independent variables:	Scenario 1#	Scenario 2#
<b>1</b>	<b>Supplier Integration (SI)</b>	0.149	0.241*
	<b>F</b>	2.001	5.409*
	<b>R<sup>2</sup></b>	0.022	0.058*
<b>2</b>	<b>Supplier Integration (SI)</b>	0.149	0.241*
	<b>Fashion Content (FC)</b>	0.107	0.188
	<b>F</b>	1.511	4.473*
	<b>ΔR<sup>2</sup></b>	0.011	0.035
<b>3</b>	<b>Supplier Integration (SI)</b>	0.049	0.030
	<b>Fashion Content (FC)</b>	-0.112	-0.274
	<b>SI X FC</b>	0.273	0.577**
	<b>F</b>	1.522	5.817**
	<b>ΔR<sup>2</sup></b>	0.017	0.075**

- #Scenario 1: Difference between periods 09-10 and 06-07; Scenario 2: Difference between periods 11-12 and 06-07
- The  $\Delta R^2$  was calculated using the F-test
- Standardized coefficients are shown in the table
- \* $p < 0.05$ , \*\* $p < 0.01$

**Table 4.10 Regression results for fashion enterprises' change in inventory turnover before and after financial tsunami on their levels of SI**

Dependent variables:		Inventory turnover	
Model	Independent variables:	Scenario 1#	Scenario 2#
<b>1</b>	<b>Supplier Integration (SI)</b>	0.067	0.025
	<b>F</b>	0.398	0.054
	<b>R<sup>2</sup></b>	0.005	0.001
<b>2</b>	<b>Supplier Integration (SI)</b>	0.067	0.025
	<b>Fashion Content (FC)</b>	-0.055	-0.130
	<b>F</b>	0.328	0.781
	<b><math>\Delta R^2</math></b>	0.003	0.017
<b>3</b>	<b>Supplier Integration (SI)</b>	0.043	0.040
	<b>Fashion Content (FC)</b>	-0.107	-0.096
	<b>SI X FC</b>	0.066	-0.043
	<b>F</b>	0.245	0.527
	<b><math>\Delta R^2</math></b>	0.001	0.000

- #Scenario 1: Difference between periods 09-10 and 06-07; Scenario 2: Difference between periods 11-12 and 06-07
- The  $\Delta R^2$  was calculated using the F-test
- Standardized coefficients are shown in the table

**Table 4.11 Regression results for fashion enterprises' change in ROA before and after financial tsunami on their levels of SI**

Dependent variables:		ROA	
Model	Independent variables:	Scenario 1#	Scenario 2#
<b>1</b>	<b>Supplier Integration (SI)</b>	-0.160	-0.164
	<b>F</b>	2.317	2.429
	<b>R<sup>2</sup></b>	0.026	0.027
<b>2</b>	<b>Supplier Integration (SI)</b>	-0.160	-0.164
	<b>Fashion Content (FC)</b>	-0.104	-0.092
	<b>F</b>	1.642	1.593
	<b>ΔR<sup>2</sup></b>	0.011	0.008
<b>3</b>	<b>Supplier Integration (SI)</b>	-0.288*	-0.291*
	<b>Fashion Content (FC)</b>	-0.383	-0.369
	<b>SI X FC</b>	0.349	0.347
	<b>F</b>	1.956	1.912
	<b>ΔR<sup>2</sup></b>	0.027	0.027

- #Scenario 1: Difference between periods 09-10 and 06-07; Scenario 2: Difference between periods 11-12 and 06-07
- The  $\Delta R^2$  was calculated using the F-test
- Standardized coefficients are shown in the table
- \* $p < 0.05$

(i) Net income

In the first step of the hierarchical multiple regressions, SI was entered. Model 1 of Table 4.9 was statistically significant in Scenario 2 ( $F=5.409$ ;  $p < 0.05$ ) which explained 5.8% of the variance ( $R^2$ ) in the fashion enterprises' net income. Thus,

there was a *significant direct relationship between SI and fashion enterprises' change in net income in Scenario 2* ( $\beta=0.241, p<0.05$ ).

(ii) Inventory turnover

According to Table 4.10, the relationships between supplier integration and fashion enterprises' inventory turnover in both Scenarios 1 ( $\beta=0.067, p>0.05$ ) and 2 ( $\beta=0.025, p>0.05$ ) were insignificant.

(iii) ROA

Similar to the results for inventory turnover, the relationships between supplier integration and fashion enterprises' ROA in both Scenarios 1 ( $\beta=-0.160, p>0.05$ ) and 2 ( $\beta=-0.164, p>0.05$ ) were insignificant.

To sum up, *H2a was partially supported*. To be specific, a high level of supplier integration helped mitigate the adverse effect of financial tsunami on a fashion enterprise's net income in Scenario 2.

#### **4.2.4 Hypothesis 2b testing- the moderating effect of fashion content against financial tsunami**

This section assesses the relationship between the two-way interaction (SI x fashion content) and a fashion enterprise's financial performances against financial tsunami, in order to determine whether there would be a moderating effect of fashion content. Again, ModGraphs were used for the presentation of significant statistical interactions.



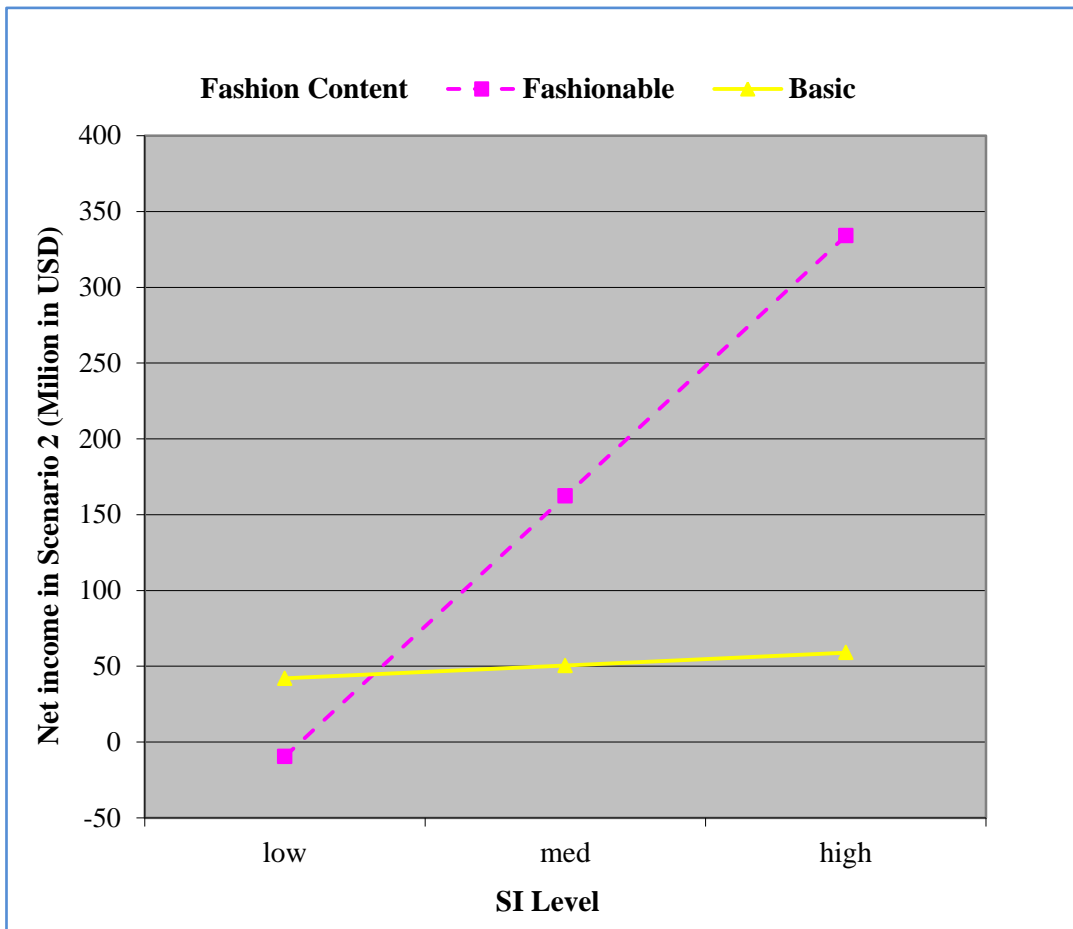
H2b: Fashion content moderates the strengths of supplier integration to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

The results are shown in Models 2 and 3 of Tables 4.9-4.11.

(i) Net income

After entry of the moderator (fashion content) into Model 2, the change of predictive power from Model 1 to Model 2 was insignificant in both scenarios: Scenario 1 ( $\Delta R^2=0.011$ ,  $p>0.05$ ) and Scenario 2 ( $\Delta R^2=0.035$ ,  $p>0.05$ ). In the final model (Model 3), *only the interactive term (SI x FC) in Scenario 2 ( $\beta=0.577$ ,  $p<0.01$ ) was significant. Therefore, fashion content had a significant moderating effect on the relationship between supplier integration and a fashion enterprise's change in net income in Scenario 2.* Fashion content, according to the results, was a pure moderator which moderated the form of the relationship between SI and change in the net income through its interaction with SI, but did not feature a main effect itself.

The results from the further analysis suggested the relationship between supplier integration and change in net income before and after financial tsunami was particularly strong for the group of “fashionable” enterprises in Scenario 2 (see Figure 4.5).



**Figure 4.5 ModGraph showing the moderating effect of fashion content on the SI-net income (Scenario 2) relationship**

**Table 4.12 Simple slope analysis for ModGraph 4.5 output**

Net income in Scenario 2	Fashion content	
	Fashionable	Basic
Simple slopes	111.809	5.521
t-value	3.708**	0.238

\*\* $p < 0.01$

Figure 4.5 shows that “fashionable” group manifested a steeper slope between supplier integration and change in net income in Scenario 2 than “basic” group did. The larger the value for the simple slope, the higher the correlation between

SI and the change in net income. Simple slope analysis yielded the results that “fashionable” group manifested a significant positive slope (111.809,  $p < 0.01$ ) whereas “basic” group evidenced an insignificant slope (see Table 4.12). These results suggested that *“fashionable” group’s change in net income before and after financial tsunami was significantly related to its differential use of supplier integration while there was no significant correlation between SI and the change in net income for the “basic” group.* Furthermore, the largest difference in the change in net income between two groups occurred under the condition of high supplier integration whereas both groups’ change in net income was similar under the condition of low supplier integration.

(ii) Inventory turnover

According to Model 3 of Table 4.10, the moderating effect of fashion content on the relationships between supplier integration and fashion enterprises’ change in inventory turnover in Scenario 1 ( $\beta = 0.066$ ,  $p > 0.05$ ) and 2 ( $\beta = -0.043$ ,  $p > 0.05$ ) was insignificant.

(ii) ROA

According to Model 3 of Table 4.11, similar to the results for inventory turnover, the moderating effect of fashion content on the relationships between supplier integration and fashion enterprises’ change in ROA in Scenario 1 ( $\beta = 0.349$ ,  $p > 0.05$ ) and 2 ( $\beta = 0.347$ ,  $p > 0.05$ ) was insignificant.

To summarize, *H2b was partially supported.* Fashion content had a moderating effect on the relationship between supplier integration and fashion enterprises’

change in net income before and after financial crisis. According to the results in Sections 4.2.2 and this section, fashion content moderated the relationship between SI level and financial performances in terms of net income and ROA. “Basic” and “fashionable” groups were actually benefited in different financial perspectives, therefore it was also interesting to have a further look into the SI practices of “basic” and “fashionable” groups respectively to understand the critical SI practices for enterprises of different fashion contents (see Appendix III).

#### **4.3 Adoption of GSP and fashion enterprises’ financial performances**

This section analyzes the effect of GSP adoption on fashion enterprises’ financial performances in terms of net income, inventory turnover and ROA. Referring to Chapter 2, different conditions were considered, including (i) the direct relationship between GSP adoption a fashion enterprise’s financial performances, (ii) the moderating effect of fashion content on the relationship between GSP adoption and a fashion enterprise’s financial performances, (iii) the direct relationship between GSP adoption and a fashion enterprise’s financial performances against financial tsumani and (iv) the moderating effect of fashion content on the relationship between GSP adoption and a fashion enterprise’s financial performances against financial tsumani.

#### **Hypothesis testing**

HMR was used to test Hypotheses 3-4. They were:

H3a: Adoption of green sustainability program (GSP) by a fashion enterprise has a positive relationship with its financial performances.

H3b: Fashion content moderates the relationship between adoption of green sustainability program (GSP) and a fashion enterprise's financial performances.

H4a: Adoption of green sustainability program (GSP) by a fashion enterprise helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

H4b: Fashion content moderates the strengths of green sustainability program (GSP) to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

#### **4.3.1 Hypothesis 3a testing- the direct effect of GSP adoption**

In the first move, the direct effect of GSP adoption on fashion enterprises' financial performances during three different periods (2006-2007, 2009-2010 and 2011-2012) were investigated.

H3a: Adoption of green sustainability program (GSP) by a fashion enterprise has a positive relationship with its financial performances.

