IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF MANAGEMENT

MASTER THESIS

IMPACT OF SOCIAL SUSTAINABILITY ON SUPPLY CHAIN PERFORMANCE WITH MEDIATING EFFECT OF DIFFERENTIATION

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THESIS SUPERVISOR: ASSOC. PROF. ALI OSMAN KUŞAKCI

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IMPACT OF SOCIAL SUSTAINABILITY ON SUPPLY CHAIN PERFORMANCE WITH MEDIATING EFFECT OF DIFFERENTIATION

by

AICHA ELAICHE

A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Arts in Management

THESIS SUPERVISOR: ASSOC. PROF. ALI OSMAN KUŞAKCI

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APPROVAL PAGE

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Arts in Management

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This is to confirm that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University.

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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Signature

ÖZ

TEDARIK ZİNCİRI PERFORMANSINA SOSYAL SÜRDÜRÜLEBİLİRLİĞİN ETKİSİ VE FARKLAŞTIRMANIN ARACILIK ROLÜ

Yazar : Elaiche, Aicha

İşletme Yüksek Lisans Programı

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Temmuz 2020, 87 Sayfa

Çevresel, Ekonomik ve Sosyal olmak üzere üç ana sacayağı olan sürdürülebilirlik, gelecek nesillerin kendi ihtiyaçlarını karşılama yeteneğinden ödün vermeden, günümüzün ihtiyaçlarını karşılamak olarak tanımlanmakta ve son zamanlarda dünyadaki ciddi değişimler nedeniyle daha yoğun ilgi görmektedir. Sosyal sürdürülebilirlik, sürdürülebilirliğin insani tarafı ile ilgilidir. Sosyal açıdan sürdürülebilir tedarik zinciri, bir tedarik ağının tüm katmanlarıyla ilgili sosyal meseleleri ele alır ve operasyonel ve stratejik faydaların yanı sıra toplum üzerinde olumlu bir etki sağlamayı amaçlar. Birçok çalışma, tedarik zincirindeki sosyal sürdürülebilirlik uygulamalarını veya bunların tedarikçi performansı üzerindeki etkisini araştırmaktadır. Ancak bu çalışma kapsamında yapılan literatür taramasında, tedarik zinciri temel performans göstergelerinin sosyal sürdürülebilirliğin belirli boyutlarının benimsenmesinden nasıl etkilendiğini ve bu ikisinin arasındaki ilişkinin rekabet avantajı uygulamaları ile bağlantısını araştıran çalışmalara rastlanılmamıştır. Bu tez, bu boşluğu tespit ederek, sosyal sürdürülebilirliğin tedarik zinciri performansı üzerindeki etkisini araştırmaktadır. Tedarik zinciri performans ölçümü için IT2F-AHP kullanılarak Mükemmel Sipariş Ölçütü (POM), Sipariş Doldurma Oranı (OFR) ve Nakit Çevrim Süresi (C2C) ölçütleri belirlenmiştir. Ayrıca bu ilişkide rekabet avantajı olarak farklılaşmanın etkisi ölçülmüştür. Bu çalışmanın bir diğer katkısı bu ilişkiyi daha önce çalışılmayan Faslı imalat şirketlerinde araştırmasıdır. Çeşitli sektörlerden Faslı imalat şirketlerine gönderilen anketlerle veri toplanmış; ölçüt geliştirmek ve veri analizi için AMOS yazılımı ile Yapısal Eşitlik Modellemesi (SEM) kullanılmıştır. Bunun yanında bir rekabet avantajı stratejisi olarak farklılaşmanın performans ve sürdürülebilirlik uygulamaları arasındaki muhtemel

aracılık etkisi araştırılmıştır. Bu çalışmanın ana bulgusu, söz konusu üç gösterge ışığında tedarik zinciri performansı ile sosyal sürdürülebilirlik uygulamaları arasında kayda değer bir ilişki olduğudur. Dahası farklılaşmanın yukarıda bahsedilen iki konu üzerinde bir aracılık etkisi olduğu bulunmuştur.

Anahtar Kelimeler: Sosyal Sürdürülebilirlik, Tedarik zinciri, Tedarik Zinciri Performansı, Farklılaşma, Aralık Tip-2 Bulanık AHP, Yapısal Eşitlik Modellemesi

ABSTRACT

IMPACT OF SOCIAL SUSTAINABILITY ON SUPPLY CHAIN PERFORMANCE WITH THE MEDIATING EFFECT OF DIFFERENTIATION

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Sustainability which is often explained as meeting the present needs without compromising the ability of future needs, considering its three pillars –Environmental, Economic and Social- has recently gained more attention due to the serious changes the world has been going through. Social sustainability takes into concern the human side of sustainability. Socially-sustainable supply chain (SSSC) addresses social issues related with all tiers of a supply network and may provide operational and strategic benefits as well as a positive impact on society. Many studies explore Social Sustainability Practices (SSP) in supply chain or their impact on supplier performance. However, within the literature review we have not been able to detect the presence of studies that investigate how supply chain key performance indicators (KPIs) are affected by the adoption of specific dimensions of social sustainability, nor had we observed the effect of competitive advantage on the relationship of social sustainability adoption and supply chain. Detecting this gap, we aim at exploring the impact of social sustainability on Supply Chain Performance (SCP) in terms of specific KPIs such as Perfect Order Measurement (POM), Order Fill Rate (OFR), and Cash-to-Cash Cycle Time (C2C) that were chosen using IT2F AHP, while trying to measure the effect of differentiation as a competitive advantage on that relationship. A further contribution this study is trying to achieve is to explore this relationship in the Moroccan market which has not been approached before by any scholar. We collected data through surveys sent to Moroccan manufacturing companies in various industries. Structural Equation Modelling (SEM) using AMOS software has been used for data analysis and instrument measurement.

Later we tested the mediating effect of Differentiation as a competitive advantage. This work's main finding is that there is a significant correlation between the SSP and the enhanced SCP in the light of the three mentioned indicators, also it has been found that Differentiation as competitive advantage has a total mediation effect on the two aforementioned constructs' relationship .

Keywords: Social Sustainability, Supply Chain, Supply Chain Performance, Differentiation, Interval Type-2 Fuzzy AHP, Structural Equation Modelling

DEDICATION

To My Family

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I would like to express my gratitude and appreciation to my supervisor Assoc. Prof. Ali Osman KUŞAKCI for his contribution, guidance, constructive criticism and motivating comments from the beginning of this work. His encouragement, and believe in me throughout my study have been helpful. It has been an honor to work with him.

I thank as well deeply my family, my mom Zakia and My father Abdelaziz for their support and tolerance. I am indebted to my friends Firdaws, Asmaa and Mariam for their encouragement and their endless patience, and colleague Dounia for her much needed help for their help during the hard circumstances of the pandemic.

Aicha Elaiche

ISTANBUL, 2020

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LIST OF SYMBOLS AND ABBREVIATIONS

3PL	Third Party Logistics
4PL	Fourth Party Logistics
AHP	Analytical Hierarchy Process
ANOVA	Analysis Of Variance
AVE	Average Variance Extracted
C2C	Cash-to-Cash Cycle Time
CB-SEM	Covariance-Based Structural Equation Modeling
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Composite Reliability
CSR	Corporate Social Responsibility
DTraT	Defuzzified Trapezoidal Type-2-Fuzzy Set
ESG	Environmental, Social and Governance
GFI	Goodness-of-Fit Index
IFI	Incremental Fit Index
IT2F	Interval Type-2 Fuzzy
JIT	Just-In-Time
KMO	Kaiser-Meyer-OIkin
KPI	Key Performance Indicator
LC	Labor Condition
LLCI	Lower Limit Class Interval
MCDM	Multi-Criteria Decision-Making Method
MTMM	Multi-Trait Multi-Method Matrix
NFI	Normed Fit Index
OFR	Order Fill Rate
PCFI	Parsimony Comparative Fit Index
PLS	Partial Least Square
PLS-SEM	Partial Least Squares Structural Equation Modeling
PNFI	Parsimony Normed Fit Index

POM	Perfect Order Measurement
RMSEA	Root Mean Square Error of Approximation
SCP	Supply Chain Performance
SCSS	Supply Chain Social Sustainability
SEM	Structural Equation Modeling
SRB	Socially Responsible Buying
SSP	Social Sustainability Practices
ULCI	Upper Limit Class Interval
VB-SEM	Variance-Based Structural Equation Modeling
WCED	World Environment and Development

CHAPTER I
INTRODUCTION

Sustainability is recently becoming more popular thanks to the increased awareness among stakeholders on environmental and social issues. Supply chains in emerging economies recently are acknowledging expansion due to cost advantage. With the increasing activities in these supply chains, the actions taken by the different parties within the chain (e.g. suppliers) increase the risk (Klassen & Vereecke, 2012). Actions and decisions taken in supply chains which relate to process and product aspects affect surrounding society (Venkatesh Mani, Gunasekaran, Papadopoulos, Hazen, & Dubey, 2016). In time, supply chains will have to confront the risks related to social issues threatening its success and existence. Many studies present different approaches to deal with risk related to social problems in supply chains (Klassen & Vereecke, 2012), however, only a few of them tackle some exact social issues (Venkatesh Mani & Gunasekaran, 2018). In literature, issues linked to labor conditions have received much attention and how improving these conditions can results in accident reduction and steady lead times (Yuan & Woodman, 2010). Others have recently discussed topics such as failing design of vehicles and chemicals toxic to children's products in multiple supply chains (Roth, Tsay, Pullman, & Gray, 2008). Firms that were proven to commit such malpractices faced some serious issues like backlash from customers, product recalls, fines and market share loss. While firms that invest in sustainability efforts build reliable reputation (Fombrun et al. 2010).

Other studies suggest that the adoption of social sustainability in the supply chain not only enhances social performance but can also contribute to a competitive advantage that helps to reduce costs and increase market share (Klassen & Vereecke, 2012), and can also improve SCP (Venkatesh Mani, Gunasekaran, & Delgado, 2018). The improvement of working conditions improves the quality of the product, because of the

enhanced motivation of employees (Pagell, Wu, & Wasserman, 2010). According to Carter and Rogers (2008), social responsibility implementation of in the supply chain is vitally essential for manufacturing systems because it results in reduced health and welfare issues, better product efficiency, and enhanced reputation.

1.1. Relevance of this Study

Only little research has tackled social sustainability in supply chain in non-western countries, which represents only the westernized perspective on social issues in supply chains (Sancha, Gimenez, Sierra, & Kazeminia, 2015; Yawar & Seuring, 2017a). While research was carried out in emerging economies that were using either qualitative or case based approach like Hall, Matos, and Silvestre (2012) in their research studied the Brazilian oil and gas supply chain calling for some social problems related to poverty reduction, education, and health care. Also, Gopalakrishnan et al. (2012) brought up social sustainability in developing markets such as code of ethics, safety, and diversity.

Although there is a noticeable increase in the attention paid to supply chain social sustainability, it is still almost a non-existing issue to many African countries including the Moroccan market. Other than the research done by Mani and Gunasekaran (2018), it is hard to see the use of social measures for measuring performance in supply chain literature in a global context (Torugsa, O'Donohue, & Hecker, 2013). We believe that social issues may influence SCP not only on the financial level but also on different levels.

Differentiation as a competitive advantage has been approached differently in the literature as an important factor in determining quality of products as firms adopting such strategy strive for high quality production. From the perspective of this work, this leads to questioning the impact of such strategy adoption on sustainability goals, which may be seen as a novel instrument of differentiation from the market average.

1.2. Research Questions

Our study aims at exploring the social issues related to supply chains mentioned in the literature review, checking their impact on SCP, and measuring the impact of

differentiation strategy on both social sustainability and SCP. Hence, our research questions are:

- Does the adoption of SSP affect the SCP in terms of POM, OFR, and C2C?
- Does differentiation as a competitive strategy mediate this relationship?

Taking on field data from Moroccan manufacturing industry, our research defines the benefits gained by adopting such social issues throughout supply chain. Hence we explore the possible benefit that supply chains can gain from the adoption of SCP in emerging economies. In addition, this helps understanding how companies following differentiation as a competitive strategy might find it easier to integrate the success of their supply chains with the adoption of social sustainability policies.

The remaining sections of this work are organized as follows: The second section presents the theoretical aspects discussed in the thesis. The third section goes over the extant literature and identifies the research gap. The forth section explains the hypotheses development and research model we adopted. The fifth section demonstrates the application of the model on Moroccan manufacturing companies while the last section contains the discussion and conclusion of the study.

CHAPTER II

LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1 Supply Chain and Supply Chain Management

Supply chain management (SCM) is one of the most crucial topics in management. Supply chain refers to the chain where the product movement initiates from the supplier to the producers and through distributors to retailers and customers to meet their needs (Chopra & Meindl, 2007). Supply chain holistically incorporates different activities to produce a product. Rather than managing supply chain a sub-system, it is advocated to manage it as a whole entity or system, and it is as well required that the activities, functions, and systems should be integrated throughout a supply chain. A holistically managed supply chain guarantees that a holistic business process creates value for the customers (Vickery, Jayaram, Droge, & Calantone, 2003).

In recent years, it has become very challenging for organizations to exist alone; their success is based on how well they manage their coordination with other members of the supply chain (Min & Zhou, 2002). The supply can be defined as the integration of key business functions which are extended to the key suppliers that add value to customers and provide products and services. The cooperative internal and external integration is the key enabler of all operations. This coordination does not necessarily indicate a merger of organizations.

2.1.1 Supply Chain

The supply chain is basically the flow of products, services and information from the supplier to the consumer (Verma and Seth 2010). Supply chain involves keeping the

balance of supply and demand, the supply of raw materials, assembly of products, inventory management, order management and delivery of products to final consumer, including maintaining the information system required for these different activities (Verma and Seth 2011). The supply chain involves all the phases from the supply of goods and services to their production and reaching to the end user. In terms of business processes, supply chain encompasses many areas such as sales process, manufacturing, inventory management, procurement, distribution, sales forecasting and customer services (Nebol 2016).

The supply chain concept goes by the physical distribution concept which represents the external logistics activities that aim at reaching the end-consumer with the finished product in a cost-effective manner. Here, the main concern is to keep the balance between the costs such as handling, inventory, and transportation costs by suitable operating methods according to the nature of the product.

Supply chain can be defined also as a group of organizations that produce products out of raw material to present it to the consumer adding value to it during the process. All these integrated organizations can be managed to be one single company or by entities that produce products, semi-finished products, Third Party Logistics (3PL) or Fourth Party Logistics (4PL) logistics providers, retailer and customers who carry out their activities through a partnership, established by several agreements (Shapiro 2006).

Although the scope of supply chain varies from business to business, it is available in every business that offers products or services. Throughout the supply chain products, money, and information flow. Beamon (1998) defines supply chain as "an integrated process, involving the supply of raw materials, turning them into end products and delivering them to the retailers by working in coordination with several businesses such as supplier, manufacturer, distributor, and retailer."

2.1.2 Basic Elements of Supply Chain

There is a close relationship that is continuously updated between the elements of the supply chain. Following are the components of a Supply Chain according to Kağnıcıoğlu (2007): Suppliers, manufacturers, distributors, retailers, and customers.

Furthermore, we can add the suppliers of suppliers that go by the name of first tier, second tier… suppliers and the same thing applies on customers; logistics service providers such as distribution and warehousing, marketing institutions, financial institutions, information and communication providers and many different sub-institutions (Görçün, 2013). Main units of the supply chain can be given as manufacturers, distributors, retailers, customers, and logistics providers.

i. Manufacturers

They are the members of the chain that process the raw material to semi-finished or end goods. A manufacturer has to take part within the cycle of raw material-semi-finished products /end product or semi-finished products/end products. In order to be able to meet the market need, most manufacturers increase their performance by accelerating the transformation of raw material into finished or semi-finished products through shortening lead times within the supply chain (Görçün, 2013).

ii. Distributors

They are the members of the chain that take care of the transportation, storage, etc. in the process of delivering goods from manufacturers to customers. The effectiveness of the distribution is determined by proportioning the distribution costs to the product prices (Ayers 2006).

iii. Retailers

They are the members of the chain that offer the final products to the final customers after receiving them from wholesalers and distributors (Görçün, 2013).

iv. Customers

They are the very last part of the chain. The provided products and services depend on the demand of customers and their expectations. Hence, they are the most crucial member and play a very important role in the decision making in supply chain (Mentzer et al., 2001).

v. Logistics service providers

They are the members of the chain that help out delivering activities of other members by providing services. Due to the increased competition supply chains tend to use third party companies that offer solutions to their problems that impact efficiency of the entire supply chain (Sheikh and Rana 2014).

2.2 Sustainability

2.2.1 Origins of Sustainability

Environmentalism is considered to be the base of sustainability. This approach was introduced in the U.S. Transcendentalist Movement of the 1800s, which suggested the value of existence full of mystical images and spirituality (Edwards, 2005). The sustainability notion was brought by the ecological movements in 1960s, in reply to worries related to the effect of excessive and fast usage of natural resources (Barron, L.; Gauntlett, 2002).

2.2.2 Concept of sustainability

Sustainability is used to describe an unquestionably desired objective. Sustainability definitions range from narrower and more precise ones to broader concepts. Some studies provide a listing of sustainability definitions from over 27 sources (Pezzey, 1989). O'Riordan (1988) suggests that developers, organizations and activists exploit this idea to explain their behavior. Developers "seek to exploit the very ambiguities that give sustainability its staying power. Similarly, environmentalists abuse sustainability by demanding safeguards and compensatory investments that are not always economically efficient or socially just."

In 1987, the World Environment and Development Commission (WCED) published a report entitled "Our Common Future" which Brundlant had prepared (Brundtland, 1987). This report focuses primarily on sustainability problems, impartiality of environment and equity. Seghezzo, 2009 stated "mankind have the ability to ensure a sustainable development, meaning that the present necessities are met without compromising the ability of future generations to meet their own." (Seghezzo, 2009).

2.2.3 Dimensions of Sustainability

Sustainability as a whole concept constitutes three broad dimensions:

- Environmental dimension: ability to enhance the value of the features of the environment, while at the same time making sure to conserve and renew the natural resources.
- Economic dimension: It refers to the ability to generate income and employment to sustain the populations.
- Social dimension: capability to assure the welfare, health, security, and education and to provide them equally. As quoted from Newman and Kenworthy (1999): "Within a territory, social sustainability means the capacity of the different social actors (stakeholders), to interact efficiently, to aim towards the same goals, encouraged by the close interaction of the institutions, at all levels."(Newman, P., & Kenworthy, 1999).

2.3 Social Sustainability

The idea that decision makers do not treat the sustainability dimensions equally gains a general agreement (Drakakis-Smith, 1995). This is attributed to the reality that sustainable growth originated from the convergence between the environmental revolution and the supporters of basic requirements, and also that it assesses the spiritual essence of the social aspects of sustainability that have measurement difficulties. Hence, there is a limited literature focus of social sustainability.

Litting and Griessler in their work "Social Sustainability: A Catchword between Political Pragmatism and Social Theory" argue that the concept of social sustainability is based on an understanding of the real political agenda and not theory (Littig & Grießler, 2005). Another study suggests that social sustainability is more concerned with elements of sustainable development than with the social outcomes of environmental structures.

Barron and Gauntlett (2002) state that; "The concept of social sustainability is explored through a range of ideas and concepts including: social capital, sustainable communities,

community strength, resilient communities, community development, healthy communities, community capacity, well-being, social exclusion and citizenship."

Although previous sustainability studies have always been linked to the environmental and economic aspects, social sustainability has actually started to achieve enhanced confirmation as a key aspect of sustainability that is beginning to receive political and institutional approval.

2.3.1 Principles of Social Sustainability

In the report of "Model of Social Sustainability", Barron and Gauntlett state that:

"The principles of social sustainability are designed to capture the goals of socially sustainable communities and to this end, are aspirational and visionary statements that describe what makes a community healthy and livable, both now and in the future."(Barron, L.; Gauntlett, 2002).

Social sustainability can be described as a successful condition and a process in the societies that can accomplish that condition. The condition indicators are stated below (Mckenzie, 2004):

i. Equity

a. All members, particularly those most vulnerable members of the group, have equitable opportunity and results for the society.
b. Fair access (including travel, housing and leisure, employment, health) for essential programs.
c. Equality between generations ensures that potential generations should not be influenced by the actions of the present generation.

ii. Diversity

a. Various groups are included in the population and variations are valued.
b. A system of social forms that protects and values diverse cultures' compensation and fosters cultural integration whenever individuals and groups demand it.

c. Extensive political involvement of people in both elective procedures and other policy fields, especially at the local level

iii. Interconnectedness

a. The community provides processes, frameworks and systems which foster connectivity at the institutional, formal and informal levels.
b. Connectivity facilitates mechanisms that regulate democratic processes; the amount and efficiency of government processes; civil and public organizations; community services; entertainment and the arts; urban facilities and planning; networking and media studies; travel, leisure and sport.
c. A system aimed at transmitting awareness of social sustainability from generation to generation.
d. Responsibility of the society in order to manage the transmitting network.
e. Mechanism in the context of group action to satisfy its own requirements.

iv. Democracy and governance

a. The community provides responsible and open governance structures, and democratic processes.
b. The rights of community members are information, expertise and the accumulation of access to knowledge.
c. Effective political mechanisms and government frameworks are in existence, as well as civil protections and fairness.
d. A framework to meet the requirements of political advocacy that cannot be fulfilled by community action.

2.4. Supply Chain Performance

Measurement of supply chain operations becomes difficult as supply chain activities get more complex. Different metrics are used for evaluation. As these measurements are industry specific, the performance evaluation should be based on the nature of organization.

Performance metrics may be classified as economical, price, energy, creativity, product stability and overall efficiency. Among the different measures used for SCP, one has been introduced by Gunasekaran (2004) which measured SCP (SCP) by evaluating suppliers at the strategic, operational and tactical level. The supplier appraisal relates to performance, movement, alignment, sensitivity, and consumer loyalty in the supply chain.

The balance scorecard has been used to measure the SCP (Brewer, Thomas, & Speh, 2000), while efficiency and effectiveness were used as key indicators to measure the performance of the supply chain (Li, Ragu-Nathan, Ragu-Nathan, & Subba Rao, 2006). Cost-containment and performance reliability can also be used as indicators where cost-containment includes inbound and outbound logistics costs, warehousing and inventory-holding costs, and reliability that addresses the order-fulfilment rate, inventory turnover rates, safety stock, inventory obsolescence and number of product warranty claims (Lee, Kwon, & Severance, 2007). Elrod, Murray, and Bande (2013), set out different success metrics and address their benefits, weaknesses and implementations. In their report, success metrics are paired with financial expenses, efficiency, time and versatility.

SCP metrics help standardizing the assessment and evaluation of the performance including internal and external links for organizations (Huan, Sheoran, & Wan, 2004). External linkage performance metric usage helps facilitate the overall production of consumer satisfaction by collaboration activities and coordination with other participants of the supply chain (Croxton, García-Dastugue, Lambert, & Rogers, 2001).

Bäckstrand (2007), in his report, argues that the efficiency of the supply chain should be calculated on the basis of the consumer interest defined by the business goals of the market demands described as the target sector, pricing, product life-cycle process and regulations. Therefore, the interest of the consumer is differentiated by consistency, distribution, expense, versatility and innovation.

SCP has been mentioned in the literature review as an output of organizations, with many different constructs such as trust which has a direct relationship with the SCP and it is one of the factors that enhance it (Gulati & Sytch, 2007). Another construct is

transparency of information and collaborative practices which according to Bailey and Francis (2008) help organizations provide high performance of order replenishment. Collaborative replenishment preparation has a significant effect on the efficiency of manufacturers in the relationship with customers (Kulp, Lee, & Ofek, 2004). Information sharing is a highly valuable collective method for improving performance (Ryu, So, & Koo, 2009).

A study conducted by Akyuz and Erkan (2010) run a literature review on SCP measurements where 24 related articles have been studied. As reported by the authors, Gunasekaran & Ngai (2004) developed a SCP measurement framework that provides a detailed 'measurement and metrics classification' while assessing importance within each group of metrics using survey. Martin and Patterson (2009) defined three key efficiency measures: inventory, cycle time and finance.

2.5. Differentiation as Competitive Advantage

2.5.1. Competitive Advantage

Porter (1985) notes that businesses operate on the basis of two specific strategies: differentiation and cost control. Cost-leaders prioritize low cost compared to their rivals. Generally speaking, they need a high relative market share. Unlike cost leadership, a differentiation strategy differentiates goods or services from rivals on the basis of a product or service's inherent characteristics rather than on the basis of price.

Competitive advantage means having an edge over rivals by providing more value to the customer, such as cheaper costs, greater rewards and services. This condition helps businesses to work effectively and therefore contributes to greater benefits for themselves (Singh, 2012).

Competitive advantage helps an organization it to stay alive by distinguishing it from the rest, (Singh, 2012). The competitive advantage is the result of a company's eagerness to balance its strengths and stimulus (Long & Vickers-Koch, 1995). Some companies, however, fail to understand what the true competitive advantages are, even whether they have any. So, they miss the benefits of competitive advantages (Smith, 2006). The five-

force view claims that these five powers influence a firm's competitive advantage and competitiveness in every industry (Porter, 1980). The figure below represents the emergence of competitive advantage according to Grant (2010).

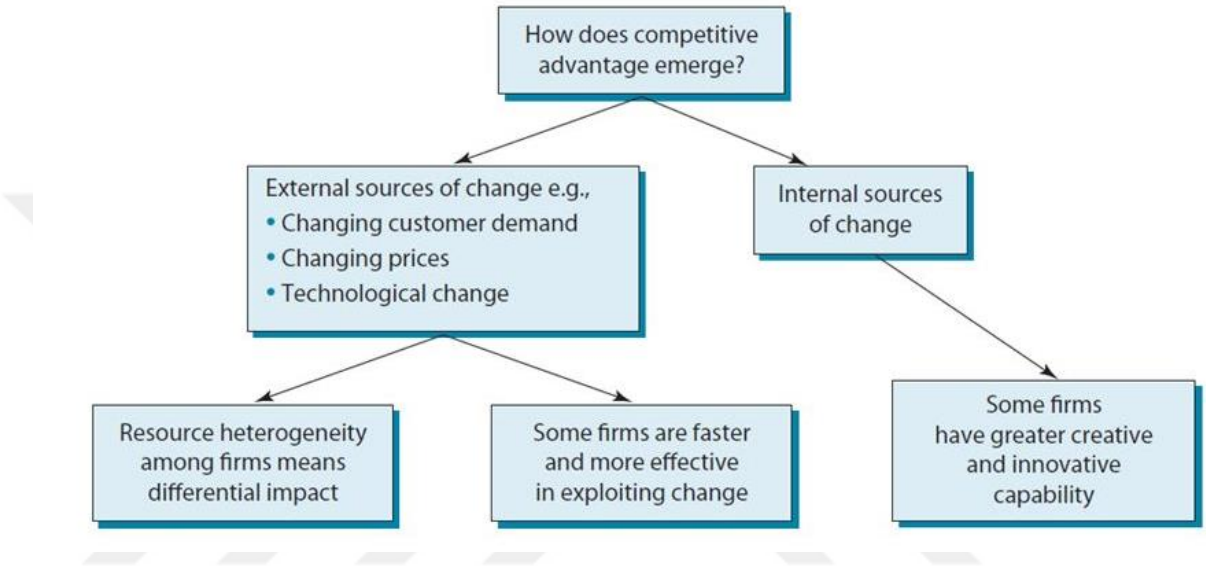


Figure 2.1 The emergence of competition (Robert M Grant & Jordan, 2015)

2.5.2. Differentiation

Strategy for differentiation means having a specific and distinctive position in customer understanding of the goods and services they deliver. Companies who follow this approach will be more costly and will demand higher prices for their goods and services because of added values they generate (Gupta, Gollakota, and Srinivasan, 2007). Differentiation policies do not mean that corporations ignore the cost, but their main strategic objective is not the cost (Porter, 1998). Effective differentiation strategies rely on establishing clos (Robert M Grant & Jordan, 2015)e relations with customers and distributors or getting powerful images or reputations of companies and brands (Douglas and Craig, 1995). Despite of its appealing results, it entails some risks:

- Customers may give up on differentiated businesses because of the big cost disparities (Porter, 1998).

- Customers may no longer need differentiating variables (Porter, 1998).
- The worldwide implementation of differentiation strategies is much less vulnerable than a short-term low-cost approach (Douglas, S.P. and Craig, 1995).

2.6. Theoretical Background

Many theories are proposed in the SCM and sustainability literature (Carter & Easton, 2011). However, the adaptation of these theories to sustainable SCM is slow (Seuring & Müller, 2008), and the efforts to introduce such theories to supply chain social sustainability is still at its beginning (Gold, Seuring, & Beske, 2010). Hence, sustainable SCM literature is built upon other different theories. The following theories were identified in SCP by Rezaee (2016).

2.6.1. Stakeholder Theory

When the shareholder theory was put forward by economist Friedman at the beginning of the 20th century, he suggested that a company should make a profit for its shareholders. The theory was first described by Freeman (1984) who spoke out in support of all of the parties interested with, or influenced by, a company: workers, activists around the company's factory, suppliers, government officials, and more. This theory has gained a lot of attention since its appearance and more than 100 articles and dozens of books concerning the topic have appeared. In terms of dealing with the stakeholders different scholars have suggested that organizations may adopt different approaches which can be pro-action, defense, reaction, coercion, or compromise (Frooman & Murrell, 2003). There are three attributes that identify the interactions between the stakeholders (Mitchell, Agle, & Wood, 1997), and these are Power, Legitimacy, and Urgency. Related goals of the social sustainability and Stakeholder Theories, such as value development and successful stakeholder management, have enabled the two to coexist and to converge, yet to succeed separately.