Tables 4.13-4.15 summarize the regression results for fashion enterprises' financial performances on their GSP adoption.

**Table 4.13 Regression results for fashion enterprises' net income on their GSP adoption**

Dependent variables		Net Income		
Model	Independent variables:	11-12	09-10	06-07
<b>1</b>	<b>GSP</b>	0.296**	0.292**	0.320**
	<b>F</b>	8.437**	8.205**	10.014**
	<b>R<sup>2</sup></b>	0.087**	0.085**	0.102**
<b>2</b>	<b>GSP</b>	0.290**	0.287**	0.314**
	<b>Fashion Content (FC)</b>	0.162	0.138	0.138
	<b>F</b>	5.587**	5.059**	5.995**
	<b>ΔR<sup>2</sup></b>	0.026	0.019	0.019
<b>3</b>	<b>GSP</b>	0.166	0.157	0.222
	<b>Fashion Content (FC)</b>	0.029	-0.002	0.038
	<b>GSP X FC</b>	0.244	0.256	0.183
	<b>F</b>	4.641**	4.369**	4.491**
	<b>ΔR<sup>2</sup></b>	0.026	0.028	0.014

- *The ΔR<sup>2</sup> was calculated using the F-test*
- *Standardized coefficients are shown in the table*
- *\*p<0.05, \*\*p<0.01*

**Table 4.14 Regression results for fashion enterprises' inventory turnover on their GSP adoption**

Dependent variables		Inventory Turnover		
Model	Independent variables:	11-12	09-10	06-07
<b>1</b>	<b>GSP</b>	-0.072	0.075	-0.076
	<b>F</b>	0.455	0.449	0.513
	<b>R<sup>2</sup></b>	0.005	0.006	0.006
<b>2</b>	<b>GSP</b>	-0.060	0.080	-0.076
	<b>Fashion Content (FC)</b>	-0.298**	-0.134	-0.005
	<b>F</b>	4.513*	1.047	0.255
	<b><math>\Delta R^2</math></b>	0.089**	0.018	0.000
<b>03</b>	<b>GSP</b>	0.061	0.089	0.017
	<b>Fashion Content (FC)</b>	-0.168	-0.124	0.095
	<b>GSP X FC</b>	-0.240	-0.018	-0.185
	<b>F</b>	3.856*	0.694	0.597
	<b><math>\Delta R^2</math></b>	0.025	0.000	0.015

- *The  $\Delta R^2$  was calculated using the F-test*
- *Standardized coefficients are shown in the table*
- *\* $p < 0.05$ , \*\* $p < 0.01$*

**Table 4.15 Regression results for fashion enterprises' ROA on their GSP adoption**

Dependent variables		ROA		
Model	Independent variables:	11-12	09-10	06-07
<b>1</b>	<b>GSP</b>	-0.044	0.135	0.083
	<b>F</b>	0.170	1.627	0.607
	<b>R<sup>2</sup></b>	0.002	0.018	0.007
<b>2</b>	<b>GSP</b>	-0.041	0.137	0.079
	<b>Fashion Content (FC)</b>	-0.086	-0.058	0.088
	<b>F</b>	0.408	0.956	0.647
	<b>ΔR<sup>2</sup></b>	0.007	0.003	0.008
<b>3</b>	<b>GSP</b>	-0.082	0.161	0.145
	<b>Fashion Content (FC)</b>	-0.130	-0.031	0.159
	<b>GSP X FC</b>	0.081	-0.049	-0.130
	<b>F</b>	0.351	0.660	0.642
	<b>ΔR<sup>2</sup></b>	0.003	0.001	0.007

- *The ΔR<sup>2</sup> was calculated using the F-test*
- *Standardized coefficients are shown in the table*
- *\*p<0.05, \*\*p <0.01*

(i) Net income

In the first step of hierarchical multiple regressions, GSP was entered. Model 1 of Table 4.13 was statistically significant in all three time periods: 2006-07 (F=10.014; p<0.01), 2009-10 (F=8.205; p<0.01) and 2011-12 (F=8.437; p<0.01) which explained 10.2%, 8.5% and 8.7% of the variance (R<sup>2</sup>) in the fashion



enterprises' net income respectively. Thus, there were *significant direct relationships between GSP adoption and fashion enterprises' net income in 2006-07 ( $\beta = 0.320$ ), 2009-10 ( $\beta = 0.292$ ) and 2011-12 ( $\beta = 0.296$ ).*

(ii) Inventory turnover

According to Model 1 of Table 4.14, the direct relationships between GSP adoption and fashion enterprises' inventory turnover in all three time phases: 2006-07 ( $\beta = -0.076$ ,  $p > 0.05$ ), 2009-10 ( $\beta = -0.075$ ,  $p > 0.05$ ) and 2011-2012 ( $\beta = -0.072$ ,  $p > 0.05$ ) were insignificant.

(iii) ROA

According to Table 4.15, the direct relationships between GSP adoption and fashion enterprises' ROA in all three time periods: 2006-07 ( $\beta = 0.083$ ,  $p > 0.05$ ), 2009-10 ( $\beta = 0.135$ ,  $p > 0.05$ ) and 2011-2012 ( $\beta = -0.044$ ,  $p > 0.05$ ) were insignificant.

Summarizing the results above, GSP adoption had a significantly positive effect on the net income of a fashion enterprise in all three periods while its effect on the other financial performance measurements was insignificant. *H3a was partially supported.*

#### **4.3.2 Hypothesis 3b testing- the moderating effect of fashion content**

This section is to assess the relationship between the two-way interaction (GSP adoption x fashion content) and fashion enterprises' financial performances, in order to determine whether there would be a moderating effect of fashion content

(see Model 3 of Tables 4.13-4.15). ModGraphs were used for the presentation of significant statistical interactions.

H3b: Fashion content moderates the relationship between adoption of green sustainability program (GSP) and a fashion enterprise's financial performances.

The results are contained in Model 3 of Tables 4.13-4.15.

(i) Net income

According to Model 3 of Table 4.13, although the F statistics for time periods 2006-07 ( $F=4.491$ ,  $p<0.01$ ), 09-10 ( $F=4.369$ ,  $p<0.01$ ) and 11-12 ( $F=4.641$ ,  $p<0.01$ ) were significant, the additional term added too little predictive power to the models (Flynn et al., 2010) : 2006-07 ( $\Delta R^2=0.014$ ,  $p>0.05$ ), 2009-2010 ( $\Delta R^2=0.028$ ,  $p>0.05$ ) and 2011-2012 ( $\Delta R^2=0.026$ ,  $p>0.05$ ), and the standardized coefficients of GSP x FC were also insignificant. Therefore, the moderating effect of fashion content on the relationship between GSP adoption and fashion enterprises' net income was insignificant.

(ii) Inventory turnover

According to Model 3 of Table 4.14, although the F statistics for the time period 11-12 ( $F=3.856$ ,  $p<0.05$ ) was significant, the additional term added too little to the predictive power to the model ( $\Delta R^2=0.025$ ,  $p>0.05$ ), and the standardized coefficient of GSP x FC was also insignificant. This indicated that the magnitude of the moderating effect was insignificant (see Hooley & Hussey, 1999).

Therefore, the moderating effect of fashion content on the relationship between GSP adoption and fashion enterprises' inventory turnover was insignificant.

(iii) ROA

According to Model 3 of Table 4.15, the moderating effect of fashion content on the relationships between GSP adoption and fashion enterprises' ROA in all time periods: 2006-07 ( $\beta=-0.130$ ,  $p>0.05$ ), 2009-10 ( $\beta=-0.049$ ,  $p>0.05$ ) and 2011-12 ( $\beta=0.081$ ,  $p>0.05$ ) were insignificant.

To sum up, *H3b was not supported*. The moderating effect of fashion content on the relationships between GSP adoption and fashion enterprises' financial performances (net income, inventory turnover and ROA) was insignificant.

**4.3.3 Hypothesis 4a testing- the direct effect of GSP adoption against financial tsunami**

This section focuses on the direct effect of the adoption of GSP on fashion enterprises' financial performances against financial tsunami, i.e. financial performance differences between 06-07 and 09-10 (namely Scenario 1) and between 06-07 and 11-12 (namely Scenario 2).

H4a: Adoption of green sustainability program (GSP) by a fashion enterprise helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

Regression results are summarized in Tables 4.16-18.

**Table 4.16 Regression results for fashion enterprises' change in net income before and after financial tsunami on their GSP adoption**

<b>Dependent variables:</b>		<b>Net income</b>	
<b>Model</b>	<b>Independent variables:</b>	<b>Scenario 1#</b>	<b>Scenario 2#</b>
	<b>GSP</b>	0.139	0.222*
	<b>F</b>	1.734	4.545*
	<b>R<sup>2</sup></b>	0.019	0.049*
<b>2</b>	<b>GSP</b>	0.135	0.215*
	<b>Fashion Content (FC)</b>	0.101	0.180
	<b>F</b>	1.325	3.852*
	<b>ΔR<sup>2</sup></b>	0.010	0.032
<b>3</b>	<b>GSP</b>	-0.065	0.059
	<b>Fashion Content (FC)</b>	-0.114	0.012
	<b>GSP X FC</b>	0.395*	0.308*
	<b>F</b>	3.057*	3.978*
	<b>ΔR<sup>2</sup></b>	0.067*	0.041*

- #Scenario 1: Difference between periods 09-10 and 06-07; Scenario 2: Difference between periods 11-12 and 06-07
- The  $\Delta R^2$  was calculated using the F-test
- Standardized coefficients are shown in the table
- \* $p < 0.05$

**Table 4.17 Regression results for fashion enterprises' change in inventory turnover before and after financial tsunami on their GSP adoption**

<b>Dependent variables:</b>		<b>Inventory turnover</b>	
<b>Model</b>	<b>Independent variables:</b>	<b>Scenario 1#</b>	<b>Scenario 2#</b>
	<b>GSP</b>	0.119	0.050
	<b>F</b>	1.255	0.225
	<b>R<sup>2</sup></b>	0.014	0.003
<b>2</b>	<b>GSP</b>	0.121	0.055
	<b>Fashion Content (FC)</b>	-0.059	-0.133
	<b>F</b>	0.778	0.892
	<b>ΔR<sup>2</sup></b>	0.003	0.018
<b>3</b>	<b>GSP</b>	0.025	0.009
	<b>Fashion Content (FC)</b>	-0.163	-0.183
	<b>GSP X FC</b>	0.190	0.092
	<b>F</b>	0.979	0.695
	<b>ΔR<sup>2</sup></b>	0.015	0.004

- #Scenario 1: Difference between periods 09-10 and 06-07; Scenario 2: Difference between periods 11-12 and 06-07
- The  $\Delta R^2$  was calculated using the F-test
- Standardized coefficients are shown in the table

**Table 4.18 Regression results for fashion enterprises' change in ROA before and after financial tsunami on their GSP adoption**

Dependent variables:		ROA	
Model	Independent variables:	Scenario 1#	Scenario 2#
	<b>GSP</b>	-0.076	-0.079
	<b>F</b>	0.508	0.547
	<b>R<sup>2</sup></b>	0.006	0.006
<b>2</b>	<b>GSP</b>	-0.072	-0.075
	<b>Fashion Content (FC)</b>	-0.101	-0.089
	<b>F</b>	0.701	0.622
	<b>ΔR<sup>2</sup></b>	0.010	0.008
<b>3</b>	<b>GSP</b>	-0.140	-0.139
	<b>Fashion Content (FC)</b>	-0.174	-0.157
	<b>GSP X FC</b>	0.135	0.125
	<b>F</b>	0.696	0.609
	<b>ΔR<sup>2</sup></b>	0.008	0.007

- #Scenario 1: Difference between periods 09-10 and 06-07; Scenario 2: Difference between periods 11-12 and 06-07
- The  $\Delta R^2$  was calculated using the F-test
- Standardized coefficients are shown in the table

(i) Net income

In the first step of hierarchical multiple regressions, GSP was entered. Model 1 of Table 4.16 was statistically significant in Scenario 2 ( $F=4.545$ ;  $p<0.05$ ) which explained 4.9% of the variance ( $R^2$ ) in the fashion enterprises' change in net income. Thus, there was *significant direct relationship between GSP adoption and a fashion enterprise's change in net income in Scenario 2* ( $\beta=0.222$ ,  $p<0.05$ ).

(ii) Inventory turnover

According to Model 1 of Table 4.17, the relationships between GSP adoption and fashion enterprises' change in inventory turnover in both Scenarios 1 ( $\beta=0.119$ ,  $p>0.05$ ) and 2 ( $\beta=0.050$ ,  $p>0.05$ ) were insignificant.

(iii) ROA

According to Model 1 of Table 4.18, the relationships between GSP adoption and fashion enterprises' change in ROA in both Scenarios 1 ( $\beta=-0.076$ ,  $p>0.05$ ) and 2 ( $\beta=-0.079$ ,  $p>0.05$ ) were insignificant.

Summarizing the results above, GSP adoption had a significantly positive effect on the change in the net income of a fashion enterprise against financial tsunami while its effect on the other financial performances against financial tsunami was insignificant. *H4a was partially supported.*

#### **4.3.4 Hypothesis 4b testing- the moderating effect of fashion content against financial tsunami**

In this section, the relationship between the two-way interaction (GSP adoption x fashion content) and fashion enterprises' financial performances against financial tsunami is assessed, in order to determine the existence of moderating effect of fashion content (see Models 2 and 3 of Tables 4.16-4.18). ModGraphs were used for the presentation of significant statistical interactions.

H4b: Fashion content moderates the strengths of green sustainability program (GSP) to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.

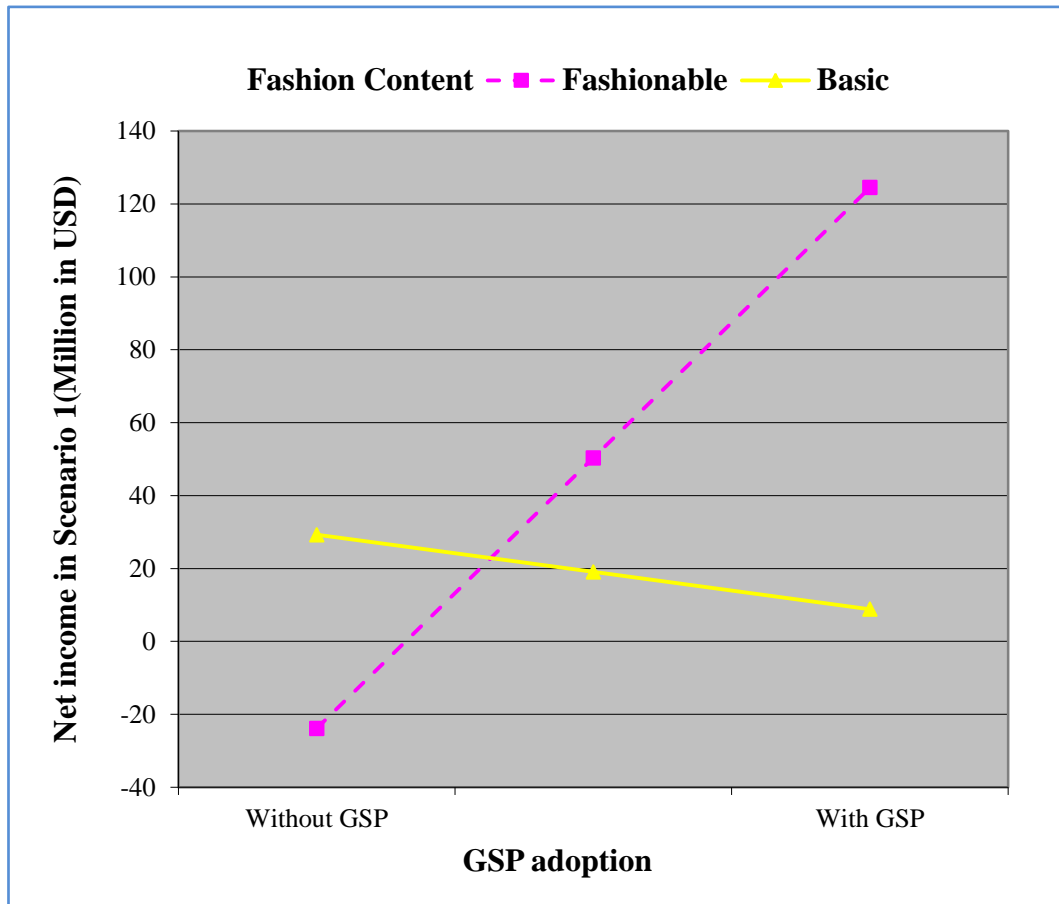
The results are contained in Models 2 and 3 of Tables 4.16-4.18.

(i) Net income

After entry of the moderator (fashion content) in Model 2, the change of predictive power from Model 1 to Model 2 was insignificant in both scenarios: Scenario 1 ( $\Delta R^2=0.010$ ,  $p>0.05$ ) and Scenario 2 ( $\Delta R^2=0.032$ ,  $p>0.05$ ). In the final model (Model 3), *the interactive term (GSP x FC) in both Scenarios 1 ( $\beta=0.395$ ,  $p<0.05$ ) and Scenario 2 ( $\beta=0.308$ ,  $p<0.05$ ) was significant. Therefore, fashion content had a significant moderating effect on the relationships between GSP and a fashion enterprise's change in net income in Scenarios 1 and 2.* Besides, fashion content, according to the results, was a pure moderator which moderated the form of the relationship between GSP adoption and the change in net income through its interaction with GSP adoption, but did not feature a main effect itself.

Findings from the further analysis suggested that the relationship between GSP adoption and change in net income before and after financial tsunami was particularly strong for the group of “fashionable” enterprises (see Figures 4.6 and 4.7).





**Figure 4.6 ModGraph showing the moderating effect of fashion content on the GSP adoption-net income (Scenario 1) relationship**

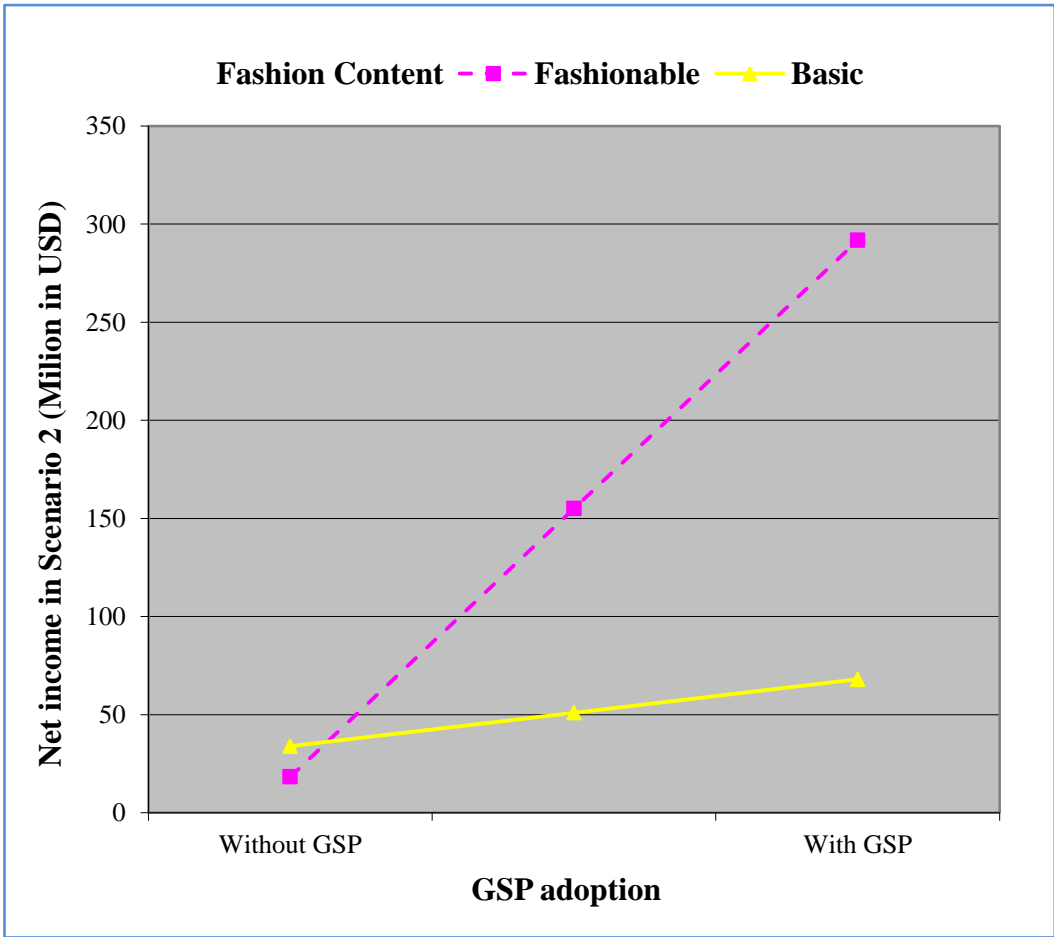
**Table 4.19 Simple slope analysis for ModGraph 4.6 output**

Net income in Scenario 1	Fashion content	
	Fashionable	Basic
Simple slopes	150.522	-20.682
t-value	2.801**	-0.500

\*\* $p < 0.01$

Figure 4.6 shows that “fashionable” group manifested a steeper slope between GSP adoption and the change in net income in Scenario 1 than “basic” group did. The larger the value for the simple slope, the higher the correlation between GSP

adoption and change in net income. Simple slope analysis yielded the results that “fashionable” group manifested a significant positive slope (150.522,  $p < 0.01$ ) whereas “basic” group evidenced an insignificant slope (see Table 4.19). These results suggested that “fashionable” group’s change in net income against financial tsunami was significantly related to its differential use of GSP while there was no significant correlation between GSP adoption and the change in net income for the “basic” group.



**Figure 4.7 ModGraph showing the moderating effect of fashion content on GSP adoption-net income (Scenario 2) relationship**

**Table 4.20 Simple slope analysis for ModGraph 4.7 output**

Net income in Scenario 2	Fashion content	
	Fashionable	Basic
Simple slopes	277.288	34.562
t-value	2.875**	0.464

\*\* $p < 0.01$

Figure 4.7 shows that “fashionable” group manifested a steeper slope between GSP adoption and the change in net income in Scenario 2 than “basic” group did. Simple slope analysis yielded the results that “fashionable” group manifested a significant positive slope (277.288,  $p < 0.01$ ); whereas “basic” group evidenced an insignificant slope (See Table 4.20). This result suggested that *“fashionable” group’s change in net income against financial tsunami was significantly related to its differential use of GSP while there was no significant correlation between GSP adoption and the change in net income for the “basic” group.* Furthermore, the largest difference in the change in net income between two groups occurred for enterprises with GSP adoption; whereas both groups’ change in net income was similar for those without GSP adoption.

(ii) Inventory turnover

According to Model 3 of Table 4.17, the moderating effect of fashion content on the relationships between GSP adoption and fashion enterprises’ change in inventory turnover in both Scenarios 1 ( $\beta = 0.190$ ,  $p > 0.05$ ) and 2 ( $\beta = 0.092$ ,  $p > 0.05$ ) were insignificant.

(iii) ROA

According to Model 3 of Table 4.18, the moderating effect of fashion content on the relationships between GSP adoption and fashion enterprises' change in ROA in both Scenarios 1 ( $\beta=0.135$ ,  $p>0.05$ ) and 2 ( $\beta=0.125$ ,  $p>0.05$ ) were insignificant.

To summarize, *H4b was partially supported*. Fashion content significantly moderated the relationship between the adoption of the green sustainability program (GSP) and fashion enterprises' change in net income before and after financial tsunami while its moderating effect on the other financial performances against financial tsunami was insignificant.

#### **4.4 Relationship between level of SI and GSP adoption**

In this section, the relationship between level of SI and GSP adoption of a fashion enterprise is presented. Then, the moderating effect of fashion content on the above relationship is assessed.

#### **Hypothesis testing**

Hierarchical logistic regression analysis was used to test Hypotheses 5a and 5b.

They were:

H5a: The level of SI of a fashion enterprise has a positive relationship with its adoption of GSP.

H5b: Fashion content moderates the relationship between SI level and GSP adoption of a fashion enterprise.

#### **4.4.1 Hypothesis 5a testing- the direct effect of SI level on GSP adoption**

Firstly, the direct relationship between level of SI and GSP adoption of fashion enterprises was investigated.

H5a: The level of SI of a fashion enterprise has a positive relationship with its adoption of GSP.

Results of the logistic regression regarding the impact of SI level on GSP adoption of the fashion enterprises are summarized in Table 4.21.

**Table 4.21 Logistic regression results for GSP adoption on SI level**

Dependent variables		GSP adoption					
Model	Independent variables:	B	S.E.	Wald( $\chi^2$ )	df	p	Exp(B)
<b>1</b>	<b>Constant</b>	-1.173	0.457	6.591	1	0.010	0.309
	<b>SI</b>	0.291	0.149	3.807	1	0.051	1.338
	<b>Model 1</b>			4.057	1	0.044	
<b>2</b>	<b>Constant</b>	-1.071	0.539	3.951	1	0.047	0.343
	<b>SI</b>	0.291	0.149	3.812	1	0.051	1.338
	<b>Fashion Content (FC)</b>	-0.161	0.455	0.125	1	0.723	0.851
	<b>Block 2</b>			0.125	1	0.724	
	<b>Model 2</b>			4.182	2	0.124	
<b>3</b>	<b>Constant</b>	-1.963	0.908	4.676	1	0.031	0.140
	<b>SI</b>	0.136	0.179	0.574	1	0.449	1.146
	<b>FC</b>	1.144	1.060	1.166	1	0.280	3.141
	<b>SI X FC</b>	0.480	0.343	1.953	1	0.162	1.616
	<b>Block 3</b>			2.144	1	0.143	
	<b>Model 3</b>			6.326	3	0.097	

- Nagelkerke's  $R^2$  in Model 1, 2 and 3 were 0.060, 0.061 and 0.092 respectively

Logistic regression was performed to ascertain the effect of SI level on the adoption of GSP of a fashion enterprise. A test of the full model (Model 1) against the base model (i.e. only with the constant term) was statistically significant (model chi square =4.057, Nagelkerke's  $R^2$ =0.060,  $p < 0.05$ ). The Wald chi square of SI demonstrated that *SI made a marginally significant effect on GSP adoption*

in fashion enterprises ( $\chi^2=3.807$ ;  $p = 0.051$ )<sup>3</sup>. Increasing level of SI was associated with fashion enterprises adopted GSP. Therefore, *H5a was supported*.