2.6.2. Agency Theory

Agency theory that was first introduced by Jensen and Meckling (1976), discusses the administration of the company by implying that the needs of shareholders (principles)

and managers (agents) are indeed not matched. The implication of agency theory for sustainability performance are that the activities of management focus mainly on executives short term targets of earnings and compensation and deviate from achieving log-term sustainable performance targets.

Although the theory of agencies has historically been used to describe the relationship between the principal and agent and the difference of interest in the maximization and encouragement of individualistic utility, this theory may be obsolete and unwelcome in the sense of emerging sustainability performance reports (Rezaee, 2016).

2.6.3. Institutional Theory

Institutional theory suggests that a firm is an institution with different stakeholders pursuing common goals. Institutional theory takes into focus the decision making process which affect the structure of organizations and offer a framework that helps addressing many issues, and challenges that lead to institutionalization. The theory concentrates on social aspects of decision-making, such as the CSR investments decisions and the conditions under which these investments are made, and their possible impact on the environment and society.

Jennings & Zandbergen (1995) state that "institutional theory helps to understand how consensus is built around the meaning of sustainability and how concepts or practices associated with sustainability are developed and diffused among organizations." It indicates that internal measures such as internal corporate governance, culture and environment can be more effective than external measures such as legislation or regulations in achieving sustainability.

While institutional theory originated at the end of the 1970s, its introduction into the area of sustainable development culminated in the 1990s. Jennings & Zandbergen (1995) discussed the usage of institutional theory as an approach to sustainable development to clarify both how agreement is built on sustainability and how sustainability strategies are created and adopted by organizations.

Several other studies applied institutional theory in a way to understand why social sustainability activities differ from an organization to another (Beliveau, Cottrill, & O'Neill, 1994; Matten & Moon, 2008). These researchers suggest taking into consideration historical, political, and cultural institutional constituents for sustainability engagement as organizations face greater pressures to adopt SSP to legitimate their activities.

2.6.4. Legitimacy Theory

Legitimacy theory suggests that firms protect their legitimacy by fulfilling their social obligation because of social and political pressure. They reveal information concerning their financial sustainability performance and perform in non-profitable sustainable activities for the sake of obtaining and sustaining legitimacy and gaining society support (Tilling, 2004). The theory of legitimacy implies that social and environmental mitigation programs and associated success are beneficial for all actors, including consumers, culture and the community. The theory indicates that failure to respect social standards and environmental criteria may damage the credibility of corporations (Tilling, 2004).

The theory of legitimacy argues that businesses use sustainability to boost their public perception of the accomplishments of sustainability (Deegan, 2002). Mitchell et al. (2016) suggest that voluntary disclosure of sustainable performance and legitimacy theory predict a positive relationship between sustainability performance and sustainability disclosure.

2.7. Literature Review

2.7.1. Supply Chain Social Sustainability

Generally, in supply chain literature, social sustainability has been defined from the perspective of CSR (Corporate Social Responsibility) (Lu, Lee, & Cheng, 2012). Social Responsibility and CSR were used together to define firm sustainability (Marcel van Marrewijk, 2003). However, there has been considerable debate on the socially sustainable development constituents of the supply chain (Awaysheh, Klassen,

Wettlaufer, & Fellow, 2010; Gimenez & Tachizawa, 2012; Marcel van Marrewijk, 2003). Three questions need to be answered first for a deeper understanding: Who should be targeted? What are the issues to address? How should these issues be the addressed? (Wood, 1991). Studying internal and external disruptions caused by events that lead to risk (Kleindorfer, P., Singhal, 2005).

In supply chain management risk has different dimensions, that is, technological risk, product development risk, demand fulfillment risk (Lewis, 2003; Zsidisin, 2003). Businesses continue to ignore the social issues that are essential to the product and process environment, which increases the chance of being held accountable (Klassen & Vereecke, 2012;).

Social sustainability can be related to different stakeholders such as suppliers, manufacturers, customers, and society at whole (Freeman, 2004). We can see for example that addressing sustainable activities among suppliers helps promoting social equity in the upstream market (Bai & Sarkis, 2010; Krause, 1999) and socially responsible customers can help achieve efficiency and sustainability in the downstream Martínez-Jurado & Moyano-Fuentes, 2014).

Usually, studies concerning sustainability investigate main factors or practices (Searcy & Buslovich, 2014); and also the impact of social sustainability on performance (Angappa Gunasekaran & Spalanzani, 2012; Kolk, Hong, & van Dolen, 2010).

V. Mani, Agrawal, and Sharma (2014) in their study, focused on socially sustainable supplier selection across social criteria by demonstrating the development of SCP and explaining how those metrics can be used to evaluate supplier selection decision making alternatives.

Another study explored the development in the Indian supply chain of different social dimensions and how differences and similarities exist in the different industries. (V. Mani, Agrawal, & Sharma, 2015).

Ehrgott et al. (2011) examined social sustainability in the selection of suppliers by analyzing how demands from consumers, the state, and workers decide the degree to which companies perceive social factors in the selection of suppliers.

Social sustainability dimensions are identified in a study conducted by Mani et al. (2018), while the benefits gained by suppliers and buyers by effectively managing social issues in supply chain are explored.

In another study, Mani et al. (2016), revealed social sustainability aspects not only in terms of the main company, but also in terms of first-tier suppliers and clients. They came out with the result that each dimension is associated to some potential performance outcome.

Social sustainability of the healthcare supply chain, its barriers, incentives and enablers have been investigated with the focus on four stakeholder groups: suppliers, employees, patients/community and owners/government by Hussain, Ajmal, Gunasekaran, and Khan (2018).

Pressure from factors such as consumers, environmental culture, government, and external stakeholders serves as the organization's key constituents in deciding the degree to which it considers implementation of social sustainability in the supply chain. Social sustainability adoption has a direct benefit to the supply chain in the form of social performance of manufacturers, organizational performance of purchasers and credibility of purchasers.

Across the literature review, many scholars have identified dimensions or practices of social sustainability in supply chain. Carter & Jennings (2004) have suggested five activities that drive SR which are diversity, environment, safety, human rights, and philanthropy. Other studies have indicated that social sustainability activities in the supply chain may include equity, philanthropy, defense, health and welfare, ethics and human rights (Mani et al., 2016). In its relationship with supply chain and supply chain components, social sustainability could take different patterns according to each level of the chain, for instance, Mani et al. (2018) have defined main constituents of supplier’s SCP as labor rights, safety & health, societal responsibility, diversity, and product

responsibility. On the other hand, they defined the same from manufacturer's perspective as society, health & safety, ethics, equity, labor rights, philanthropy, child and bonded labor, wages, education, and housing (Mani et al., 2016).

It was explained that such practices have become familiar and interlinked in the supply chain by reducing unemployment, ensuring health and safety, and preventing social exclusion and inequality (Leire & Mont, 2009).

In the extant literature, the social sustainability in the supply chain was viewed from different angles. Several studies dealt with socially responsible buying (SRB), which applies to social problems in purchasing decisions advocated by organizational stakeholders (Mcwilliams & Siegel, 2001), and to the enhancement of role of purchasing managers which leads to improved trust and supplier commitment. Lu et al. (2012) established a study on socially responsible development of suppliers and their role in measuring the sustainability of the buyer, while emphasizing the relationship between social sustainability and efforts to develop the supplier.

On the other hand, a different aspect of supply chain social sustainability deals with the incorporation of social issues within the chain. Drumwright (1994), for example, asserted that socially responsible buying depends mainly on two factors: the organizational context of the decision and the policies established with zeal for social wellness.

Some global supply chains like Bae and IKEA have integrated SCP with external and internal environments, including suppliers (Gopalakrishnan et al., 2012). Tate et al. (2010) analyzed sustainability report of 100 global corporations and described the practices of these corporations. Cambra-Fierro and Ruiz-Benítez (2011) performed research on two Spanish firms in separate sectors, culminating in discrepancies in sustainable policies that led them to specific solutions to sustainable. Furthermore, the consumer pressure and SEBI's (Stock Exchange Board of India) compulsory guidance on corporate inclusion of social performance records in their financial statements indirectly forced Indian businesses to search into separate sustainability practices and their inclusion in their supply chain.

The exploration of different SCP within supply chain, their adoption, and their impact on the performance of supply chain form different perspectives have been studied so far academically with various measures. However, within the literature review we have not been able to detect the presence of specified supply chain KPI and how they are affected by the adoption of specific dimensions of social sustainability, nor had we observed the effect of determinants like competitive advantage on the relationship of social sustainability adoption and supply chain. Detecting this gap, we aim at exploring the impact of social sustainability on SCP in terms of specific KPIs such as C2C, POM, and OFR, while trying to measure the effect of differentiation as a competitive advantage on that relationship. Another goal this study is trying to achieve is to explore this relationship in the Moroccan market that has not been approached before by any scholar.

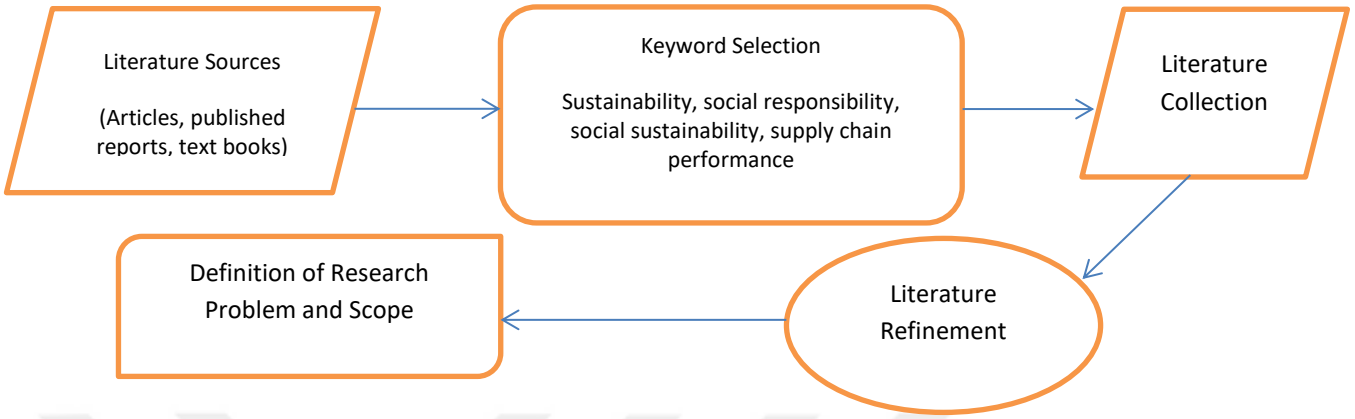
CHAPTER III

HYPOTHESIS DEVELOPMENT AND RESEARCH MODEL

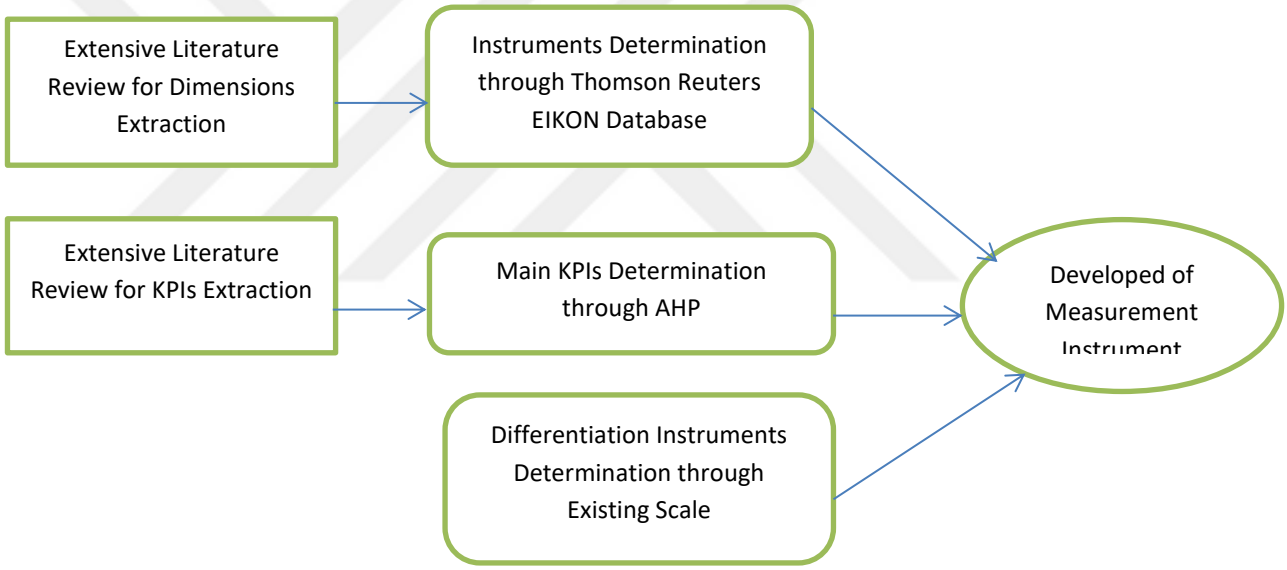
In this study, the impact of SSP on SCP is measured. We focused on the Moroccan manufacturing companies in various industries. The figure 3.1 illustrates the overall research path which starts by literature review where we collected literature and refined it to get the an overall picture on the scope of our research, next we went through instrument development where we run extensive literature review to get the social sustainability dimensions that we later turned them into instruments based on Thomson Reuters' SDG report and supply chain KPIs that were classified using AHP analysis, in the end and after collecting data we finished by analyzing it and discussing its results.

To determine dimensions of social sustainability in supply chain we run extensive literature review and picked six dimensions based on the frequency of the repetition of each dimension in literature review. As for the supply chain KPI we have specified nine KPIs from literature review and picked some of them based on expert opinion using Multi Criteria Decision Making (MCDM) technique, Interval Type-2 Fuzzy AHP.