#### **4.4.2 Hypothesis 5b testing- the moderating effect of fashion content on SI-GSP adoption linkage**

In this analysis, the presence of the moderating effect of fashion content on SI-GSP relationship was indicated based on the statistical significance of the block chi-square in Block 3 (in which SI x FC was included) (Norusis, 2008).

H5b: Fashion content moderates the relationship between SI level and GSP adoption of a fashion enterprise.

According to Model 3 of Table 4.21, however, the entry of SI x FC in Block 3 was insignificant to increase its block's predictive power (Block 3 chi square =2.144, Nagelkerke  $R^2=0.092$ ,  $p>0.05$ ), and the Wald chi square of all component independent variables were insignificant ( $p>0.05$ ). This indicated that the moderating effect of fashion content on the relationship between SI and GSP adoption in fashion enterprises was insignificant. Therefore, *H5b was not supported*.

#### **4.5 The indirect effect of SI on fashion enterprises' financial performances**

In this section, the mediating effect of GSP adoption on the linkage between SI and fashion enterprises' financial performances is presented. As mentioned in

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<sup>3</sup> According to Hauck & Donner (1977) and Norusis (2008), the likelihood-ratio test was more desirable than Wald statistic in testing a coefficient for a variable.

Chapter 3 Section 3.4.3, there were preconditions for establishing mediation. The first two were met: (i) SI of a fashion enterprise was significantly associated with its financial performances; ii) SI of a fashion enterprise was significantly associated with its GSP adoption. The third condition: the significant relationship between GSP adoption of a fashion enterprise and its financial performances when SI was also included in the regression model is now presented. Table 4.22 shows statistical output of SI and GSP adoption predicting financial performances of the fashion enterprises.

**Table 4.22 Statistical output of regression of financial performances on the SI and GSP adoption**

Dependent variables		Net income <sup>4</sup>			
Model	Independent variables	11-12	09-10	06-07	Scenario 2
1	SI	0.286**	0.273**	0.292**	0.241*
2	SI	0.234*	0.221*	0.235*	0.203
	GSP	0.246*	0.245*	0.270**	0.179

- *Standardized coefficients are shown in the table*
- *\*p<0.05, \*\*p<0.01*

According to Model 2 in Table 4.22, the effect of GSP adoption (mediator) on fashion enterprises' net income was significant in time periods 2006-07 ( $\beta=0.270$ ,

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<sup>4</sup> According to the findings in previous sections, adoption of GSP only had significant relationship with fashion enterprises' net income in those four phases, thus regression was done to test those 4 variables only before examining the mediating effect of GSP adoption.



$p < 0.01$ ), 2009-10 ( $\beta = 0.245$ ,  $p < 0.05$ ) and 2011-12 ( $\beta = 0.246$ ,  $p < 0.05$ ). Besides, the standardized coefficients of SI were reduced in Model 2 when compared to that in Model 1. Therefore, *the strength of the basic relationships between SI and fashion enterprises' net income were reduced in periods 2006-07, 2009-10 and 2011-12.*

#### **4.5.1 Hypotheses 6a and 6b testing- the mediating effect of GSP adoption on SI –financial performances linkage**

To assert the occurrence of mediation, Sobel test was then applied to verify whether the size of the indirect effect was statistically significant (Jose, 2012; Sobel, 1982).

H6a: The relationship between SI and a fashion enterprise's financial performances is mediated by its GSP adoption.

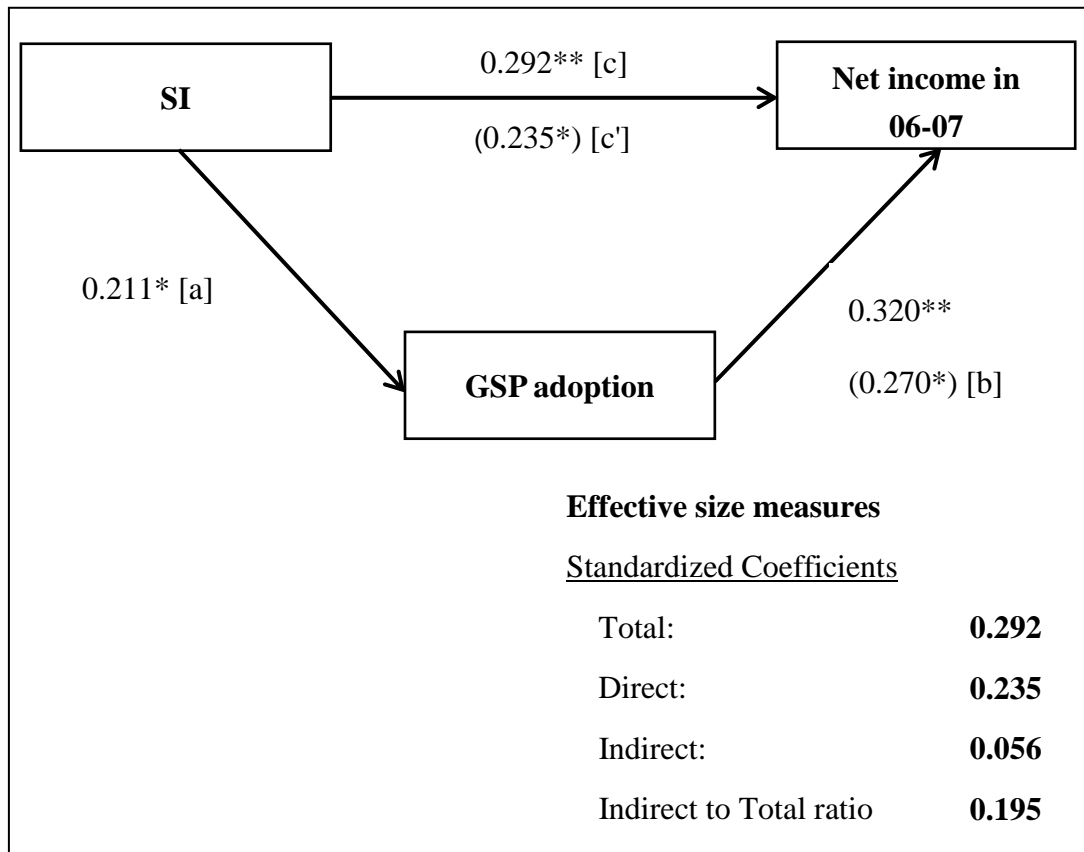
H6b: The relationship between SI and a fashion enterprise's financial performances against financial tsunami is mediated by its GSP adoption.

Sobel tests results are summarized in Table 4.23. A significant z-value indicated that the indirect effect of SI on fashion enterprises' financial performances via GSP adoption was significantly different from zero (see Jose, 2012). Medgraphs were then presented to have a further understanding on the mediational pattern and the effect size value of each variable (see Figures 4.8-4.10).

**Table 4.23 Summary of the Sobel test results**

<b>Dependent variable</b>		<b>Sobel test</b>	
<b>Financial performance</b>	<b>Phases</b>	<b>z-value</b>	<b>p-value</b>
<b>Net income</b>	<b>11-12</b>	1.516	0.130
	<b>09-10</b>	1.511	0.131
	<b>06-07</b>	1.573	0.116

The Sobel z –values in the Table 4.23 were all insignificant. The results indicated no significant evidence that GSP adoption exhibited mediation to the relationship between SI and the above concerned financial performance and thus the null hypothesis should be accepted. GSP adoption did not explain any significant portion of the basic relationship between SI and fashion enterprises’ financial performance. Therefore, *H6a and 6b were not supported.*

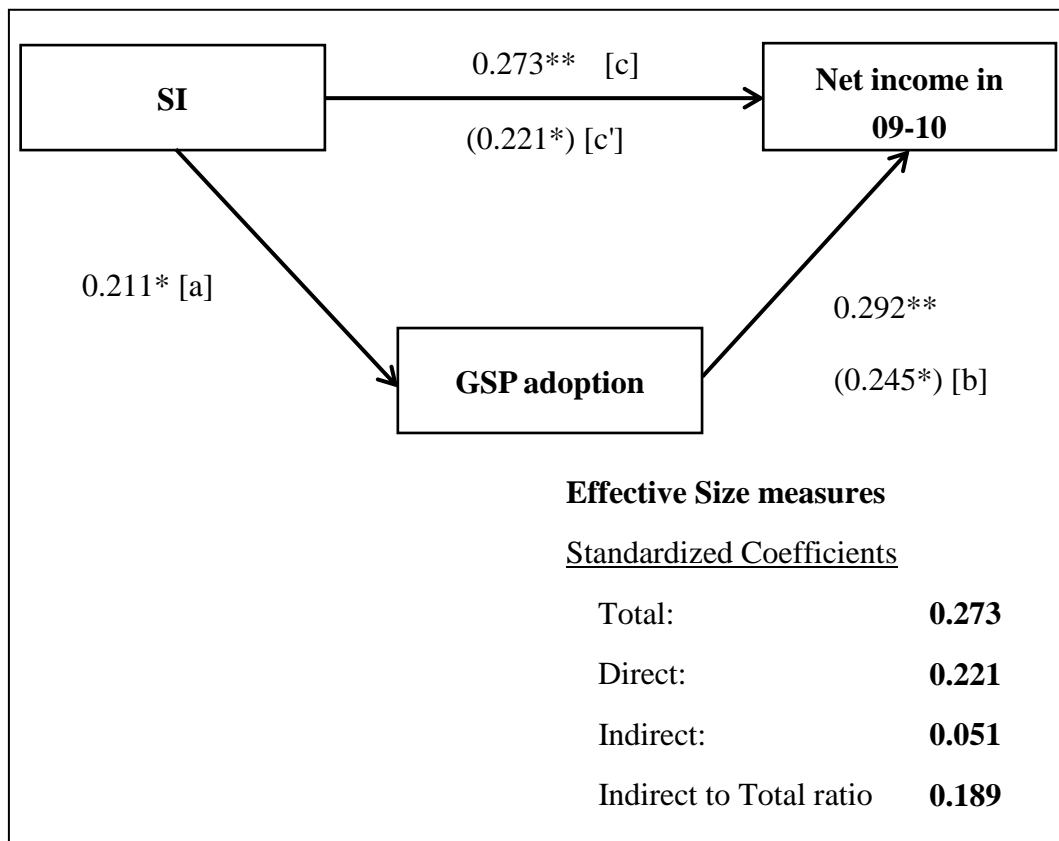


**Figure 4.8 MedGraph of GSP adoption mediating the SI-net income (06-07) relationship**

*-The numerical values in parentheses are beta weights taken from the regression and the other values are zero order correlations*

*- \* $p < 0.05$ , \*\* $p < 0.01$*

According to Figure 4.8, the standardized coefficient of the direct effect of SI on fashion enterprise' net income in 06-07 was 0.235 ( $p < 0.05$ ) and that of the indirect effect was 0.056. Only 19.5% of the original basic relationship was explained by the indirect effect.