Phase 1: Literature Review



Phase 2: Instrument Development



Phase 3: Data Analysis and Results

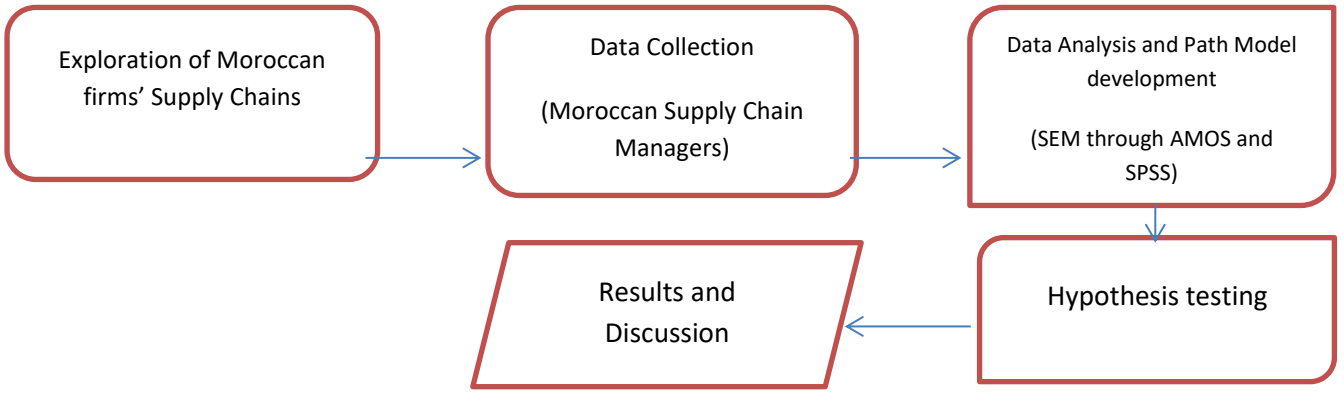


Figure 3.1 Overall research Path

3.1. Methodological Background

3.1.1 Fuzzy Analytic Hierarchy Process

3.1.1 Basis for using Fuzzy AHP

We are leveraging IT2F-AHP in this study to rate a set of performance metrics used to assess supply chain operational performance since evaluating the performance is rather subjective.

In other words, our emphasis is on finding the weights of n possible parameters that m decision-makers subjectively evaluate. An accurate numerical assessment by decision-makers is not a reasonable expectation for subjective judgements (Zeng et al., 2016). Here, the extension of the analytical hierarchy process (AHP), Interval Type-2 Fuzzy (IT2F) AHP, comes to our support (Yilmaz, Kusakci, Tatoglu, Icten, & Yetgin, 2019).

3.1.3 Interval type-2 fuzzy AHP

AHP has been a traditional method of multi-criteria decision-making (MCDM), consisting of two key phases: (i) comparing weight of assessment criteria on a pairwise basis and (ii) comparing alternatives pairwise. AHP deterministic types are criticized for their inability to cope with inherent subjectivity to the problem of MCDM (Kiliç & Kaya, 2015). IT2F-AHP is a novel form of systematic MCDM methods applied in different decision- cases involving intense personal decisions under fuzziness. Kahraman, Öztayşi, Uçal Sari, & Turanoğlu, (2014;2012) presented a recent IT2F-AHP model which also provides a basis for our research. As the theoretical background and definitions of basic calculus of IT2F sets are far beyond the scope of this thesis, they are not included in the text. A good summary can be found in (Yilmaz et al., 2019).

The main steps of IT2F-AHP are described below:

Step 1. Define the problem and construct a problem hierarchy.

Step 2. Create *m* fuzzy pairwise comparison matrices, $\widetilde{\widetilde{\boldsymbol{A}}}^{\boldsymbol{k}}$, where $k = 1, \dots, m$, and $\widetilde{\widetilde{\boldsymbol{A}}}^{\boldsymbol{k}}$ is IT2F evaluation of k[th] decision maker. $\widetilde{\widetilde{\boldsymbol{A}}}^{\boldsymbol{k}}$ is built by one decision maker as a matrix of nxn trapezoidal IT2F sets.

$$\tilde{\tilde{\boldsymbol{A}}}^{\boldsymbol{k}} = \begin{bmatrix} 1 & \tilde{\tilde{a}}_{12}^{k} & \dots & \tilde{\tilde{a}}_{1n}^{k} \\ \tilde{\tilde{a}}_{21}^{k} & 1 & \dots & \tilde{\tilde{a}}_{2n}^{k} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{\tilde{a}}_{n1}^{k} & \tilde{\tilde{a}}_{n2}^{k} & \dots & 1 \end{bmatrix} \quad (1)$$

where $\tilde{\tilde{a}}_{ji}$ is reciprocal of $\tilde{\tilde{a}}_{ij}$. Namely, $\tilde{\tilde{a}}_{ji} = 1/\tilde{\tilde{a}}_{ij}$. Additionally, $i = 1, \dots, n$ and $j = 1, \dots, n$. Here, $\tilde{\tilde{a}}_{ij}^{k}$ represents the IT2F pairwise comparison between criteria *i* and *j* made by k^{th} decision maker.

Step 3. Examine the consistency of the fuzzy pairwise comparison matrix. In this step, the fuzzy reciprocal matrices are defuzzified and tested for consistency. A Defuzzified Trapezoidal Type-2-Fuzzy Set (DTraT) approach is used for defuzzification (Kahraman et al., 2014).

Step 4. Aggregate the pairwise comparisons of *m* decision makers, $\tilde{\tilde{\boldsymbol{r}}}_{\boldsymbol{ij}}$, by using the geometric mean approach.

$$\tilde{\tilde{\boldsymbol{r}}}_{\boldsymbol{ij}} = \left[\tilde{\tilde{a}}_{ij}^{1} \dots \otimes \tilde{\tilde{a}}_{ij}^{k} \otimes \dots \otimes \tilde{\tilde{a}}_{ij}^{m}\right]^{1/m} \quad (2)$$

Here, $\tilde{\tilde{r}}_{ij}$ is a matrix composed of *nxn* IT2F sets.

Step 5. Estimate the fuzzy weights for each criterion. To do this, the geometric mean of each row, $\tilde{\tilde{r}}_i$, is calculated using Eq. (2). Subsequently, the fuzzy priorities are computed by normalization of each row. Accordingly, the fuzzy weight of the i^{th} criterion, $\tilde{\widetilde{w}}_i$, is calculated as follows:

$$\tilde{\widetilde{w}}_i = \tilde{\tilde{r}}_i \otimes [\tilde{\tilde{r}}_1 \oplus \dots \oplus \tilde{\tilde{r}}_i \oplus \dots \oplus \tilde{\tilde{r}}_n]^{-1} \quad (3)$$

Step 6. Calculate the ranking value, $Rank(\tilde{\widetilde{w}}_i)$, of the T2F weights. Thereafter, obtain ranking scores, R_i, of the alternatives:

$$R_i = \text{Rank}(\tilde{\widetilde{w}}_i) \quad (4)$$

3.2. Structural Equation Modeling (SEM):

Here, we will present the fundamental principles of the usage of structural equation modeling and the basis for the application of SEM in this study. The application will be shown practically with the research model that has been used.

3.2.1. Basis for using SEM

The research model we adopt contains two latent constructs, which initially were measured by 10 sub-constructs, and each of the ten was measured by several items. To this effect, the two latent constructs, SCP and SCP were latent variables (Kline, 2005), which were being measured by latent variables, human rights, philanthropy, diversity, labor condition, ethics, education and health and safety for the former; then POM, OFR, C2C time for the latter. To be able to test these latent relationships, scholars do concur that no other statistical analysis is as robust and accurate as SEM (Schreiber, 2008). Using standard regression tests fails to accommodate the latent effect in the dependent and independent variables and aggregating the items would be inaccurate as they would fail to accommodate the inter-item discrepancies (Raykov & Marcoulides, 2006).

The applications of SEM include generally the interactions of latent variables, hierarchical linear modeling, multi-trait multi-method matrix (MTMM) modeling, latent class analysis, and latent trait-state modeling (Schreiber, 2008). Based on the conceptual framework, SEM has been considered the optimal modeling technique that addresses the best the latent variable interactions as well as multilevel regression analysis.

3.2.3. Features of SEM

According to Ketchen (2013), the dimensions, the objects, the error terms as well as the paths constitute a basic structural equation model. The dimensions are typically latent variables, which are divided into two variables, exogenous, and endogenous. Exogenous variables are the independent variables, so there is no arrow pointing at them in a path model to allow for the error term (Field, 2016). On the other hand, endogenous variables consist of causal variables and dependent variables, and these have the arrows pointing to them in the path model. Causal endogenous variables contain both arrows pointing at them and arrows pointing away from them, while dependent endogenous variables have

only one arrow pointing at them. The respective measures, or rather items / indicators that constitute a dimension, are beyond the dimension point, and these are typically two or more for any given dimension (Kline, 2005). First are the error words, which set the measurement error for some specific latent variable or dimensional indicators. Finally, the paths are shown by arrows that measure the magnitude and direction of an exogenous variable's direct effect on an endogenous variable (Hair, Sarstedt, Ringle, & Mena, 2012). Such paths are important because they pose the standard regression coefficient, the beta whose precision depends on the estimation technique used, which can either be the maximum probability, the generalized least squares, the unweighted least squares of the scale-free least squares (Raykov & Marcoulides, 2006).

3.2.4. Types of SEM Techniques

Researchers usually divide structural equation modeling techniques into two: either the covariance-based structural equation modeling (CB-SEM) or the variance-based structural equation modeling (VB-SEM) (Sarstedt, M., Ringle, and Gudergan, 2018).

As Hair, Sarstedt, Ringle, and Gudergan, (2018) put it, the key difference between the two lies in the fact that while CB-SEM is of a confirmatory type, VB-SEM is predictive. Therefore, CB-SEM is optimal where parametric test assumptions are met, whereas VB-SEM performs best if the distribution is nonparametric. To this end, for sample sizes greater than 200, CB-SEM is more accurate, whereas VB-SEM is more accurate for sample sizes less than 200 (Hair et al., 2012). With respect to computational methods, MPLUS, LISREL and SPSS AMOS are the most commonly used for CB-SEM, while Smart-PLS is the most commonly used for VB-SEM. For this study, however, the total sample size was 100. Thus, CB-SEM was opted for and to test the model using SPSS Amos.

3.2.5. Results from SEM

As noted above, SEM is an extension to the traditional regression analysis, but instead expands its capabilities to CFA handling (Schmitt, 2011). The main estimates naturally calculated are path coefficients as both unstandardized and standardized. A higher path coefficient shows a high intensity in the relationship between the exogenous variable

and the endogenous variable. The standard error is also measured, as well as the critical ratio and the p-values. The vital ratio should be greater than 1.96 at a confidence level of 95 per cent for statistical significance (IBM, 2018). As Hair et al. (2012) noted, the covariance is also measured and used to assess the discriminating validity. Therefore, the squared multiple correlations determine the magnitude of the variance against an endogenous variable as explained by the exogenous variables. Also important are the adjustment indices used to classify problem items and measurements are important and they help improving fitness of the model (IBM, 2018; Tabachnick, B. G.; Fidell, 2007). In this analysis, we enhanced model fitness via this method, where items with modification indices greater than 10.0 were dropped in the model (Hair et al, 2012)

3.2.6. Fitness of SEM

Several goodness-of-fit checks are carried out to check the validity of a SEM. There are three broad categories of model fitness measures, including absolute fit indices, relative fit indices, and parsimonious fit indexes (Hair et al., 2011). The CMIN/DF is the most common for the absolute fit indices. The chi-square p-value test should be greater than 0.05, while the CMIN/DF should be less than 3.0. On the other hand, the Goodness-of-Fit Index (GFI), the Comparative Fit Index (CFI), the Incremental Fit Index (IFI) and the Normed Fit Index (NFI) are the most common relative fit indices which should be greater than 0.90. With respect to the parsimonious fit indices, the most common alternatives are the Parsimony Normed Fit Index (PNFI), Parsimony Comparative Fit Index (PCFI) as well as the Root Mean Square Error of Approximation (RMSEA) according to Schmitt (2011). Nevertheless, the most common is RMSEA and according to Steiger (2007), the maximum acceptable value is 0.08. Satisfying the goodness-of-fit at these three levels qualify the structural model being tested to be accurate and valid (Schreiber, 2008).

3.3. Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) was initially introduced to check whether a collection of items described a construct by Jöreskog in the 1960s (Schumacker, R., & Lomax, 2010). When doing CFA the researcher requires a theoretical model that has

been defined a priori. So, the researcher must have a good background in theory. Before the analysis, all factors and their relationships, and all the observed variables, must be specified. The goal then is to check whether the sample data fits in with the proposed measurement model based on a theory or analysis. To apply CFA to a model, the researcher will determine how many factors there are, what factors are correlated with each other, and what observed variables measure each factor.

The representations of the CFA model can be seen in Figure 3.2. There are variables that are latent, and variables that are observed. Oval forms represent latent variables, and rectangular ones show observed variables. The foregoing variables cannot be evaluated directly. They can be calculated with the variables observed. Two observed variables are calculated in latent variable 1 and four observed variables in latent variable 2. The single-arrows from the latent variables to the observed variables reflect the assumed causal effect of the latent variables on the observed variables (Kline, 2005).The coefficient of regression was set at 1. Because the coefficients have to be set to a number to minimize the approximate number of parameters in the model. Smaller ellipses represent the measurement errors. A curved, double headed line between two factors indicates a correlation of the latent variables or a mutual variance between them. They are in theory connected, in other words.

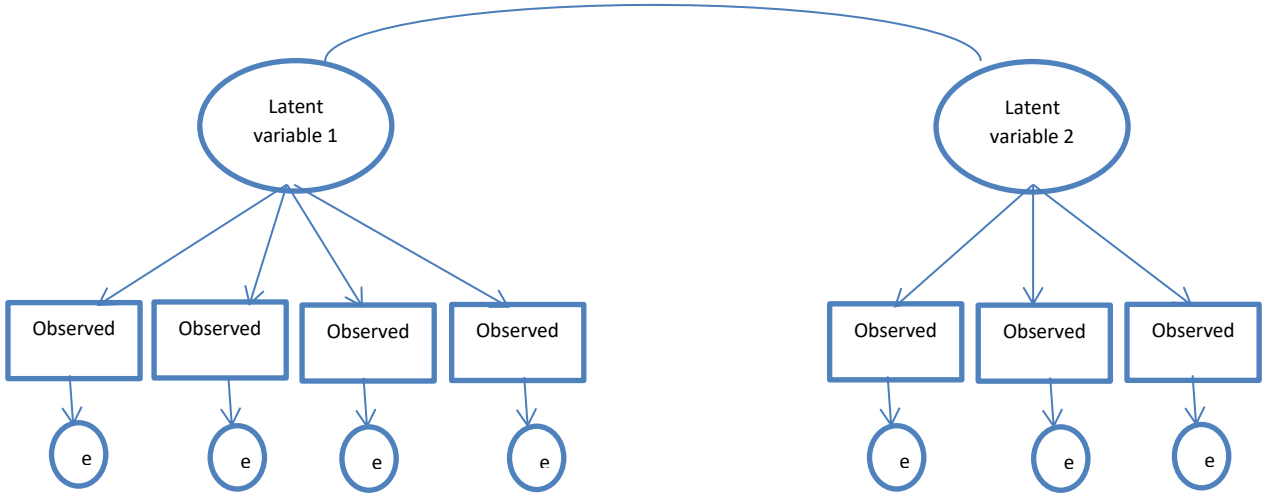


Figure 3.2 CFA Model

In CFA the coefficients of regression can be unstandardized or standardized. In CFA, the factor loadings are interpreted as coefficients of regression. T-value tests will check the statistical significance of the regression coefficients. In addition, the most influencing variable found is the one that has the largest coefficient of regression. The validity and reliability tests have to be carried out when doing CFA. The formulas are explained in the following sections for these tests. Not only is the significance of the t-values is required, but goodness-of-fit statistics must also be within their reasonable thresholds.

3.4. Path Analysis

“The aim of path analysis is to provide estimates of the magnitude and significance of hypothesized causal connections among sets of variables displayed though the use of path diagrams.” (Stage, Carter, & Nora, 2004a). Path analysis is a special case of multiple regressions because it involves several simultaneously estimated multiple regression models or equations, and they are closely related (Stage et al., 2004a).

A path diagram is a pictorial description of a pattern (Tatar, 2015). It represents the variables, the arrows and all the causal relationships between variables.

"Path coefficients in path models are typically derived from the values of a Pearson product moment correlation coefficient (r) and/or a regular partial regression coefficient (b)," according to Schumacker & Lomax (2010). The direct effect of a trigger on an effect in the path model can be described by using the path coefficient. There are two types of coefficients for pathways (Stage et al., 2004). One of them, standardized coefficients of the path (beta weight), is standardized because it is calculated from correlations. Unstandardized coefficients of the path are determined by variable calculation. Unstandardized path coefficients can be used when comparing models with different samples (Stage et al., 2004).

3.5. Construct Validity

The appropriateness of the measurement model is evaluated by measuring the reliability of the construct, the convergent validity of the measures associated with the individual constructs and the discriminating validity (Hulland, 1999). To test the adequacy of the

measuring mode, such validity tests should be used. Campbell and Fiske (1959) stated that discriminant validity as well as convergent validity are required for assessing construct validity. Hair et al., (1998) suggested that convergent validity refers to the degree to which the potentially correlated content of the products is actually correlated. The convergent validity and discriminant validity can be checked using values obtained from an analysis of confirmatory factors. Convergent validity can be tested with composite reliability (CR) and average variance extracted (AVE) (Fornell & Larcker, 1981). Also, for convergent validity, all standardized item loadings of buildings should be relevant and should exceed 0.5 (J. C. Anderson & Gerbing, 1988).

3.6. Exploratory Factor Analysis (EFA):

The model of EFA is a statistical approach that is a set of techniques for analyzing correlations between factors. The key objectives of the exploratory factor analysis (EFA) are to evaluate the number of common factors impacting a series of measures, and to define the relationship between the factors and the measures observed (DeCoster, 1998). EFA is, therefore, a good tool for determining the dimensionality of variables and also removing variables that do not well represent the dimensions.

3.7. Hypothesis Development

This section is dedicated to the development of the hypotheses assumed in the evaluation of our research questions. Each hypothesis represents the dimensions of the latent constructs of the study.

Carter and Jennings (2004) describe issues relating to supplier diversity and how they affect supply chain efficiency. Although they were unable to find a direct link in the supply chain between social issues and success, they found an indirect link, mediated by learning and trust. From Stakeholder Perspective (Freeman, 1984), Researchers argue that higher level of social performance can be achieved through gender non-discrimination and the promotion of deprived communities in supplier sites (Yakovleva, Sarkis, & Sloan, 2012). Chin and Tat (2015), however, found no link between gender diversity practices and success in the supply chain. Regardless of the inconsistent

findings of the literature on diversity activities and the focus of academics on future studies (Yawar & Seuring, 2017), we propose:

H1: Adoption of diversity practices positively relates to SCP.

Health and safety at suppliers' facilities also include physical and mental health issues of workers that have an impact on their well-being (Yawar and Seuring, 2015). Scholars believed that health and safety at work are important social issues for internal and external stakeholders. They also suggest that the effects of hazardous and unsafe work environments can create difficulties in recruiting and retaining workers, which can affect the long-term success of the organization (Torugsa et al., 2013). Building on the legitimacy theory, Tate et al. (2010) have shown how companies can improve their credibility by releasing CSR reports on reducing security and safety problems within the supply chain. However, health and safety issues are the mostly repeated literature that distinguishes among developed and emerging countries and require further research. (Yawar and Seuring, 2015). Our next hypothesis is formulated as:

H2: Adoption of health and safety practices positively relates to SCP.

Addressing labor issues properly as they are an integral part of social sustainability will boost supply chain efficiency (Mani et al., 2016). In addition, based on the views of stakeholders, Nishant, Goh, and Kitchen (2016) found that addressing labor issues adequately at the workplace helps to maintain skilled labor and create positive image among internal and external stakeholders. Many research described the working standards and freedoms of manufacturers, forced labor and child labour in the supply chain and their effect on the success of the focal business (Chardine-Baumann & Botta-Genoulaz, 2014). In turn, improving the working conditions of workers at the supplier's location leads to a significant reduction in injuries, less delays and less delay in product production, which improves the operating efficiency of manufacturers and purchasing companies (Klassen & Vereecke, 2012). In terms of stakeholders' views, some argue that, if the working conditions of the manufacturer 's employees are improved, this in effect increases the quality of the product provided by increasing employee satisfaction (Pagell et al., 2010). Future research should involve critical labor concerns to explain the

role of job problems in the supply chain (Yawar & Seuring, 2017). Therefore, we suggest:

H3: Adoption of labor conditions practices positively relates to SCP.

Scholars argue on the need for human rights to be brought directly into the discourse and the policy interests of those who devise the policies and run the institutions that are at the center of contemporary society's push for increased globalization (Welford, 2002). Mena et al. (2009) suggest in their study that business participation in low-income communities will contribute to empowerment if, in addition to human rights enforcement programs, businesses follow a co-creation strategy, and community empowerment was described as a way to achieve sustainable development and greater respect for human rights. Further studies will focus on the impact of human rights issue on organizational performance. Hence, we propose:

H4: Adoption of human rights practices positively relates to SCP.

Many studies define business ethics as a key measure of CSR (llewelyn, 1998) and interchangeably use the term business ethics with CSR (Beauchamp, 2001; Velasquez, 1982). The presence of a code of ethics (Forker & Janson, 1990) and ethical principles and practices (Carter, 2000) are other antecedents found in the current literature. (Carter, 2000), in his empirical study finds that there are two distinct dimensions of ethical problems in buyer-supplier relationships (Carter, 2000). The first element, "deceptive practices," involves activities such as the use of vague contract terms to support suppliers; the second level, "nuanced practices," involves much more subtle actions such as showing favoritism in selecting suppliers. Following the fact that there is an almost absolute absence of the performance of an ethical supply chain management, we propose that:

H5: Adoption of ethical practices positively relates to SCP.

Supply chain managers often addressed the role of education in the context of training and skill-enhancement. These trainings cover protection, health and hygiene, news skills learning, and career development. Scholars highlighted the effect on manufacturer and

supply chain efficiency of employee education initiatives (Sureeyatanapas, Yang, & Bamford, 2015). Spending in education is still being discussed in developed countries, however, as it requires more monetary investment on suppliers. Therefore, we suggest:

H6: Adoption of education practices positively relates to SCP.

Having the discussion in mind, our main hypothesis is:

H7: SSP positively relate to SCP.

Organizations with a differentiated strategy focus on recognizing customer desires and bringing value to customers. Therefore, to be effective for companies implementing this strategy, they need to be versatile enough to shift production, service, and organizational resources to meet the evolving business and consumer needs. The distinction between goods or services concerns a flexible operating system, extensive training and high employee commitment (Bae & Lawler, 2000). SSP, such as employees' education, stress these issues effectively and efficiently which leads to enhancement of SCP from different perspectives (Venkatesh Mani et al., 2018). Hence, we suggest that:

H8: Differentiation as a competitive strategy mediates the relationship between social sustainability on SCP.

3.8. Instruments Development and Measurement

Due to the absence of measures to assess social sustainability in the supply chain literature, we undertook a systematic literature review to classify current interventions relevant to social sustainability in the supply chain and main performance indicators. Additionally we have relayed on the Thomson Reuters database EIKON's ESG (Environmental, Social and Governance) metric to determine a comprehensive list of measures. This led to a consensus that the social sustainability in supply chain is a latent second-order construct focused on six dimensions: Health and Safety, Human Rights, Labor Conditions, Education, Diversity, and Ethics. We ended up initially with a set of 21 measures relevant to supply chain social practices.

Considering the SCP construct, we have extracted nine KPIs from relevant literature review and narrowed the number for better measurement using IT2F-AHP.

As for the last latent construct, Differentiation (as a competitive advantage), we adopted the existing measures using Onyango (2017) approach to differentiation.

3.8.1. Social Sustainability Dimensions

The next part of the questionnaire that comes after the demographic questions is the social sustainability dimensions measurement part. We first run extensive literature review and picked the dimensions which were most frequently repeated as seen in Table 3.1.

Table 3.1. Scale items and measures for social sustainability

Dimension	Relevant Studies
Health& Safety	(Carter & Jennings, 2004; Hutchins & Sutherland, 2008; Kleindorfer, P., Singhal, 2005; Venkatesh Mani et al., 2018, 2016; Pagell & Gobeli, 2009; Sancha, Gimenez, & Sierra, 2016; Yawar & Seuring, 2017b)
Human Rights	(Carter & Jennings, 2002, 2004; Hutchins & Sutherland, 2008; V. Mani et al., 2014; Venkatesh Mani et al., 2016; Welford, 2002; Yawar & Seuring, 2017b)
Diversity	(Carter & Jennings, 2002, 2004; V. Mani et al., 2014; Venkatesh Mani et al., 2018; Prieto-Carrón, 2008; Tallontire, Dolan, Smith, & Barrientos, 2005; Yawar & Seuring, 2017b)
Ethics	(T. A. Chin & Tat, 2015; Lu, Lee, & Cheng, 2012b; V. Mani et al., 2014, 2015; Venkatesh Mani et al., 2016; Stage, Carter, & Nora, 2004b)
Labor Conditions	(Burchielli et al., 2010; de Giovanni, 2012; Golini, Giacomo, & Kalchschmidt, 2016; Grabner-Kräuter & Waiguny, 2015; Gualandris & Kalchschmidt, 2014; Klassen & Vereecke, 2012; Leire & Mont, 2009; Pagell et al., 2010; Park-Poaps & Rees, 2010);
Education (training)	(Andersen & Skjoett Larsen, 2009b; Venkatesh Mani et al., 2016; POIST, 1989; Sureeyatanapas et al., 2015)

Almost all dimensions we reexamined using a five point Likert scale ranging from 1=Strongly Disagree to 5= Strongly Agree, and for the Diversity‘s last two questions we scaled it as multiple choice. The questions were derived from the EIKON’s ESG Metric

as mentioned before. This scale consisted of 20 items representing 6 dimensions in total. The details are shown in Table 3.2 below.

Table 3.2. Social sustainability items

Dimension	Items
Health&Safety	Your company trains its executives or key employees on employee health & safety in the supply chain
	Your company has a policy to improve the skills training of its employees
Education	Your company has a policy to improve the career development paths of its employees
	Your company has a policy to improve the career development paths of its employees
	Your company provides training in environmental, social or governance factors for its suppliers
Diversity	Your company has a policy to drive diversity and equal opportunity
	Your company has set targets or objectives to be achieved on diversity and equal opportunity
	What is the percentage of women employees
	What is the percentage of women managers
Human Rights	Your company has a policy for the exclusion of the child, forced or compulsory labor, or to guarantee the freedom of association universally applied independently of local laws
	Your company has a policy to avoid the use of child labor
	Your company has a policy to avoid the use of forced labor
	Your company has a policy to ensure the respect of human rights in general
	Your company reports or shows to be ready to end a partnership with a sourcing partner if human rights criteria are not met
Ethics	Your company describe in the code of conduct that it strives to avoid bribery and corruption at all its operations
	Your company has appropriate communication tools to improve general business ethics
	Your company has received an award for its social, ethical, community, or environmental activities or performance
Labor Condition	Your company has a policy to ensure the freedom of association of its employees
	Your company claim to provide day care services for its employees
	There has been a strike or an industrial dispute that led to lost working days

(Source: Author's own composition based on the items in EIKON's ESG report)

3.8.2. Key Performance Indicators

3.8.2.1. Application of IT2F-AHP for Selection of KPIs

To remain successful, manufacturers need to manage inventory and resources efficiently and effectively in an environment where product complexity is growing. Performance assessment is also important for businesses to recognize and direct competitiveness-enhancement efforts (Kolk et al., 2010). The presence of numerous different performance measures of supply chain in the literature had us conduct an extensive literature review to select the measures we believe were the most important due to their frequency of repetition in studies concerning SCP. The table 3.3 below shows the articles that enabled us to build relevant supply chain KPIs.

Table 3.3. Scale items and measures for KPIs

Measure	Source
Perfect Order Measurement (POM)	(B. Y. L. Lapide, 2010; L. Lapide, 2000; Novack, Thomas, Novack, & Thomas, 2015)
Order Fill Rate (OFR)	(Closs, Nyaga, & Voss, 2010; Larsen, 2017; Lu et al., 2012a; Park & Kyung, 2014; Rim & Park, 2008; Song, 1998)
Cash-to-Cash Cycle Time (C2C)	(Akgün & Gürünlü, 2010; Farris & Hutchison, 2002; Hutchison, 2014; Mayer, 2012; Theodore Farris & Hutchison, 2003)
Supply Chain Cycle Time (SCCT)	(C Bozarth, 2008; Mason-Jones, Naylor, & Towill, 2000; Mason-Jones & Towill, 1999; Towill, 1996; Wang, Teng, & Lou, 2014)
Inventory Days of Supply (IDS)	(Djanegara et al., 2006; Lo, Yeung, & Cheng, 2009;; URoberto Ayala, Yorktown Heights, NY (US); Michael P. Murray, Ridgefield, CT (US); Mauricio Alejandro Villalobos, 2003)
Inventory Turnover (IT)	(Demeter & Matyusz, 2011; Gaur, Fisher, & Raman, 2005; Kolias, Dimelis, & Filios, 2011; Rao & Rao, 2009)
Days Sales Outstanding (DSO)	(Ganga & Carpinetti, 2011; Keith J Stone, Arlington, VA (US); David J Santoro, Jr., Yardley, 2013; Losbichler, Mahmoodi, & Rothboeck, 2008; Stewart, 1995)
Average Payment Period (APP)	(Falope & Ajilore, 2009; Jamal, Sarker, & Shaojun, 1999; Mathuva, 2010)
On Time Shipping Rate (OTSP)	(Davenport, 2002; Doreen J. Martin; Guy M. Givens, both of Boise; Justin D. Kuttler, Meridian, 1998; Tommelein & Li, 1999; Zimmer, 2002)

As mentioned before for the selection of the supply chain KPIs, we use IT2F-AHP where a table of comparison containing the nine chosen KPIs has been prepared and sent to ten experts and academicians who ranked them by order of importance.

We faced a pre-emptive classification question at this stage to decide the order of KPIs on the basis of experts' opinions. While ranking alternatives linguistic terms were used instead of numerical values to solve this problem. Because of subjectivity of ranking process, we used IT2F-AHP (Görener, Ayvaz, Kuşakcı, & Altınok, 2017), where nine KPIs are measured using complex linguistic expressions coded as trapezoidal IT2F numbers as given in Table 3.4.