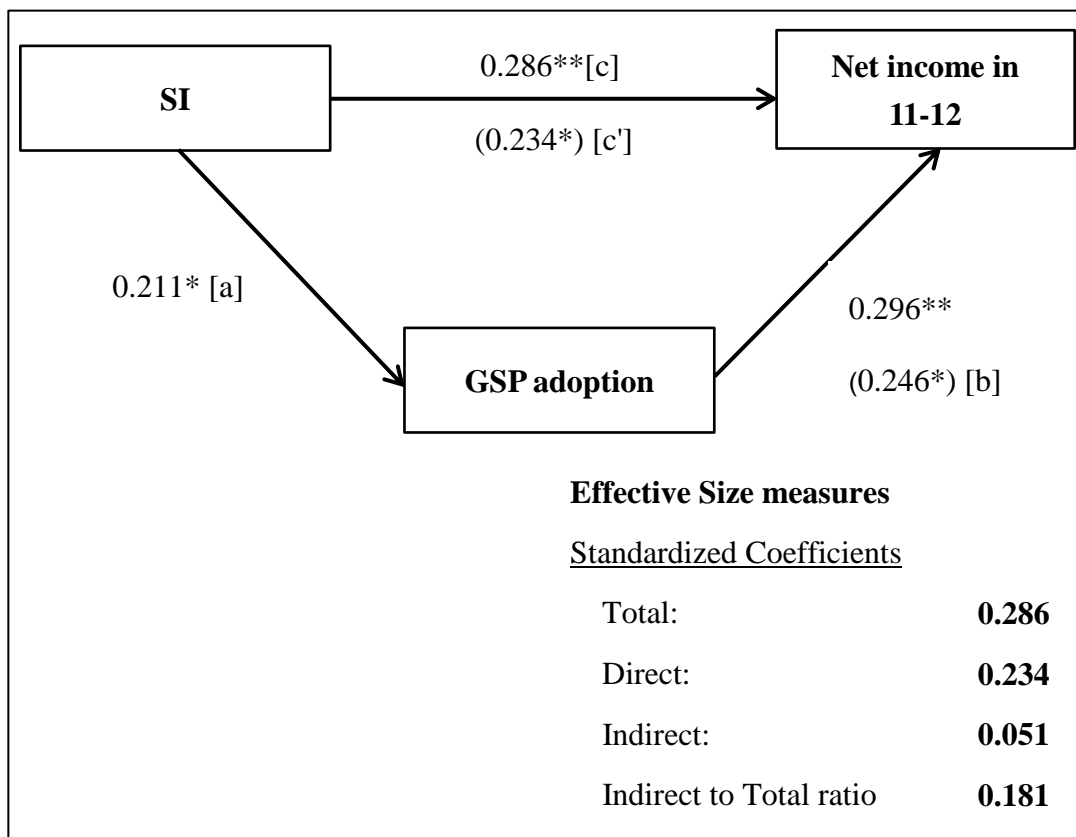


**Figure 4.9 MedGraph of GSP adoption mediating the SI- net income (09-10) relationship**

*-The numerical values in parentheses are beta weights taken from the regression and the other values are zero order correlations*

*- \* $p < 0.05$ , \*\* $p < 0.01$*

According to Figure 4.9, the standardized coefficient of the direct effect of SI on fashion enterprise' net income in 09-10 was 0.221 ( $p < 0.05$ ) and that of the indirect effect was 0.051. Only 18.9% of the original basic relationship was explained by the indirect effect.



**Figure 4.10 MedGraph of GSP adoption mediating the SI- net income (11-12) relationship**

*-The numerical values in parentheses are beta weights taken from the regression and the other values are zero order correlations*

*- \* $p < 0.05$ , \*\* $p < 0.01$*

According to Figure 4.10, the standardized coefficient of the direct effect of SI on fashion enterprise' net income in 11-12 was 0.234 ( $p < 0.05$ ) and that of the indirect effect was 0.051. Only 18.1% of the original basic relationship was explained by the indirect effect.

#### **4.6 Chapter summary**

In this chapter, all data analysis results were presented. Firstly, the descriptive statistics of the fashion enterprises were summarized. Secondly, the relationship between the level of supplier integration and a fashion enterprise's financial performances, and the moderating effect of fashion content on the above relationship were analyzed. Thirdly, the relationship between adoption of green sustainability program and a fashion enterprise's financial performances and the moderating effect of fashion content on that relationship were examined.

In addition, to have a clearer picture, the relationship between SI and GSP adoption and the mediating effect of GSP adoption on the relationship between SI and a fashion enterprise's financial performances were also studied. All hypotheses were tested and the results are summarized in Table 4.24. Discussions and recommendations of the findings would be stated in next chapter.

**Table 4.24 Summary table of the hypothesis testing results**

<b>Hypotheses</b>		<b>Financial Performance Measure</b>	<b>Periods with significant result</b>	<b>Result</b>	<b>Remarks for the significant moderating effect</b>
H1a	The level of supplier integration of a fashion enterprise has a positive relationship with its financial performances.	i) Net income	06-07, 09-10, 11-12	Support	N.A.
		ii) Inventory turnover	09-10,11-12	Support	
		iii) Return on asset	09-10	Support	
H1b	Fashion content moderates the relationship between the level of supplier integration and a fashion enterprise's financial performances.	i) Net income	06-07, 09-10, 11-12	Support	"Fashionable"
		ii) Inventory turnover		Do not support	No moderating effect
		iii) Return on asset	09-10	Support	"Basic"
H2a	A high level of supplier integration helps mitigate the adverse effect of financial	i) Net income	Scenario 2	Support	N.A.
		ii) Inventory turnover		Do not support	

	tsunami on a fashion enterprise's financial performances.	iii) Return on asset		Do not support	
H2b	Fashion content moderates the strengths of supplier integration to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.	i) Net income	Scenario 2	Support	"Fashionable"
		ii) Inventory turnover		Do not support	No moderating effect
		iii) Return on asset		Do not support	No moderating effect
H3a	Adoption of green sustainability program (GSP) by a fashion enterprise has a positive relationship with its financial performances.	i) Net income	06-07, 09-10, 11-12	Support	N.A
		ii) Inventory turnover		Do not support	
		iii) Return on asset		Do not support	
H3b	Fashion content moderates the relationship between adoption of green sustainability program (GSP) and a	i) Net income		Do not support	No moderating effect
		ii) Inventory turnover		Do not support	No moderating effect
		iii) Return on asset		Do not support	No moderating effect



	fashion enterprise's financial performances.				
H4a	Adoption of green sustainability program (GSP) by a fashion enterprise helps mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.	i) Net income	Scenario 2	Support	N.A
		ii) Inventory turnover		Do not support	
		iii) Return on asset		Do not support	
H4b	Fashion content moderates the strengths of green sustainability program (GSP) to mitigate the adverse effect of financial tsunami on a fashion enterprise's financial performances.	i) Net income	Scenario 1, Scenario 2	Support	"Fashionable"
		ii) Inventory turnover		Do not support	No moderating effect
		iii) Return on asset		Do not support	No moderating effect
H5a	The level of SI of a fashion enterprise has a positive relationship with its	N.A.		Support	N.A.

	adoption of GSP.				
H5b	Fashion content moderates the relationship between SI level and GSP adoption of a fashion enterprise.	N.A.		Do not support	No moderating effect
H6a	The relationship between SI and a fashion enterprise's financial performances is mediated by its GSP adoption.	i) Net income		Do not support	
H6b	The relationship between SI and a fashion enterprise's financial performances against financial tsunami is mediated by its GSP adoption.	i) Net income		Do not support	

## **Chapter 5 Discussion and Recommendations**

In this chapter, discussion and interpretation of the findings are presented. Then recommendations would be given.

### **5.1 Implication of fashion enterprise's SI**

Referring to the previous chapter, the identified supplier integrated practices were “use of IT”, “long-term relationship with suppliers”, “joint goal setting and continuous improvement programs”, “joint product development”, “production flexibility”, “joint quality control program” and “joint inventory management”. The relationship between SI level (i.e. numbers of supplier integrated practices established) of a fashion enterprise and its financial performances and the moderating effect of fashion content on the above relationship are discussed in the following subsections.

#### **5.1.1 SI and fashion enterprise's financial performances**

The higher the level of SI a fashion enterprise had, the greater the financial performances (net income, inventory turnover and ROA) were, especially after financial tsunami in the periods 09-10 and 11-12 (Chapter 4, Section 4.2.1). High level of SI could enhance fashion enterprises' profit and efficiency. This was in line with previous research which posited the positive relationship between supply chain integration and market performances (Cao & Zhang, 2011; Feng et al., 2014; Najafi Tavani et al., 2013). It was reported that SI practices had a fundamental influence on the companies' financial performances in long run (Li et al., 2006). Fashion enterprises and their suppliers contributing a set of resources in the

integration could generate competitive advantages and benefit the supply chain. High level of SI resulted in better knowledge sharing and product innovation and higher market responsiveness, which contributed to fashion enterprises' profit (Feng et al., 2014; Najafi Tavani et al., 2013). External integration was important in cost reduction (Huo et al., 2013). Involving suppliers in product development and joint decision making could maintain the consistency between product designs and capabilities of suppliers, which further reduced the development cost and time (Cousins et al., 2011; Najafi Tavani et al., 2013). These explained the findings that a fashion enterprise with a higher level of SI would always have a better net income regardless of financial tsunami.

According to the findings, the level of SI of a fashion enterprise increased with its inventory turnover and ROA in the post-financial crisis periods. Inventory turnover and ROA were more related to the business and operational efficiencies. A high level of SI might help enhance information sharing, inventory management, production process and trust building between supply chain partners. Suppliers in the joint cooperation took up more roles and responsibilities in scheduling (Petersen et al., 2005). It resulted in improved delivery dependability, flexibility, and time-to-market (Li et al., 2006). After financial tsunami, there were too many uncertainties in the fashion market. Management of physical flow was one of the major challenges in supply chain risk management (Lavastre et al., 2014). Joint decision making, timely information exchange could prevent over-production which led to inventory obsolescence and low inventory turnover. Better supplier management resulted in better delivery and flexibility performances (Prajogo et al., 2012). Under high volume uncertainty, buyer who provided more information

to its suppliers could be benefited from a higher degree of flexibility provided from them (van Donk & van der Vaart, 2005). As some suppliers shared resources in different supply chains, a high level of SI facilitated the priority in addressing orders. Changes of business strategies and resources reallocation were necessary to prevent a company from going bankrupt. A close relationship with suppliers allowed more flexibility in inventory and resources management. Joint decision making, timely information exchange, reduced duplication of efforts and risk sharing between supply chain partners helped increase the fashion enterprises' efficiency (Lavie, 2006). Therefore, a high level of SI resulted in better performance in inventory turnover and ROA of a fashion enterprise in post-financial crisis.

The findings could also be explained by several supply chain operations management theories. Applying the theory of *RBV of the firm* (Dyer & Singh, 1998), SI enabled the two parties to combine resources and capabilities in a strategic way to achieve the competitive advantages over competing others. SI was a relational resource existing in a supply chain level that facilitated the joint efforts between fashion enterprises and their suppliers and the complementarity of their capabilities. The argument for valuable SI was also built upon the *KBV* of a firm. SI emphasized the sharing of information and knowledge co-creation between fashion enterprises and suppliers which improved decision-making, new product development and inventory management (Cousins et al., 2011; Mihm, 2010; Swink et al., 2007). According to Cao and Zhang (2011), the direct impact of SI on financial performances came from the private benefits generated by the focal firms. It was about how they transferred what they had gained from the SI,

including resources and knowledge, to create internal benefits. All these resources and knowledge could help fashion enterprises to perform better in the market and generate superior financial performances.

The findings in this study also supported the *transaction cost economics (TCE)*. Without SI, fashion suppliers were simply involved in a purchasing process; idea sharing and joint operations were not expected. Thus, the fashion enterprises were required to pay more attention to select the proper suppliers, negotiate with them, inspect delivered product and keep an eye on every relevant processes as opportunism undermined trust. Development of SI inspired long term relationship and trust development which generally lowered uncertainties and opportunism levels, thus the transaction costs were reduced, which resulted in superior performances and higher efficiency (Cao & Zhang, 2011; Das et al., 2006). The close relationship between suppliers and fashion enterprises improved efficiency and reduced transaction cost in their supply chains. After financial tsunami, recession caused many fashion enterprises hard to sustain economically in the market, integrating with suppliers could lower uncertainties, and create more ideas to withstand the crisis.

### **5.1.2 The moderating effect of fashion content on SI–fashion enterprise’s financial performances linkage**

Fashion content significantly moderated the relationship between SI level and a fashion enterprise’s financial performances. In particular, a significant relationship between supplier integration and net income in all studied periods existed for enterprises in the “fashionable” group, while a significant relationship between SI

and ROA after financial crisis existed for enterprises in the “basic” group (Chapter 4, Section 4.2.2).

The products of “fashionable” group were characterized by shorter product life cycles, and frequent innovation was needed. Product design and time-to-market were the important criteria to achieve better sales and market share. Thus, “fashionable” group with a high level of SI could be benefited by a function of combined efforts and shared resources with suppliers. SI provided fashion enterprises with production skills, innovation search scope, reduced research time and cost and improved manufacturing performances (Feng et al., 2014). High level of SI helped develop new products in a time efficient way (Feng & Wang, 2013). Besides, long lead time caused forecasting error and over- or under-production. In the fashion industry, only around two-thirds of products could be sold at full prices while the rest had to be discounted (Mattila, King & Ojala, 2002). High production flexibility enhanced market responsiveness; therefore, companies’ financial performances were improved (Droge et al., 2004). The supply chains of enterprises in “fashionable” group had to be more responsive, agile and use more modern supply chain management practices and multi-dimensional developments to sustain in its niches. Higher level of SI therefore further strengthened their business strategies which resulted in better net income.