Table 3.4. Linguistic Terms And Corresponding Trapezoidal IT2F Sets

Linguistic term	Trapezoidal IT2F sets
Absolutely strong (AS)	$\widetilde{\widetilde{AS}}$ = ((7,8,9,9;1,1),(7.2,8.2,8.8,9;0.8,0.8))
Very strong (VS)	$\widetilde{\widetilde{VS}}$ = ((5,6,8,9;1,1),(5.2,6.2,7.8,8.8;0.8,0.8))
Fairly strong (FS)	$\widetilde{\widetilde{FS}}$ = ((3,4,6,7;1,1),(3.2,4.2,5.8,6.8;0.8,0.8))
Slightly strong (SS)	$\widetilde{\widetilde{SS}}$ = ((1,2,4,5;1,1),(1.2,2.2,3.8,4.8;0.8,0.8))
Exactly equal (E)	$\tilde{\tilde{E}}$ = ((1,1,1,1;1,1), (1,1,1,1;1,1))
Slightly weak (SW)	$\widetilde{\widetilde{SW}} = 1/\widetilde{\widetilde{SS}}$ = ((0.200,0.250,0.500,1; 1,1),(0.208,0.263,0.454,0.833; 0.8,0.8))
Fairly weak (FW)	$\widetilde{\widetilde{FW}} = 1/\widetilde{\widetilde{FS}}$ = ((0.143,0.167,0.250,0.333; 1,1),(0.147,0.172,0.238,0.312; 0.8,0.8))
Very weak (VW)	$\widetilde{\widetilde{VW}} = 1/\widetilde{\widetilde{VS}}$ = ((0.111,0.125,0.167,0.200; 1,1),(0.114,0.128,0.161,0.192; 0.8,0.8))
Absolutely weak (AW)	$\widetilde{\widetilde{AW}} = 1/\widetilde{\widetilde{AS}}$ = ((0.111,0.111,0.125,0.143; 1,1),(0.111,0.114,0.122,0.139; 0.8,0.8))

Based on ranking scores shown in Figure 3.3, we chose the KPIs that scored more than 11 points and those were the first three POM, FR, C2C.

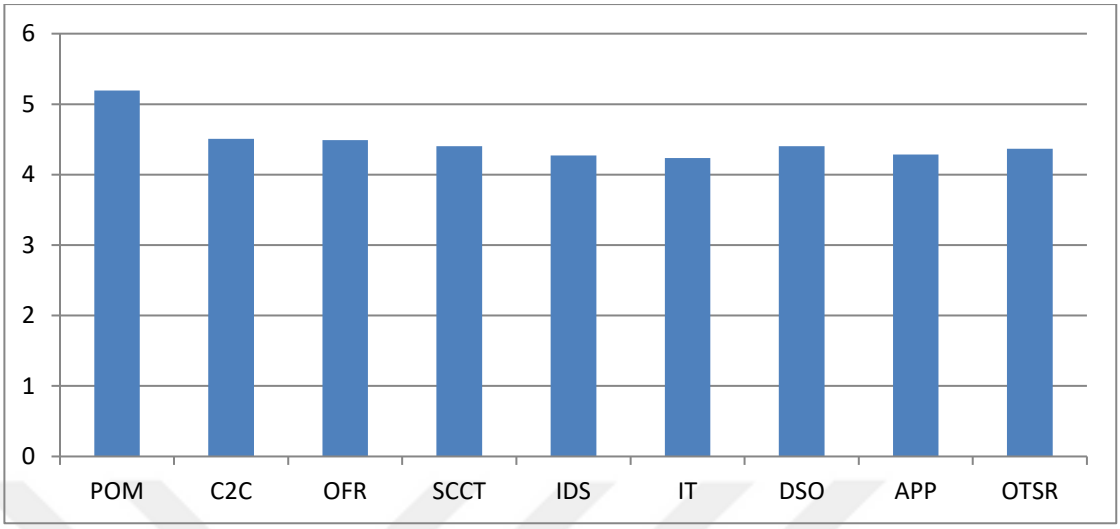


Figure 3.3. IT2F-AHP ranking results

The concept of perfect order is a bundling of logistics resources into one metric. The optimal order, then, is a more straightforward indicator of the customer service logistics of a company. Studies have also shown that there are many benefits of POM over conventional measures. Perfect order allows firms to (1) consistently meet or exceed consumer expectations; (2) enhance customer service flexibility; (3) decrease order cycle times; (4) mitigate variable and inaccurate service; (5) create a better decision-making environment; and (6) identify important bottle necks and deficiencies within the order management system (LH Mullinix, 1999). The OFR, the probability of completing a full customer order from the shelf immediately – or more generally, within a given time period – is a significant service metric in industry. The OFR is defined as "full orders filled as a fraction of the total number of orders" (Zinn, Mentzer, & Croxton, 2002) and is a measure of availability that it includes other forms of filling rates, such as unit fill rate. Where the correct amount of all items is available from the stock in that order, the order is completed (Levi, Kaminsky, &Illinois, 2003). The unit fill rate represents typically the ability of the company to satisfy particular product demand, while the OFR represents the ability of the company to satisfy a wide variety of goods demand. If the firm profitability depends, to a large extent, on a limited customer base, then it is important to ensure high product availability for each customer. In this case, order fill rate is the correct performance metric, as it calculates the level of service

offered to key customers with regard to the combination of stock holding units contained in each order. Being considered a measure of inventory control to satisfy the customer's demand efficiently, it is important to maintain this rate as high as possible in order to prevent delays in delivering the finished product.

Definition of Cash-to-Cash cycle time or so called C2C can range from a general statement, like “C2C is a composite metric describing the average days required to turn a dollar invested in raw material into a dollar collected from a customer” (Stewart, 1995) to the simple description that C2C reflects “the length of time between cash payment for purchase of resalable goods and collection of accounts receivable generated by sale of these goods” (Moss & Stine, 1993).

CHAPTER IV

AN APPLICATION ON MOROCCAN MANUFACTURING INDUSTRY

4.1. Research Design

To collect data, we used an email survey with structured questionnaire due to COVID-19 pandemic and physical distance to the country of interest. The data were collected from Moroccan manufacturing firms. We based our sample selection on 2 criteria: first firm should have been operating for no less than 10 years, second it should have no less than 50 employees. These criteria is meant to help getting more adequate data since the firm would have more suitable experience in sustainability and target market. Furthermore previous research has found that smaller firms tend to lag behind (Min & Galle, 2001) when it comes to sustainability, as opposed to larger firms with high revenues. It means participants are ideally qualified and appropriate to this research. The step-by-step research design procedure shall be defined as follows.

4.2. Data Collection:

The questionnaire has been applied through e-forms which we have shared using online professional platforms such as LinkedIn where we defined the desired target companies from different industries as shown in Table 4.1 then we emailed 420 supply chain managers. In total, 100 (response rate, 23.8%) responses were collected, captured, and cleaned and these shall be analyzed in this chapter in line with research hypotheses.

Both IBM SPSS Statistics v25 and IBM SPSS Amos v22 were used to conduct the study. The former have been used to carry out reliability analysis, descriptive statistics,

correlation analysis and exploratory factor analysis (EFA) with other related inference checks, while the latter as used for CFA(CFA) and structural equation modeling (SEM).

Table 4.1 Sample characteristics

Industry	Frequency	Percent
Clothing/ Textile	32	32%
Food, sugar, edible oil	20	20%
Agriculture	14	14%
Construction/ Architectural	10	10%
Automobile	8	8%
Electrical/ Electronic	7	7%
Pharmaceutical	3	3%
Oil and natural gas	3	3%
Mechanical manufacturers	2	2%
Mining	1	1%

4.3. Findings and Results

In this section, are three main sections: Characteristics of the Sample, Scale Validity and Reliability, Test of Research Model, mediation effect of differentiation, and demographic characteristics regression.

4.3.1. Sample Demographic Characteristics:

This section describes the key demographics of the obtained sample as the first section of our questionnaire. For demographic inputs we considered Gender, Company's age, and Number of Employees. The distribution of each item is show below. It is important to create the socio-demographic characteristics of the respondents to the survey, according to Bryman and Bell (2015), as this will provide an explanation for potential patterns in response variability.

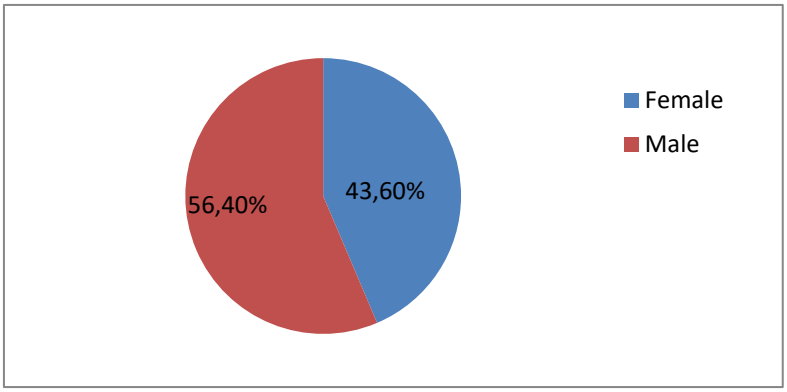


Figure 4.1 Sample's gender distribution

Based on the above chart the majority of respondents were male comprising 56.4% while female respondents were 43.6%.

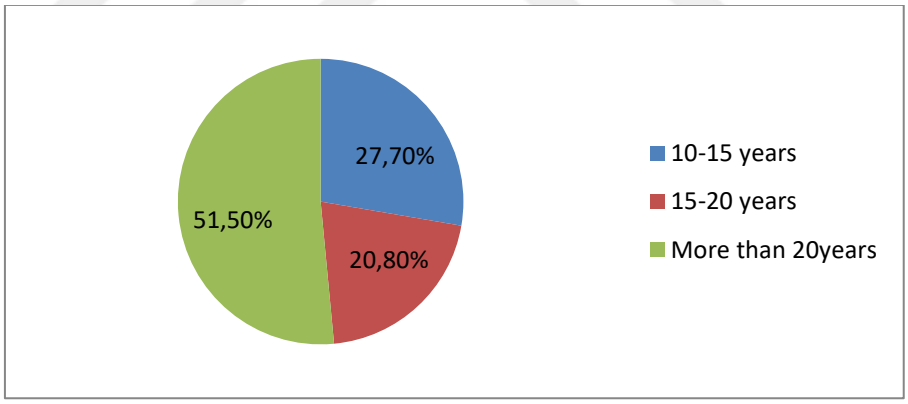


Figure 4.2 Company's age distribution

The companies' age according to Figure 4.2 is 51.5% more than 20 years as a majority followed by 27.7% for between 10 to 15 years, then 20.8% for between 15 and 20 years.

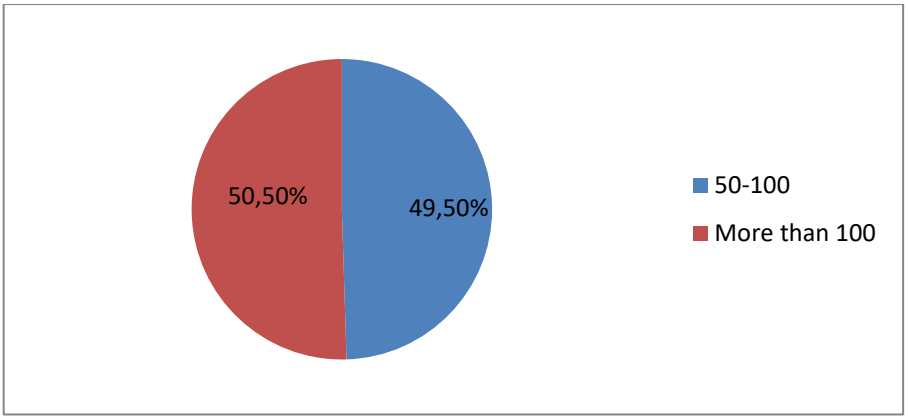


Figure 4.3 Number of employees per company

As depicted in Figure 4.3, 50.5% of the companies have more than 100 employees whereas the rest employs between 50 and 100 employees.

4.3.2. Scale Validity and Reliability

For CFA the coefficients of regression can be unstandardized or standardized. For CFA, the factor loadings are represented as coefficients of regression. T-value tests will test the statistical significance of the regression coefficients. The t-values gained from the analysis will need to be significant. In addition, the most influencing variable found is the one that has the largest coefficient of regression. The validity and reliability tests have to be carried out when doing CFA. The formulas are explained in the following parts for these tests. The regression coefficients can be used to measure the values. Not only is the significance of the t-values sufficient, but goodness-of - fit statistics must also be at their reasonable thresholds. The researchers will use many metrics of goodness-of - fit to determine a model for a sample fit. Goodness-of-fit reverses sample size and number of variables.

4.3.3. Factor Analysis

The main goal of our study was to identify social sustainability dimensions in the supply chain and to evaluate the effect of their implementation on supply chain performance. There are very few researches on sustainable supply chain management based on the social dimension of sustainability and its impact, as we mentioned earlier. This means

that a scale which measures constructs on SCSS practices, such as health and safety or human rights, have not yet been developed. We conducted EFA with Varimax rotation to identify the fundamental constructions underlying our indicators (Kaiser, 1958). In addition, we applied three commonly used decision criteria for the extraction of the social sustainability dimensions of the supply chain (Hair et al. 2010). First, we omitted items loading less than 0.40 and cross-loading items for two or more items. Finally, factors with an eigenvalue greater than 1 were considered to be the cut-off value for the extraction of the factor. Five factors explained 69.5 percent of the total variance (Table 4.2). These five dimensions are labeled as SS1, SS2, SS3, SS4, and SS5 where SS refers to Social Sustainability. KMO test and Bartlett's were performed to understand the applicability of the factor analysis. "The measure Kaiser-MeyerOIkin (KMO) should be greater than 0.70, and is insufficient if less than 0.50. The KMO test informs one whether or not any factor predicts enough items. The Bartlett test should be significant (i.e., a significance value of less than 0.05); this means that the variables are correlated highly enough to provide a reasonable basis for factor analysis" (Leech et al., 2005).In our case KMO values were greater than recommended value and Bartlett's test was significant (Table 4.3).