On the other hand, the findings suggested a significant relationship between SI and ROA existed for enterprises in the “basic” group. ROA measured how effective a fashion enterprise could convert the money it had invested into

earnings. One possible reason was that a high level of SI might help “basic” group to increase ROA by reducing its investment. This study proposed that “basic” group could utilize SI in different aspects. Compared with “fashionable” group, “basic” group required less innovations and efforts in trendy product designs and in turn it might focus more on improving business and operation efficiency. High level of SI encouraged joint continuity planning and decision making. Suppliers in the joint cooperation took up more roles and responsibilities in planning, resources or even risk sharing. There were different types of asset specificity such as physical and dedicated asset specificity, representing additional investment from a supplier in a production process (see Handfield & Bechtel, 2002). High quality of collaboration shared resource like equipment, facilities and financial assets to facilitate goal achievement synergistically (Carton & Cummings, 2012). After financial tsunami, fashion companies might get into financial problems easily due to the bad resource management. “Basic” group could be benefited from the joint efforts with its suppliers who were active in contributing complementary resources and skills that supported the supply chain to counter challenges and uncertainties (Simatupang & Sridharan, 2008). For instance, during post- recession periods, fashion enterprises might easily sit on too much inventory which affected their cash flow or other necessary investments on business operations. High level of SI enabled timely information exchange, flexible production process and joint planning which allowed “basic” group to hold fewer inventories. This was also in line with Jutter and Maklan (2011), who proposed that collaborating with supply chain parties helped reduce the opportunistic decision making and the negative impact on cost during financial crisis. All these accounted for the significant relationship between SI level and



ROA of “basic” group after financial tsunami.

The findings also built upon *strategic fit theory* which emphasized the match between a company’s capabilities and the competitive environment (Swink et al., 2007). It suggested that strategic integration played an important role in developing organizational capabilities which led to competitive advantages (Lawrence & Lorsch, 1967). Supplier integration was a state of synergy accomplished through a variety of integration practices between suppliers and fashion enterprises. This synergy produced a combined benefit where each practice was complementary to others. It helped the fashion supply chain to match resource deployments with the strategic demands, thus achieving a fit between competitive capabilities and the environment of high variation. The ‘fashionable’ group, as mentioned previously, needed to innovate frequently and the competences created by SI included better production innovations, shorter lead time, and lower cost of products (Feng et al., 2014; Feng & Wang, 2013). Therefore, it helped the “fashionable” group to be more competitive in its niches. For the “basic” group, on the other hand, SI enhanced the resource management in supply chain, leading to a higher operation and business efficiency which ultimately increased its competitiveness in responding to market disruption.

To summarize, a significant relationship between supplier integration and net income existed for enterprises in the “fashionable” group, while a significant relationship between SI and ROA existed for enterprises in the “basic” group. This might give fashion enterprises an insight that companies of different contents utilized SI in different ways to improve their financial performance. Although

they involved in the same level of SI, they might receive financial benefits in different aspects.

## **5.2 Implication of fashion enterprise's SI against financial tsunami**

The relationship between SI level of a fashion enterprise and its financial performances against financial tsunami and the moderating effect of fashion content on the above relationship are discussed in the following subsections.

### **5.2.1 SI and fashion enterprise's financial performance**

Level of SI was positively associated with a fashion enterprise's net income against financial tsunami (Scenario 2) (Chapter 4, Section 4.2.3). High level of SI resulted in a better improvement of net income of a fashion enterprise from 2006-07 to 2011-12. Operational- and strategic- level of SI shared supply chain risk and increased flexibility during the global financial crisis (Jutter & Maklan, 2011). High level of SI encouraged long-term relationship and joint continuity plans with suppliers which further increased supply chain visibility and facilitated the willingness to share the supply chain risk from the volatile demands (Simatupang & Sridharan, 2008).

High supply chain visibility was especially critical under financial crisis; it enabled fashion enterprises to evaluate the vulnerability of the suppliers and the risk they might encounter. Early risk identification allowed them to help their suppliers financially to safeguard the transactions and normal supply chain operations as cost invested in a distressed supplier could be substantial (Blome & Schoenherr, 2011). Also long-term relationship and strategic information

exchange determined the methods used in mitigating the supply chain risk (Lavastre et al., 2014). Fashion enterprises which were bonded with their suppliers might have a better understanding about their suppliers' operations and control over the supply chains. During financial tsunami, SI allowed both parties to identify risks associated in the supply chain earlier, and find an optimal way to withstand and recovery from financial tsunami effectively. These helped reduce the potential cost associated with supply chain vulnerability, which resulted in a better net income improvement.

Increased supply chain flexibility was another result of high level of SI. It was *“the capability of a company to respond to internal and external changes so as to gain or maintain a competitive advantage”* (Moon, Yi & Ngai, 2012). Throughout the recession, customers' demands on fashion products were fluctuated. Supply chain flexibility supported changes in the product offerings (feature, volume and speeds) (Jutter & Maklan, 2011). Timely information exchanges, flexible production and joint inventory management allowed fashion enterprises to catch up with the volatile demand and economic trends. Capacity reallocation was also important under financial crisis to satisfy the rising demands for low-priced products (Jutter & Maklan, 2011). SI encouraged joint planning, discussion-making to further increase the flexibility of capacity reallocation and priority of work, in order to stimulate purchase and help mitigate the negative effect on revenue.

In addition, during the post-recession phase when demand started to raise back, there were demand pick-ups and reallocation of market share because of

competitors' insolvency (Jutter and Maklan, 2011). In such situation, the extents of SI determined the supply chain ability to adjust the product featuring, resources allocation and production plans, so as to pick up the customers' demands and absorb better market share. These helped explain the results of this study that the improvement in net income of fashion enterprises against financial tsunami increased with their SI levels.

However, SI level did not show any significant relationship with a fashion enterprise's ROA and inventory turnover improvement against financial tsunami (Chapter 4, Section 4.2.3). Although SI level increased with these financial performances in the post-financial crisis periods, the changes/ improvement against financial tsunami were still insignificant. This might be because the consumers' purchase intention was not yet recovered (which affected inventory turnover) and the effect of SI on resource management after financial tsunami was not substantial enough to reduce a fashion enterprise's investment or the increase in net income was comparable to that in investment (which related to ROA) after financial tsunami.

### **5.2.2 The moderating effect of fashion content on SI–fashion enterprise's financial performances linkage**

The moderating effect of fashion content on the relationship between SI level and a fashion enterprise's financial performance was significant in Scenario 2. To be specific, a significant relationship between SI level and net income existed in the group of enterprises with “fashionable” content (Chapter 4, Section 4.2.4). The “Fashionable” group not only experienced the positive relationship between SI

and net income in all three time periods under study, but also resulted in a considerable improvement of net income against financial tsunami. These findings indicated the importance of being flexible in the “fashionable” group which was selling the more market-driven and trendy fashionable items. It required multi-dimensional developments, more innovations and a responsive supply chain to sustain. And SI matched the needs of this group. Integrating with suppliers enabled the “fashionable” group to strengthen its competitive advantages, providing more opportunities for joint development and projects to create innovations that facilitated fashion enterprises’ net income improvement.

### **5.3 Implication of GSP adoption of fashion enterprise**

The empirical findings on the impact of GSP adoption were presented in Chapter 4, Section 4.3. The relationship between GSP adoption of fashion enterprises and their financial performances and the moderating effect of fashion content are discussed in the following subsections.

#### **5.3.1 GSP adoption and fashion enterprise’s financial performances**

GSP adoption was found to have a positive effect on the net income of a fashion enterprise in all three periods; while its effect on the other financial performance measurements were insignificant (Chapter 4, Section 4.3.1). Applying the traditional *resource based view (RBV) of a firm theory* (Rungtusanatham et al., 2003); the valuable resources of a firm which were difficult to copy could help achieve sustainable competitive advantages. Extending it to consider environmental issue, the *natural resource based view of the firm (NRBV) theory* had emerged and proposed that the natural environment and resources should be

considered together as “valuable resources”. Thus, the final proposal was that future successful business had to be rooted with respect to the environmentally sustainable economic activities (see Markley & Davis, 2007).

In the literature, the majority of findings showed that sustainability programs enhanced the companies’ competitive advantages. The findings of this study indicated that fashion enterprises that were environmentally sustainable, were also economically successful during economic recession. Good organizations behaving well could be a precondition for customer to be interested. Customers with environmental commitment had better attitudes and purchase intention toward the eco-fashion brands (Yan, Hyllegard & Blaesi, 2012). According to Chatterjee (2009), customers would like to purchase from companies with high environmental contribution. They were willing to pay a premium price for the eco-fashion (Chan & Wong, 2012; Lee, 2009). Therefore, a market-based sustainability could be a strategic resource that led to superior performances ultimately (Ketchen, Hult & Slater, 2007). On the other hand, sustainable designs reduced cost for energy consumption and waste disposal and treatment (Zhu & Sarkis, 2004). According to Pal (2014), mass customization (MC) was also a green practice in design phase; it reduced wastes through replacing the physical samples by the virtual product image displayed on screens. Adidas, because of its MC program, expected to save millions dollars per season by stopping production of around 230,000 samples (Salvador, de Holan & Piller, 2009). This supported the findings that fashion enterprises had implemented GSP would always receive a better income than those had not regardless of financial tsunami.

Besides, fashion enterprises adopted GSPs could enjoy stronger supports for operations and development. Companies developed green sustainability could get helps from environmental regulators (Darnall, Potoski & Prakash, 2010). For instance, the UK government supported enterprises to develop green innovations by providing funding through green competitions (The UK Government, 2014). The intangible benefits of green sustainability improved market performances and the shareholders' perceptions toward the business (Hart & Milstein, 2003).

In addition, the positive relationship between GSP adoption and fashion enterprises' net income could be explained by the increased ecological efficiencies, such as energy saving, pollutes reduction and material reutilization (Henri & Journeault, 2010; Porter & Van der Linde, 1995). For example, Stella McCartney (a fashion company under Kering Group) has been involved in Natural Resource Defense Council's (NRDC) and lunched "Clean by Design" program within their Italian mills. It focused on reducing waste and emissions by improving process efficiency. This program helped its fashion supply chain to save approximately 25% of water and 30% of fuel (Stella McCartney, 2014). This kind of superior performances helped fashion enterprises to reduce costs associated with fluctuation in energy and resources cost, and enhance materials management.

According to this study's findings, adoption of GSP did not show any significant relationship with a fashion enterprise's ROA and inventory turnover (Chapter 4, Section 4.3.1). A possible reason was that GSP adoption did involve investment so as to be technologically responsible for energy saving and pollution reduction. It

required resources to provide sustainable guidance to their suppliers. GSP adoption, on one hand, could enhance fashion enterprises' brand images and increase sales. On the other hand, these green programs might also sit on company resources and investment, thus causing the insignificant results in fashion enterprises' ROA. Green supply chain management resulted in negative economic performances in terms of the increased operational cost and investment, as practices like material recycling and recovery were costly (Zhu & Sarkis, 2004).

### **5.3.2 The moderating effect of fashion content on GSP adoption-fashion enterprise's financial performances linkage**

The moderating effect of fashion content on the relationship between GSP adoption and a fashion enterprise's financial performances was insignificant (see Chapter 4, Section 4.3.2). As there were increasing environmental concerns among consumers and society that urged for sustainability, fashion enterprise (regardless of their fashion contents) which desired to improve brand images and increase sales would therefore take different measures of GSPs and communicate these through their sustainability strategies. Zara, an Inditex-owned fashion company, emphasized four principles of its image, which were beauty, clarity, functionality and sustainability. Zara declared their products were environmental-friendly that encompassed the initiatives of better water, energy and pollution management and biodiversity protection (Inditex, 2013). On the other hand, Gap Inc., an enterprise of "basic" content, has launched projects that established guidelines within its supply chain in order to reduce energy and water usage and waste emissions (Gap Inc., 2012). As mentioned in the last section, customers had better attitudes and purchase intention toward the eco-fashion



brands (Yan et al., 2012), therefore fashion enterprises adopted GSP would generally resulted in better financial performances across different time periods. Although neither groups of “fashionable” nor “basic” content evidenced a significantly stronger relationship between GSP adoption and financial performances in a single time period, the moderating effect of fashion content showed up in Scenarios 1 and 2 (measuring the difference of financial performances before and after financial tsunami). This would be discussed in Chapter 5, Section 5.4.2.

#### **5.4 Implication of GSP adoption of fashion enterprise against financial tsunami**

The empirical findings on the impact of GSP adoption of fashion enterprises against financial tsunami were presented in Chapter 4, Sections 4.3.3 and 4.3.4. The relationship between GSP adoption of a fashion enterprise and its financial performances against financial tsunami and the moderating effect of fashion content of the above relationship are discussed in the following subsections.

##### **5.4.1 GSP adoption and fashion enterprise’s financial performances**

GSP adoption of a fashion enterprise had a significantly positive effect on its net income against financial tsunami (Chapter 4, Section 4.3.3). Fashion enterprises adopting GSP could significantly improve its net income in Scenario 2.

Sustainability activities were the intangible assets in building up reputation and networks. They acted as a tool to enhance brand evaluations and market values in the long run (Lin et al., 2009). Besides, GSP adoption rewarded with more satisfied customers and better access to the financial markets (Marom, 2006).

Therefore, the adoption of GSP helped mitigate the adverse effect of financial tsunami and enhanced the financial performance gradually.

#### **5.4.2 The moderating effect of fashion content on GSP adoption–fashion enterprise’s financial performances linkage**

The moderating effect of fashion content on the relationships between GSP adoption and fashion enterprises’ net income were significant in both Scenarios 1 and 2 (Chapter 4, Section 4.3.4). And the above relationships were significant in the group of enterprises with “fashionable” content. Although the previous results showed that the moderating effect of fashion content was insignificant in certain time periods, the degree of change in financial performance across periods could be different between the “fashionable” and “basic” groups, which contributed the significant result here.

This study indicated that “fashionable” content strengthened the effect of GSP adoption which contributed to a better improvement of financial performance to resist the adverse effect of financial tsunami. Undoubtedly, there was an increasing demand of consumers for “fashionable” products (Turker & Altuntas, 2014) especially in the young generations. According to Garlick and Langey (2007), young adult consumers were the powerful purchasing group and they were less sensitive to product prices. At the same time, because of the personal effect and their ecological knowledge, they had a better intention to do green purchase (Kanchanapibul, Lacka, Wang & Chan, 2014). This suggested that pricing might not hinder the purchase of eco-fashion. Once “fashionable” group found solutions to make its products sustainable yet still “fashionable”; its financial performance

could be improved. The differential use of GSP by the “fashionable” group resulted in significant improvement of net income against financial tsunami while the “basic” group did not indicate a significant correlation between GSP adoption and net income improvement. Maintaining a “fashionable” image, but at the same time contributing to the environment were both important especially in the post-recession phase, which contributed to a significant improvement of profit under market disruption. H&M, for instance, encouraged customers to bring unwanted garments of any brands and in any conditions to their stores, and discount coupons were given as a reward for customer supporting the campaign (H&M, 2012). This helped stimulate the purchase motivation of customers in the post-recession period.

For the “basic” group, on the contrary, adoption of GSP did not significantly improve financial performance after financial crisis. A possible reason was that the “basic” group experienced a lower growth rate in sales after financial crisis. Customers’ intention to purchase “basic” but “sustainable” products was lower in post financial crisis when compared to pre-financial crisis (Li, Choi & Chow, 2014). Therefore for the “basic” group, GSP adoption could not significantly improve its net income after financial tsunami.

### **5.5 Implication of SI and GSP adoption of fashion enterprise**

The empirical findings on the relationship between SI level and GSP adoption of fashion enterprises were presented in Chapter 4, Section 4.4. The relationship between SI level and GSP adoption and the moderating effect of fashion content on the above relationship are discussed in the following subsections.

### **5.5.1 SI and GSP adoption of fashion enterprise**

High level of SI was associated with a fashion enterprise adopted GSP (Chapter 4, Section 4.4.1). Companies that aimed to adopt GSP should continuously rely on supplier management to create a supply chain environment characterized by mutual understanding, goal alignment, and knowledge exchange (Gualandris et al., 2014). High level of SI of a fashion enterprise could encourage GSP adoption in several perspectives. First of all, mutual trust and long term relationship with suppliers encouraged suppliers' environmental assessments and joint problem-solving discussion to reduce the environmental and social impact of the supply chain operations (Vachon & Klassen, 2008). Moreover, involving supply chain partners in the decision-making process could gain a broader view on the environmental consequences of redesigning products and processes (Seuring, 2004). High level of SI inspired exchange of knowledge that could extend the capacity of the company to develop innovative technologies which were beneficial for the environment (Hajmohammad et al., 2013). It showed that integrated with suppliers created a collaborative atmosphere for promoting GSP adoption in a fashion enterprise.

### **5.5.2 The moderating effect of fashion content on SI-GSP adoption linkage**

Fashion content did not have any moderating effect on the relationship between SI and GSP adoption of a fashion enterprise (Chapter 4, Section 4.4.2). Sustainability pressures have caused the fashion supply chains to evolve in sustainable management proactively. Sustainable supply chain was advocated as a new standard for companies to increase ecological efficiency, while meeting stakeholder requirements and improving competitiveness (Ahi & Searcy, 2013).

Thus, fashion enterprises with high SI level, regardless of their fashion contents, were associated with the proactive environmental strategies in order to outperform their competitors.

### **5.6 Implication of the mediating effect of GSP adoption on SI-fashion enterprise's financial performances**

This study hypothesized that SI could directly and indirectly (via GSP adoption) affect fashion enterprises' financial performances. However, the insignificant results of Sobel test showed that the effect of SI on fashion enterprises' financial performances was indeed direct and did not significantly pass through the GSP adoption (Chapter 4, Section 4.5). GSP adoption did not explain any significant portion of the basic relationship between SI and a fashion enterprise's financial performances.

SI in this study was defined as the number of joint supply chain practices between fashion enterprises and their suppliers (including information sharing, long term relationship, production development and inventory management, etc.). These supplier integrated practices were believed to be influential to the fashion enterprises' financial performances. On the other hand, the objectives of GSP adoption could be brand image improvement, cost reduction and revenue maximization of fashion enterprises which were also beneficial to financial performances. Although both SI and GSP adoption of a fashion enterprise were positively associated with its financial performances, the relationship between SI and GSP adoption was not strong enough (marginally significant) to form the indirect path. High SI might encourage the GSP adoption in a fashion enterprise,

as mentioned in the previous section, mutual trust established between two supply chain parties would inspire development in different aspects and GSP adoption probably also needed supports from the suppliers. However, the insignificant indirect effect of SI on financial performances through GSP adoption suggested that the effect of GSP adoption of a fashion enterprise on its financial performances might not be attributed to its SI level.

## **5.7 Recommendations to fashion enterprises**

After analyzing the data, some recommendations are provided to fashion enterprises in the following subsections.

### **5.7.1 Supplier integration**

Generally speaking, level of SI increased with a fashion enterprise's financial performances, and did improve performances against financial crisis. SI defined in this study involved different aspects in a fashion supply chain, for example, information sharing, product design, continuity planning and inventory management etc. Therefore, having an all-round supplier integration would be crucial to a fashion enterprise. As each supplier integrated practice maybe complementary to each other, and thus having an all-round supplier integration can enhance the marginal effectiveness of each component practice and the overall performances. The dimensions of SI in this study maybe served as a tool or checklist for fashion managers to establish supplier integration.

Fashion enterprises can start integration with the suppliers that they have or intend to have long-term relationship, as longer relationship motivates trust and mutual

goals development. It is also important to create a win-win situation that encourages suppliers to achieve business synergy. Enterprise' managers should create alignments and communicate well with their suppliers about the objectives and roles of the two parties in the integration. As SI also provided an ideal platform for learning and knowledge exchange (Malhotra, Gosain & Sawy, 2005), fashion enterprises are encouraged to take this opportunity to acquire technical skills and knowledge from external parties and jointly create values that help generate competitive advantages. These would benefit their financial performances directly.

Besides, it was interesting to note that the effect of SI was context dependent, which was affected by fashion content, in some cases. This implied that even with the same level of SI, supply chain and business nature would modify the use of SI and in turn the subsequent outcomes. Fashion enterprises in different categories were beneficial from SI in different aspects. The findings suggested that a significant relationship between SI of a fashion enterprise and net income existed in the "fashionable" group while a significant relationship between SI of a fashion enterprise and ROA existed in the "basic" group. Under market disruption, resources of the fashion enterprises are limited; fashion enterprises are suggested to engage in different aspects of SI according to their fashion content to generate better financial performances. For example, the "fashionable" group with high level of SI may put more efforts on joint product development, knowledge sharing and quality enhancement, etc. These supplier integrated practices fit the "fashionable" group's business strategies and improve its capabilities, thus help create competitive advantages. On the other hand, as SI could improve the "basic"

group's business efficiency, therefore the "basic" group is encouraged to involve its supplier in continuity planning, joint decision making and inventory management etc., and let its supplier to take up more responsibility in sharing resources and risks especially after financial tsunami; this would result in better investment management.

Moreover, the "fashionable" group with high level of SI significantly improved net income after financial crisis. That is, SI could considerably mitigate the adverse effect of financial crisis. Therefore, this group of fashion enterprises is highly recommended to develop high level of SI in order to withstand unstable economic conditions. High level of SI may require resources and investment that hinder a fashion enterprise from engaging in it. Therefore, integration with suppliers should be step by step and develop in a gradual approach. Understanding a fashion enterprise's positioning before establishing SI would be important too. Fashion enterprises which fail to understand the moderating role of fashion content maybe unable to develop useful capabilities and experience the benefits of SI.

### **5.7.2 Green sustainability program**

Adoption of GSP was positively associated with a fashion enterprise's net income in all investigated time periods. And the above relationship was insignificantly moderated by fashion content, which meant all fashion enterprises were generally benefited from GSP adoption.



A better result of net income can be induced by cost reduction and/or sales maximization. Fashion enterprises are suggested to invest in green sustainability programs to enhance market performances through improving materials management, minimizing packaging and energy consumption and reducing waste disposal. For example, providing eco-production guidelines to supply chain members, having periodic supplier environmental audits and restructuring supply chain processes. These practices help fashion enterprises to reduce unnecessary by-products, pollution handling fees and transportation cost. By exploring and comparing different various environmental management tools, production processes could be optimized to reduce costs too (Schaltegger & Synnestvedt, 2002).

Another way to improve profit is maximizing sales performance. There are increasing environmental concerns among consumers and society that urged for sustainability. Fashion enterprises are recommended to focus on the market-based sustainability which considered the aspects of product needs, desires of customers and the demands on environmental issues (Hult, 2011). This approach encourages market research on eco-product development. For example, using life cycle assessment software to measure the environmental impact of a newly launched green product and compared it with a conventional product (Dangelico & Pujari, 2010). Besides, establishing credible certifications from the green organizations and involving consumers into the recycling programs may also help. Good market-focused sustainability practices could satisfy stakeholders, enhance brand reputation and improve revenue (Dangelico & Pujari, 2010).

According to Yan et al. (2012), explicit message about environmental friendly products and/or production processes created positive attitudes towards fashion enterprises. Brand communications helped customers to build up their beliefs and confidence about a fashion enterprise's green sustainability initiatives, which might then stimulate purchase and develop brand loyalty. As customers may have less knowledge about green labeling and the technology behind GSP, fashion enterprises are recommended to communicate their green practices more specifically in terms of their initiatives, actions and results through official websites or sustainability reports. This helps educate consumers and shapes their purchase intention. Besides, fashion enterprise may initiate internal learning of green practices and encourage green product and/or process innovation as these could be acknowledged as quality leaders which contributed to brand image and positioning (Schaltegger & Synnestvedt, 2002).

Adoption of GSP also mitigated the adverse effect of financial crisis. Fashion enterprises adopted GSP experienced a significant increase in net income after financial tsunami. However, during financial crisis, many companies may encounter cash flow problem. Thus, fashion enterprises are highly recommended to assess the potential costs and benefits of every green practices frequently and manage the operation priorities to ensure the company can be financially benefited from various environmental induced chances. It is important for a fashion enterprise to improve green performance and brand reputation in a more economical manner.

## **5.8 Chapter summary**

In this chapter, the interpretations of the research results, including the main effect of SI and GSP adoption on fashion enterprises' financial performances in different time periods and scenarios were discussed. Then, the moderating effect of fashion content on the above relationships was conducted. In addition, corresponding recommendations were given to the fashion enterprises for implementation. The next chapter would conclude this current study.

# **Chapter 6 Conclusion, Limitations and Future Research Directions**

In this chapter, research summary and limitations of this study are discussed. Finally, future research opportunities are suggested.

## **6.1 Research summary**

This study aimed to investigate the effect of SI and GSP adoption on a fashion enterprise's financial performances, the relationship between SI of a fashion enterprise and its GSP adoption, the moderating effect of fashion content on the above linkages, and the mediating effect of GSP adoption on the relationship between SI and a fashion enterprise's financial performances. The research objectives stated in Chapter 1, Section 1.2 were achieved.

### **6.1.1 The effect of SI**

The results from the present study confirmed the positive relationship between SI and a fashion enterprise's financial performances (net income, ROA and inventory turnover) in different time periods and against financial tsunami (Chapter 4, Section 4.2.1 and 4.2.3). The findings also indicated that fashion content (selling "fashionable" or "basic" products) did moderate the relationship between SI of a fashion enterprise and its financial performances (Chapter 4, Sections 4.2.2 and 4.2.4). To conclude, the effect of SI on fashion enterprises' net income was strengthened for the "fashionable" group while the effect of SI on fashion enterprises' ROA was strengthened for the "basic" group.

These results offered several implications and managerial insights (Chapter 5, Sections 5.1, 5.2 and 5.7.1). First, having an all-round supplier integration is crucial to fashion enterprises, as each supplier integrated practice is complimentary to others. The supplier integrated practices stated in this study would be served as a checklist for fashion managers' reference. Second, the effect of SI was context dependent, even at a high level of SI, fashion enterprises of different fashion contents experienced the effect of SI in different aspects (which reflected in their financial performances). Therefore, the ways that SI contributed to fashion enterprises to improve their financial performances against financial tsunami could be different and in different extents. This study indicated that the “fashionable” group should seriously consider the adoption of SI because it helps sustain economically after financial tsunami.

### **6.1.2 The effect of GSP adoption**

The data provided evidences that a fashion enterprise with GSP adoption resulted in a better performance in net income in different time periods and against financial tsunami (Chapter 4, Sections 4.3.1 and 4.3.3).