Table 4.2 Results from exploratory factor analysis for SCSS items

		Component				
		1	2	3	4	5
SS1	ED3	**0.776**				
	HS2	**0.774**				
	ED1	**0.765**				
	ED2	**0.715**				
	HR5	**0.699**				
	HS1	**0.690**				
	DV2	**0.599**				
	LC1	**0.575**				
	ET3	**0.568**				
SS2	HR4		**0.835**			
	ET1		**0.798**			
	DV1		**0.622**			
	ET2		**0.581**			
SS3	HR2			**0.907**		
	HR1			**0.868**		
	HR3			**0,642**		
SS4	DV3				**0,899**	
	DV4				**0,880**	
SS5	LC3					**0,883**
	LC2					**0,670**

Table 4.3 KMO results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,805
Bartlett's Test of Sphericity	Approx. Chi-Square	976,269
	df	190
	Sig.	,000

Next, the reliability of the instruments was measured using Cronbach's alpha, the most commonly used method for measuring reliability. According to Nunnally (1978), the instruments used in basic research must have a minimum alpha coefficient of 0.70 or greater (Nunnally, 1978) cited in (R. E. Anderson & Srinivasan, 2003). Other scholars,

including Lan (2016) and Taber (2016), however, argue that even alpha statistics as small as 0.6 remain appropriate. Items representing social sustainability dimensions had a Cronbach's alpha of 0.882 which is considered as appropriate reliability index. The items and the factors that were extracted through EFA and mentioned in the table above were initial factors which helped us draw an initial path model for CFA. The initial model is presented in the Figure 4.4. Having tested for variables reliability, variable validity checking before using variables in hypothesis testing must be done (W. W. Chin et al., 2008; Sarstedt et al., 2016). Dimitrov (2012) added further that this can be done by CFA, by convergent validity testing. With respect to convergent validity, the items ought to have a standardized path coefficient of at least 0.4 (Hair et al., 2012; Schmitt, 2011).

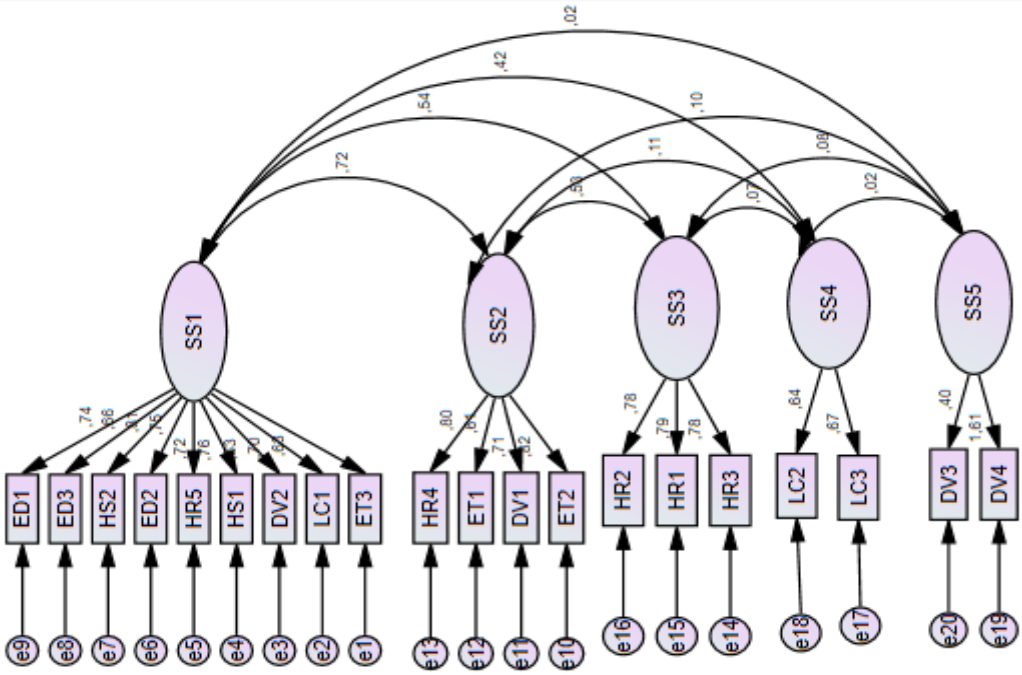


Figure 4.4 CFA– Initial Extraction

The corresponding table presenting the above path coefficients, including the standardized path coefficients is presented in Table 8. From the table, it is evident that among all the items, only one failed to meet the standardized regression coefficient of

0.4 and this was DV4 whose standardized coefficient was 1.614. To this effect, as prescribed by Schmitt (2011), this was subsequently dropped.

Table 4.4 CFA– Regression Weights (Initial Extraction)

			Estimate	Standardized	S.E.	C.R.	P
ET3	<---	SS1	1	0,635			
LC1	<---	SS1	0,867	0,699	0,104	8,375	***
DV2	<---	SS1	0,882	0,629	0,123	7,148	***
HS1	<---	SS1	1,074	0,76	0,112	9,627	***
HR5	<---	SS1	1	0,724			
ED2	<---	SS1	0,921	0,746	0,099	9,315	***
HS2	<---	SS1	1,113	0,807	0,104	10,744	***
ED3	<---	SS1	1,01	0,661	0,131	7,687	***
ED1	<---	SS1	0,949	0,743	0,103	9,256	***
ET2	<---	SS2	1	0,821			
DV1	<---	SS2	0,859	0,712	0,104	8,283	***
ET1	<---	SS2	0,797	0,612	0,12	6,661	***
HR4	<---	SS2	0,97	0,805	0,096	10,074	***
HR3	<---	SS3	1	0,78			
HR1	<---	SS3	1,196	0,792	0,131	9,156	***
HR2	<---	SS3	1,025	0,78	0,114	8,983	***
LC3	<---	SS4	1	0,67			
LC2	<---	SS4	0,937	0,637	0,197	4,761	***
DV4	<---	SS5	1	1,614			
DV3	<---	SS5	0,25	0,401	0,437	0,572	0,568

Based on the above CFA, ED3 has the highest regression weight on the SS1, while ET1 has the lowest effect on SS2.

The revised confirmatory analysis diagram is presented in Figure 6. While analyzing and testing model fit, items with very high modification indices were omitted and these in total were 12 item and thus 3 factors were dropped SS3, SS4 and SS5. The resulting improved model is presented in Figure 4.5.

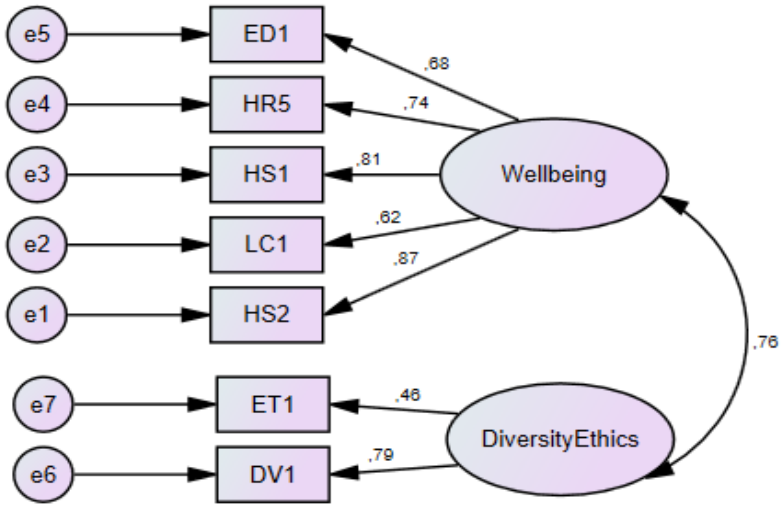


Figure 4.5 CFA– Final Extraction

Likewise, the resulting table presenting the path coefficients is given in Table 4.5.

Table 4.5 CFA– Regression Weights (Final Extraction)

			Estimate	Standardized	S.E.	C.R.	P
HS2	<---	Wellbeing	1	0,867			
LC1	<---	Wellbeing	0,654	0,619	0,106	6,192	***
HS1	<---	Wellbeing	0,952	0,806	0,108	8,842	***
HR5	<---	Wellbeing	0,878	0,738	0,112	7,822	***
ED1	<---	Wellbeing	0,715	0,682	0,102	7,021	***
DV1	<---	Diversity Ethics	1	0,789			
ET1	<---	Diversity Ethics	0,6	0,461	0,185	3,24	0,001

4.3.4. Path Analysis

The unidimensionality of social sustainability scales has been checked by CFA. Two measuring models have been developed to evaluate the five dimensions. For the first model the two aspects of the SCSS were taken as first order latent variables. The SSP model, second-order latent construct, calculated in its constituent first-order parameters, refers to SCP.

Additionally, another measurement model was created for SCP that consisted of three items POM, OFR, and C2C. The Figure 4.6 illustrates the final path model with SSP second-order social sustainability construct and SCP. The results indicate adequate fit with respect to goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), Bentler-Bonett normed fit index (NFI), Tucker–Lewis index (TLI), and non-normed fit index

(Hair et al., 2012; Hu & Bentler, 1999)

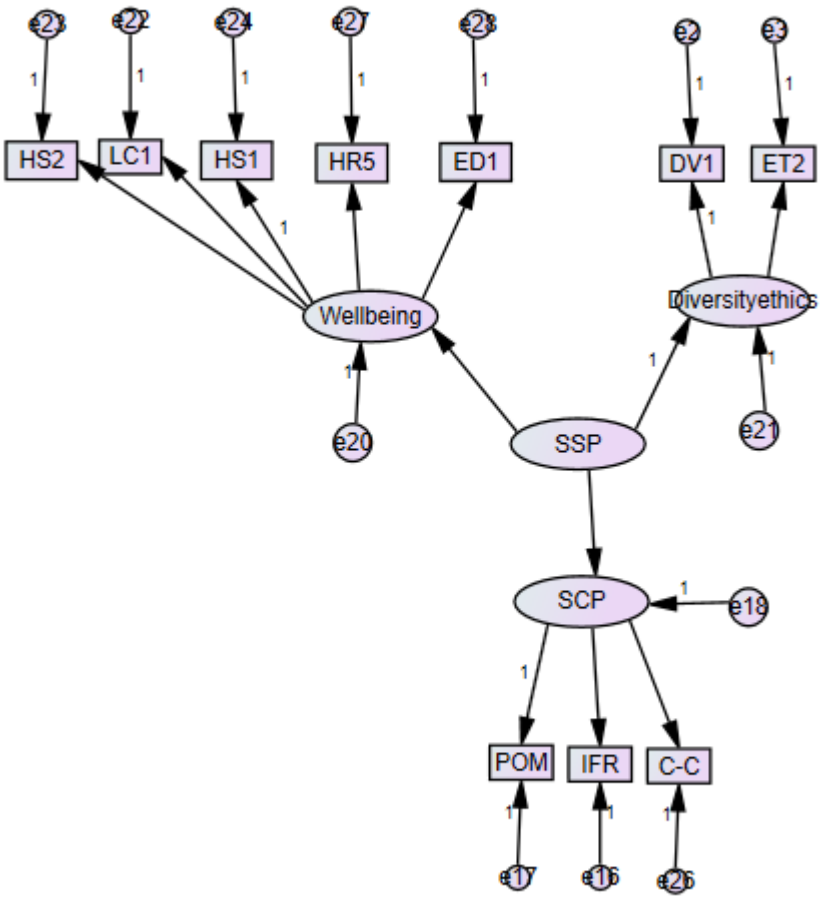


Figure 4.6 SEM - Path model

4.3.4.1. Convergent and Discriminant Validity

Validity describes how well a test measures what it is supposed to be measuring. Parameters such as item load factor, extracted average variance (AVE) and composite reliability must be examined in order to determine convergent validity (Hair et al., 2012). The AVE and CR values are shown above the thresholds in Table 4.6 (AVE = 0,50; CR>= 0,70). The AVE is the main convergence indicator and the CR value greater than 0.70 indicates the internal consistency of the analyzed latent structure (Hair et al.,

2012). These results suggest that they are appropriate in terms of convergent and discriminant validity.

Table 4.6 Convergent and discriminant validity

	CR	AVE	MaxR(H)	Cronbach's Alpha
SSP	0,867	0,69	0,946	0,882

Model-fit tests were considered to confirm the validity of these findings. CMIN / DF was considered for the absolute fit index (Sarstedt et al., 2016), and the relative fit indices, IFI and CFI were considered, while RMSEA was considered for the model parsimony (Schmitt, 2011). According to Hair et al. (2012), for model validity, CMIN/DF should be less than 3.0, while CFI and IFI should be greater than 0.90, and RMSEA ought to be less than 0.70 (Steiger, 2007). Table 4.7 presents the respective results.

Table 4.7 CFA– Primarily Model Statistics

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	23	38.28	32	0.206	1.196
Saturated model	55	0	0		
Independence model	10	371.438	45	0	8.254
Baseline Comparisons					
Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	0.897	0.855	0.981	0.973	0.981
Saturated model	1		1		1
Independence model	0	0	0	0	0
RMSEA					
Model	RMSEA	LO 90		HI 90	PCLOSE
Default model	0.047	0		0.096	0.5
Independence model	0.287	0.26		0.314	0

From the foregoing, CMIN/DF = 1.196, and because the statistic was less than 3.0, it was confirmed that the absolute fit index was valid (Rençber & Mete, 2018). Further, IFI and CFI were 0.981 and 0. 981 respectively, and being greater than 0.900, this confirms that the relative fit indices were valid. Lastly, RMSEA was 0.047, and being less than 0.70, this confirms the validity of the model parsimony (Hair et al., 2012). Overall, these model fit tests do confirm that the CFA final model was valid.

Because our first-order model did not show an acceptable match for fit indexes, we performed a second-order confirmatory factor study to see individually the importance of each social dimension to the perception of specific social problems and their relation to the social sustainability trend in the supply chain (Carter, 2000). The model's fit has been shown previously in the table above. All the first-order latent variables (Wellbeing, Diversity and Ethics) leading to second-order latent variable SCP are significant. The path loadings of the first-order latent variables toward SCP describe wellbeing at 0.967 and Diversity and Ethics at 0.827.

4.3.5. Hypothesis Testing

We performed SEM as shown in Figure 10 to test our hypotheses from H1 to H6. The values in the model for $\chi 2$(DF): 1.196, GFI, GFI: 0.981 RMSEA: 0.047. Our results show the 0.67 loading path between SSP and SCP. Both values are significant at p=0.001 and Table 4.8 outlines the loadings and the effects of the test hypotheses.