It is hoped that the present research has made a contribution to fashion enterprises which would like to involve in any green programs (Chapter 5, Sections 5.3, 5.4 and 5.7.2). Fashion enterprises with GSP adoption resulted in better profit. This may be attributed to the efficient use of energy and materials to reduce costs of product, and the enhanced image and green innovation to stimulate customers' purchase.

The findings also indicated that the moderating effect of fashion content on the relationships between GSP adoption and fashion enterprises' financial performances in all single time periods was insignificant. That is, all fashion enterprises could be generally benefited from GSP adoption before and after financial crisis (Chapter 4, Sections 4.3.2). However, the moderating effect of fashion content showed up in Scenarios 1 and 2 (Chapter 4, Sections 4.3.4). And only the "fashionable" group could make use of green practices to improve its profit after financial tsunami considerably whereas that improvement in the "basic" group was insignificant. Therefore, it is wise for the "fashionable" group to consider investing in its environmental sustainability programs as it is beneficial to its financial performances against the financial tsunami.

### **6.1.3 Relationship between SI and GSP adoption**

The study showed that high level of SI was associated with the fashion enterprises' GSP adoption (Chapter 4, Section 4.4). This is unsurprising, since high level of SI in a fashion enterprise benefits its GSP adoption in several perspectives including goal alignment, early coordination and knowledge sharing. And this relationship was independent of fashion content. Pressure from different parties has caused fashion supply chains to involve in sustainable management which became a standard in fashion industry.

Although the three direct paths: SI-performances; SI-GSP adoption and GSP adoption-performances (net income) were significant, there was an interesting finding suggesting that the effect of SI on financial performances was indeed direct and did not significantly pass through GSP adoption. And the effect of GSP

adoption of a fashion enterprise on its financial performances may not be attributed to its SI levels.

## **6.2 Research limitations**

Same as other empirical-based research, this study's results were subject to a few limitations. First, only publicly listed fashion enterprises were investigated and hence the findings might not be applicable to other companies in the industry or other industries. Second, only publicly available secondary data (from the annual reports of the target fashion enterprise) was employed in doing analysis which might not reflect every detail of the respective enterprises. For instance, setting up a binary variable for GSP adoption might lose information content since sustainability was a complex evolution. Unfortunately there was no standard available for measuring the sustainability level of a company at the moment. To prevent overstatement and any grey areas, sustainability binary variable was applied in this study. Third, time constraint limited the numbers of fashion enterprises being investigated in the current study whereas ideally, more data should have been involved. In light of the limited numbers of fashion enterprises, caution was warranted in interpreting the results.

## **6.3 Future research**

First of all, the scope of this study is recommended to be expanded further. A higher level of reliability and representative of the findings could be induced by a larger sample size. Besides, this study focused on the breadth of SI which had included a number supplier integrated practices to define SI. Further research on exploring relationships between the extents of individual practices and fashion

enterprises' financial performances is suggested. The findings are expected to be more insightful and detailed for advancing managerial practices. Similarly, for GSP adoption, a further step on the level of green sustainability on fashion enterprises' performances against financial crisis would be valuable to researchers and industry practitioners. Besides, as mentioned in the previous section, there is no standard available for measuring the sustainability level at present; it would be useful to develop a better framework to quantify sustainability effort. Apart from the main effect of SI and GSP adoption, more studies are recommended to determine whether other factors would moderate the effect of SI and GSP adoption on enterprises' financial performances. Specifically in the fashion industry, financial performances would vary with different factors like fashion content (fashionable/ basic), price point (premium/ mass fashion) and country of origin, etc. In this study, only fashion content was considered. Therefore it is also recommended to consider other criteria that may moderate the effect of SI and GSP adoption in future research.

#### **6.4 Chapter summary**

This chapter summarized the research findings and implication. Research limitations and future directions were discussed



## Appendices

**Appendix I Summary table of prior studies on the relationship between various dimensions of supply chain integration and performances**

Study	Samples	Approach	Supply chain integration	Performance measures	Findings/ Contribution
Feng et al. (2014)	176 Chinese manufacturing companies	Survey	Supplier involvement and customer involvement	Time-to-market of new products, operational performance and business performance	Both supplier and customer involvement contributed to the reduction of time-to-market of new products, which mediated the relationship between external involvement and firm performance.
Feng and Wang (2013)	214 Chinese manufacturing companies	Survey	Internal involvement, customer involvement and supplier involvement	New product development cost and speed and market performance	Supplier involvement had a significant positive effect on new product development cost and speed. It also improved market performance both directly and indirectly.

Huo et al. (2013)	604 groups from a wide range of industries in China	Survey	Internal integration and external integration	Cost performance, service performance and financial performance	External integration had both direct negative impact and indirect positive impact on financial performance through cost and service performance.
Najafi Tavani et al. (2013)	161 groups from a wide range of industries in Iran	Survey	Supplier involvement and absorptive capacity (AC)	Financial and non-financial performances of new product development	There was a direct and contingent effect of supplier involvement and AC on new product development performance.
Prajogo and Olhager (2012)	232 manufacturing firms in Australia	Survey	Long-term relationship, information integration and logistics integration	Operation performance	Information technology capabilities and information sharing had a significant effect on logistics integration; while long-term supplier relationship had both direct and indirect significant effects on performance.

Cao and Zhang (2011)	211 manufacturing firms in U.S.	Survey	Supply chain collaboration including information sharing, goal congruence, decision synchronization, incentive alignment, resource sharing, collaborative communication and joint knowledge creation	Collaborative advantage and firm performance	Supply chain collaboration improved the collaborative advantage and influenced firm performance. Besides, collaborative advantage mediated the relationship between supply chain collaboration and firm performance.
Wong et al. (2011)	151 automotive manufacturers in Thailand	Survey	Internal, supplier and customer integration	Delivery, production cost, quality and flexibility	Under high environmental uncertainty, the relationships between external integration and delivery and production flexibility were strengthened.
Flynn et al. (2010)	617 groups from a wide range of industry	Survey	Internal integration, supplier integration and customer integration	Operational and business performances	Internal and customer integration were more strongly related to the improved performances than supplier integration.

Mihm (2010)	2 fashion groups	Case study	Vertical integration	Financial performance	Full vertical integration strategy provided significant better financial returns.
Swink et al. (2007)	224 manufacturing plants	Survey	Corporate strategy integration, product-process technology integration, strategic customer integration and strategic supplier integration	Cost efficiency, quality, delivery, process flexibility, new product flexibility, market performance and customer satisfaction	Strategic supplier integration was positively linked with market performance. Product –process technology integration was positively linked to quality, delivery and product flexibility but negatively associated with market performance. Corporate strategy integration had a positive direct relationship with competitive capabilities. And competitive capabilities were positively related to business performance.

Cousins and Menguc (2006)	142 manufacturing and service companies in UK	Survey	Supply chain socialization and supply chain integration	Supplier's operational and communication performances and buyer's perceived level of supplier's contractual conformance	Supply chain socialization and integration improved supplier operational and communication performances which in turn enhanced buyer's perceived level of supplier's contractual conformance.
Das et al. (2006)	322 manufacturing firms	Survey	Internal and external supplier integration	Operation performance	Several supplier integration practices were positively related to operational performance.
Li et al. (2006)	196 groups from a wide range of industry in USA	Survey	Strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing and postponement	Organizational performance and competitive advantage	Higher levels of supply chain management practices led to the improved organizational performance and competitive advantage.

Petersen et al. (2005)	134 groups from a wide range of industry	Survey	Business assessment of supply integration, technical assessment, supply integration and detailed assessment supply integration	Project team effectiveness, firm financial and design performances	Technical assessment and detailed assessment were positively associated with project team effectiveness which in turn enhanced design and financial performances.
Droge et al. (2004)	57 groups in automotive supply industry	Survey	External and internal integration	Time-to-market, time-to-product, responsiveness, market share performance and financial performance	Both internal integration and external integration were related to time-based performances which in turn improved firm performances. Also, the cross-product of internal integration and external integration was significantly related to both market and financial performances.

**Appendix II Summary table of prior studies on the effect of environmental sustainability on various performances**

Study	Samples	Approach	Sustainability area	Performance measures	Findings/ Contribution
Kanchanapibul et al. (2014)	110 young consumers aged between 18 and 30	Survey	Personal effect and knowledge about sustainability	Purchase intension and actual purchase of eco-products	Affective response toward and knowledge about green issues had a positive relationship with consumer purchase intension and actual purchase of eco-products.
Sezen and Çankaya (2013)	53 companies from automotive, chemistry and electronic sectors in Turkey	Survey	Eco- product innovation, eco-process innovation and green manufacturing	Environmental, economic and social performances	Eco-process innovation was positively related to all three performances; green manufacturing was positively related to environmental and social performances. But eco-production innovation did not have any impact on all these performances.

Chan and Wong (2012)	216 consumers in Hong Kong	Survey	Product and store-related attributes of eco-fashion	Customers' eco-fashion consumption decision	Only store-related attribute of eco-fashion influenced consumers' eco-fashion consumption decision positively, and it was moderated by the price premium level of eco-fashion.
Wong et al. (2012b)	122 manufacturing firms	Survey	Green operation (GO) and environmental management capability (EMC) of suppliers	ROA, ROE, Net profit, EPS and pollution reduction	There was a positive relationship between process stewardship and firms' financial performances and that was moderated by the level of EMC of suppliers. Besides, the relationship between product stewardship and pollution reduction was also moderated by the level of EMC of suppliers.



Yan et al. (2012)	343 college students	Survey	Brand name, green message explicitness, eco-fashion involvement, environment commitment and importance of price	Attitude and purchase intension toward a brand	Message explicitness about green sustainability formed positive attitudes toward a brand. And eco-fashion involvement and environment commitment both affected the attitude and purchase intension toward a brand.
Hult (2011)	Articles in market-focused sustainability	Literature review	Market-focused sustainability	N.A.	Market-focused sustainability should achieve the market-oriented product needs and the interests of multiple stakeholders on sustainability.
Dangelico and Pujari (2010)	12 small and medium size Italian and Canadian manufacturing firms	Case study	Green product innovation	Motivations, dimensions and challenges of green product innovation	A toolbox for green product innovation was provided to give useful actions against different challenges might be faced by firms integrated with environmental sustainability.

Henri and Journeault (2010)	303 Canadian manufacturing firms	Survey	Eco-control	Economic and economic performances	Eco-control had no direct effect on economic performance. But there was a mediating effect of environmental performance on the relationship between eco-control and economic performance.
Lin et al. (2009)	33 Taiwanese firms	Survey	Corporate social responsibility (CSR)	ROA, Jensen measure, the amended Jensen measure, Sharpe measure and MCV measure	CSR did not have much positive impact on short-term financial performances but it offered a remarkable long-term economic advantage.

**Appendix III Critical SI practices for enterprises of different fashion contents**

**Appendix Table 3.1 Regression results for fashion enterprises' financial performance on the seven SI practices**

Fashion content	Financial performances (Dependent variables)	Time periods	SI practices (Independent variables)	Standardized coefficients
Fashionable	Net income	11-12	Goal setting and improvement programs	0.520**
			Inventory management	0.305*
	Net income	09-10	Goal setting and improvement programs	0.579**
	Net income	06-07	Goal setting and improvement programs	0.615**
	Net income	Scenario 2	Goal setting and improvement programs	0.435**
			Inventory management	0.440**
Basic	ROA	09-10	Goal setting and improvement programs	0.266*
*p<0.05, **p<0.01				

Based on the results in Sections 4.2.2 and 4.2.4, fashion content moderated the relationship between SI level and financial performances in terms of net income and ROA. “Basic” and “fashionable” groups were benefited in different financial perspectives. Therefore, a further multiple linear regression analysis was done to identify critical SI practices for enterprises of different fashion contents.

According to the summary table in Appendix III, under different combination of SI practices, “goal setting and improvement programs” was important for the “fashionable” group to improve net income in 06-07 ( $\beta=0.615$ ,  $p<0.01$ ), 09-10 ( $\beta=0.579$ ,  $p<0.01$ ), 11-12 ( $\beta=0.520$ ,  $p<0.01$ ) and Scenario 2 ( $\beta=0.435$ ,  $p<0.01$ ). Besides, “inventory management” was also directly related to the “fashionable” group’s net income in 11-12 ( $\beta=0.305$ ,  $p<0.05$ ) and Scenario 2 ( $\beta=0.440$ ,  $p<0.01$ ). On the other hand, “goal setting and improvement programs” was crucial for the “basic” group to improve ROA in 09-10 ( $\beta=0.266$ ,  $p<0.05$ ).

The SI practice of “goal setting and improvement programs” was positively related to the “fashionable” group’s net income and the “basic” group’s ROA after financial tsunami. This indicated that fashion enterprises might modify the use of SI practices according to their fashion content to enhance financial performances. Even for the same SI practice, it covered different perspectives; the “fashionable” and “basic” groups might apply a SI practice in a different way to improve their performances. For instance, the “fashionable” group is recommended to have joint meetings and workshops with its suppliers to share business trends and product strategies and evaluate performances, so as to improve market responsiveness and

performance. On the other hand, the “basic” group could focus more on supplier evaluation and joint planning and forecasting to facilitate early risk identification, resources management and lower opportunistic decision making.

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