Table 4.8 Hypothesis testing results

Path	Direct effect	Indirect effect	Result
H1: Adoption of Diversity practices positively relates to SCP	0.000	0.747	Supported
H2: Adoption of Health& Safety practices positively relate to SCP.	0.000	0.815 and 0.864	Supported
H3: Adoption of Labor Conditions practices positively relate to SCP.	0.000	0.618	Supported
H4: Adoption of Human Rights practices positively relate to SCP.	0.000	0.738	Supported
H5: Adoption of Ethics practices positively relate to SCP.	0.000	0.781	Supported
H6: Adoption of Education practices positively relates to SCP.	0.000	0.676	Supported
H7: SSP positively relate to SCP.	0.672	0.000	Supported

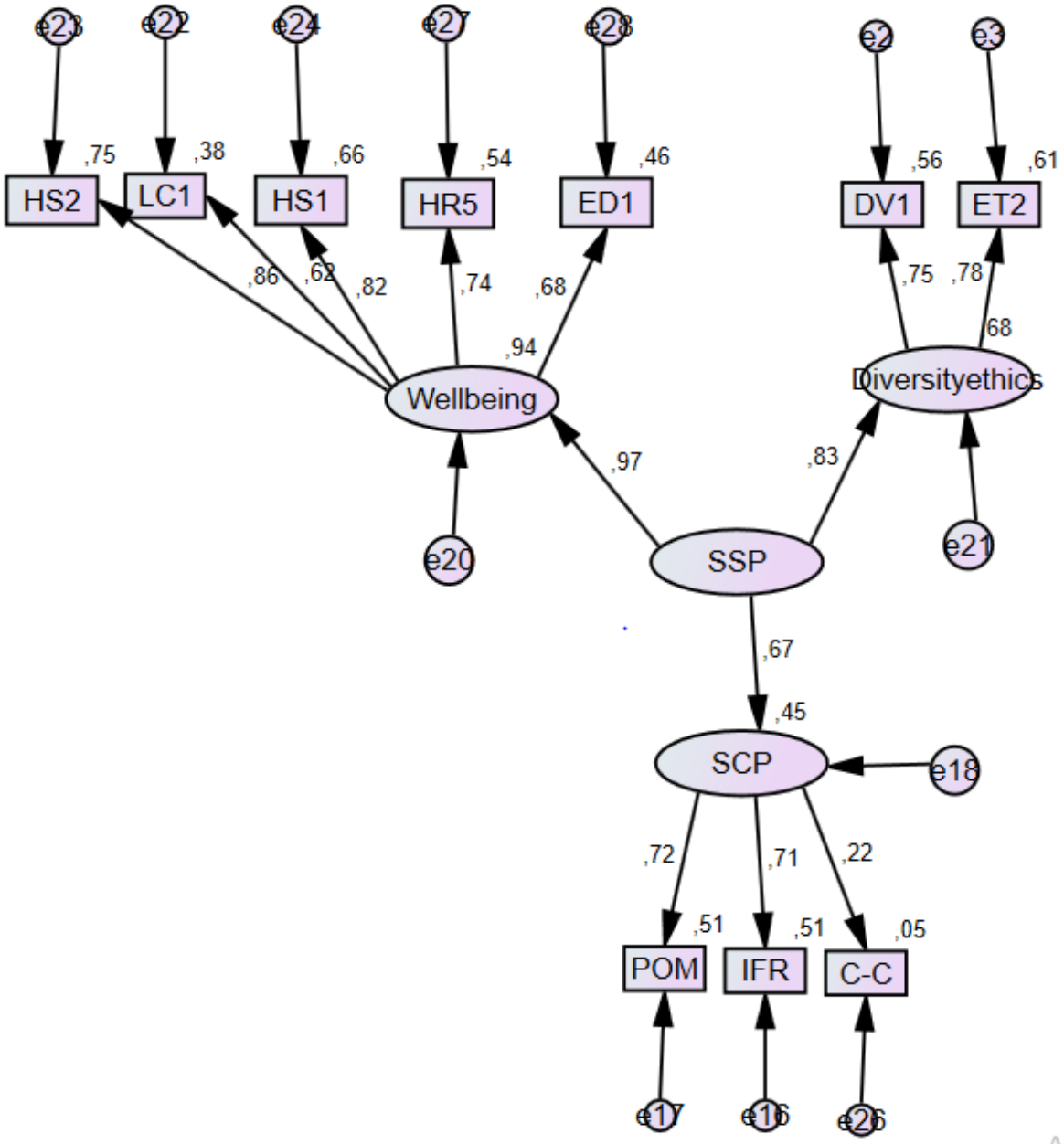


Figure 4.7 Structural Equation Model – Chart of Hypothesis

4.3.6. Mediation by Process

Process Macro is used to analyze the mediating effect of differentiation as a competitive advantage in the linkage between Social Sustainability and SCP. Process boast up the data (5000) automatically. The below mediation analysis also gives the outcomes against the unstandardized path coefficient.

a) First, it is important to see the correlation between independent variable and mediating variable that needs to be significant.
b) Second, it is important to see the relationship in between dependent variable and mediating variable which also needs to be significant. If there is a significant relationship, then there exists mediation.
c) Finally, the relationship in between dependent variable and independent variable which may or may not be significant is important.

As Baron and Kenny (1986) have indicated, in order to test the impact of mediation, the direct relationship between the dependent and independent variables should be significant for further processing to the next level. However, it has been shown in later studies performed by Andrew Hayes, Preacher & Kelly and several other researchers that the direct correlation between the dependent and independent variable should not be necessary.

In addition, the values of the upper limit class interval (ULCI) and the lower limit class interval (LLCI) show whether or not there is a mediation effect and whether or not the relationship is significant. The value of ULCI and LLCI shouldn't have zero according to Hayes (2013). Moreover, Process provides the direct and indirect effect sizes, crucial to describe the impact and overall extent of the mediation. Table 4.9 shows the results of the mediation effect on process.

Table 4.9 Results of direct Relationship between SSP and Differentiation

Model Summary						
R	R-sq	MSE	F	df1	df2	P
0.5815	0.3381	0.4719	44.4402	1.0000	87.0000	0.000
	Coeff	SE	t	P	LLCI	ULCI
Constant	1.8821	0.2771	6.7911	0.000	1.3313	2.433
SSP	0.5071	0.0761	6.6664	0.000	0.3559	0.3559

The table 13 illustrates modelling the relationship between dependent variable (Social sustainability) and the mediator (Differentiation) as simple regression. The path (direct effect) from SSP to differentiation was positive and statistically significant (b_1=0.5071, SE =0.0761, P<0.001). Hence, basically, the Moroccan firms within supply chains adopting SSP tend to follow differentiation strategy.

In Table 4.10, the outcome variable is being regressed on SCP and differentiation. The path (direct effect) from SCP to differentiation is significant (b_2=0.1545, SE= 0.0788, P= 0.0531) which indicates that firms within supply chain adopting SSP tend to have better SCP. Accordingly, the direct effect of the differentiation on SCP is positive and significant (b=0.2474, SE=0.0903, P=0.0075) indicating that supply chain firms following differentiation strategies are more likely to have higher SCP.

Table 4.10 Results of direct Relationship between SCP and Differentiation

Model Summary						
R	R-sq	MSE	F	df1	df2	P
0,4859	0,2361	0,3351	13,2895	2,000	86,000	0,000
	Coeff	SE	t	p	LLCI	ULCI
constant	0,6399	0,2889	2,2152	0,0294	0,0656	1,2142
SSP	0,1545	0,0788	1,9612	0,0531	0,0021	0,3111
Diff	0,2474	0,0903	2,7386	0,0075	0,0678	0,427

In both cases the values of LLCI i.e. Lower Limit Confidence Interval and ULCI i.e. Upper Limit Confidence Interval, against unstandardized coefficient and does not include the value of zero in between the LLCI and ULCI which shows that all the variables have a significant relationship. In Table 4.11, the direct effect of SCP on SCP is shown.

Table 4.11 Direct Effect of SCSS practices on SCP

Direct effect of X on Y							
Effect	Se	t	p	LLCI	ULCI	c'-ps	c'-cs
0.1545	0.0788	1.9612	0.0531	0.0021	0.3111	0.236	0.2272

The figure 4.8 shows the value of unstandardized path coefficients in the mediating effect of Differentiation in the linkage between SCP and Supply Chain Practices.

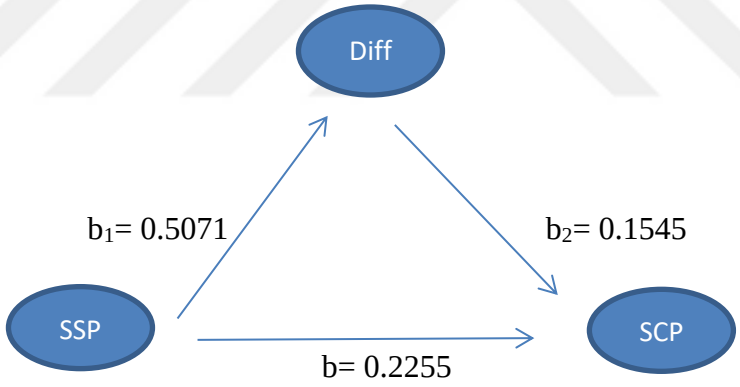


Figure 4.8 Mediation effect (Unstandardized Path coefficient)

4.3.6.1. Kappa- Squared for Indirect or Mediated Effect

The result of Kappa- Squared values for indirect effect of mediation is shown in table 4.12. Non-parametric bootstrapping is used to test the indirect effect. When the value of 0 lies in the upper 95% confidence interval, the assumption is that the indirect effect of the population is 0. If 0 falls outside the confidence interval, the indirect effect is inferred to be non-zero. In our case the indirect effect (IE=b_3= 0.2255) is statistically significant: 95% CI= (0.0278, 0.2341). Referring to the rule of thumb provide by

Preacher and Kelley (2011), it can be stated that the overall mediating effect of differentiation in the relationship between SSP and SCP is very high. Thus the hypothesis H7 cannot be rejected.

Table 4.12 Kappa- Squared for Indirect or Mediated Effect

Indirect effect(s) of X on Y:				
	Effect	BootSE	BootLLCI	BootULCI
Diff	0,2255	0,0522	0,0278	0,2341

4.3.7. Regression Analysis for Demographical Variables

Different studies have suggested that companies' characteristics like the age and the size have positive impact on social responsibility (Lucyanda & Siagian, 2012). Beatrice and Amahalu (2017) suggest that all dimensions of firm's characteristics including age and size have positive effect of firm performance. Hence, a further analysis is conducted to see the effect of age and size on company performance.

To test the effect of demographic data in our study we suggest before a hypothesis concerning company characteristics. The hypothesis suggested that:

H9: the companies' age and size relate to SSP and SCP positively.

In other words, the independent and dependent variables included:

Independent variables:

- Company's age,
- Company's size.

Dependent variables:

- SSP
- SCP

With this in mind, according to Field (2016), because multiple independent variables and continuous dependent variables, multiple linear regression would be optimal in

determining these differences in the ratings of SSP and SCP across the different independent variables and whether the differences are statistically significant (Field, 2016). To be able to test this, two regression equations were created:

H9a: SSP= δ_1 (company's age) + υ_1 (company's size) + K_1

H9b: SCP = δ_2 (company's age) + υ_2 (company's size) + K_2

The regression model summary is presented in table 4.13.

Table 4.13 Regression Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
H10a	,057[a]	0,003	-0,017	0,97771
H10b	,287[a]	0,082	0,063	0,61594
a. Predictors: (Constant), CompSize, CompAge				

For H10a the regression coefficient was 0,057 and the r-square statistic was 0,003. In this context, it can be claimed that just 0.3% of the variation in social sustainability activities was attributed to the variability of independent variables. For H10b, the regression coefficient was 0,287 and r-square statistic was 0,082. Again, it can be argued that 8.2% of the variability in SCP was a result of variability in the independent variables. Comparing both outputs, the independent demographic variables did have a higher influence towards SCP than SSP.

The respective model fit tests for both hypotheses were run and are presented in Table 4.14.

Table 4.14 Regression Model Fit

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
H10b	Regression	3,258	2	1,629	4,294	,016[b]
	Residual	36,421	96	0,379		
	Total	39,679	98			
H10a	Regression	0,301	2	0,151	0,158	,854[b]
	Residual	91,768	96	0,956		
	Total	92,070	98			
b. Predictors: (Constant), CompSize, CompAge						

From the results above we could see that the impact of company's characteristics on SSP is insignificant while it is significant on SCP. We conclude that hypothesis H10a is to be rejected.

To establish the significance of each independent variable on SCP the regression coefficients were considered. These are presented in Table 4.15.

Table 4.15 Regression Coefficients of dependent variable SCP

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,376	0,254		5,413	0,000
	CompAge	0,111	0,085	0,130	1,307	0,094
	CompSize	0,292	0,126	0,231	2,317	0,023

The results in the table above suggest that both the company's age and size have significant and positive influence on SCP based on the values for age (t=1,307), and size (t=2,317) , respectively. The result precludes the rejection of the Hypothesis H10b.

CHAPTER V

DISCUSSION AND CONCLUSION

The goal of this analysis was to test the impact of SSP on SCP, taking into account the mediating influence of differentiation as a competitive advantage on both constructs. The targeted market was the Moroccan industrial companies where we tackled supply chain managers. The analysis was conducted using SEM and the instruments of the survey were developed using extensive literature review reading, Thomson Reuter's data base report, and experts' opinion.

Regarding this, and among 20 different items underlying social sustainability in supply chain, seven of them proved to positively affect SCP under two main factors, employee wellbeing and diversity& ethics. Also, three KPIs out of nine found the most frequent in literature review were selected using IT2F-AHP with 10 decision makers who were academicians and experts of supply chain. Final outcome of this method was the SCP indicators in our study.

After collecting the data with an online questionnaire, EFA was applied and validity and reliability tests were checked and a measurement model was tested. Confirmatory analysis was the next step where we tested the convergent and discriminant validity of the factors found in EFA before we decide about the model, and according to the modification indices we had to omit three whole factors with total 12 items that were not fitting. Then, we tested the goodness of fit values of structural model to the whole data after deciding about the remaining factors of social sustainability variable.

According to path analysis, items related to health and safety, education, human rights, labor conditions, diversity and ethics were accepted as items representing social sustainability under two factors employee wellbeing and diversity & ethics which has been proved to be influencing statistically and significantly the SCP (0.67). In other

words, supply chains with SSP have higher performance which does go hand in hand with the results proved by Mani et al. (2018).

Concerning the differentiation as a competitive advantage strategy, it was found that it had a total mediating effect on the relationship of SSP and SCP. More precisely, the firms that apply SSP tend more to follow differentiation strategy for their production and get a higher SCP.

We also found that while analyzing demographic characteristics that company's characteristics like company's age and size have significant and positive influence on SCP while have an insignificant influence on SSP. This explains as well the high level of SCP found in our data since our sample companies are of big size. Other studies can tackle the small and medium companies for different range of results.

Next, our study gives the insight of the importance of the adoption of SSP in supply chain not only for the sake of social image of companies or the compliance with laws and regulations, but also for the sake of the improvement of SCP in terms of POM, OFR and C2C. Practitioners in emerging economies can give more attention to issues underlying social sustainability like health and safety, education, human rights, labor conditions, diversity and ethics and invest in these issues in order to build sustainable supply chains.

In addition to these contributions, our research has other drawbacks to be acknowledged. As the social sustainability dimensions found in our study relate more to emerging economies like Morocco, future studies that tackle other emerging countries may open up new research perspectives. As SCP has different measurement metrics and we could tackle only three of them which were considered the most important by our decision makers, other studies can use other indicators to measure the performance of supply chain while studying relations between SSP and SCP. We suggest that future researches focus on small and medium enterprises for the sake of exploration of new social sustainability dimensions and their adoption impact on supply chain level.

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