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MODERATION EFFECT OF STRATEGIC INFORMATION SYSTEM DEVELOPMENT ON THE RELATIONSHIP SOCIAL SUSTAINABILITY IN THE SUPPLY CHAIN AND FIRM PERFORMANCE

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A B S T R A C T

This paper aims to explore the determinants of social sustainability in the supply chain (SSSC) of the company and examine the role of strategic information systems development as moderating variables in the relationship of SSSC and firm performance. The research setting used a sample of 106 SMEs of natural color batik of "Batik Tulis" in Bantul Regency. Testing the hypothesis in this study using hierarchical regression analysis techniques. The results of the study proved that determinant variables such as environmental uncertainty, regulation of environmentally friendly proved to have a significant effect on SSSC, while interdependency determinant variables consisting of three dimensions namely interdependency task, interdependency goal and interdependency reward identified that the three dimensions had no significant effect on SSSC. While the influence of SSSC on firm performance proved to have a significant effect, also the ability of the strategic information system development variable to prove significant was able to strengthen SSSC's influence on firm performance. The results of the study provide empirical evidence about the concept of social sustainability in supply chain (SSSC) in order to develop a new theory of Sustainability Supply Chain Management.

1. INTRODUCTION

The Globalization leads to a fierce business competition. The rapid development of information technology results in a fast-paced, less predictable changes of market needs. Such changes inevitably require companies to provide immediate response. The responding capability is impossible to conduct by the companies alone as it requires responses and support from parties associated with the company business. Chan et al (2016) defined business relational connection in supply chain as a concept of social sustainability in supply chain that

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reflects the relational capability in the event of establishing business solutions collectively. The development of business network at the upstream and downstream levels is considered a critical factor for companies to deliver a more superior performance (Mani et al, 2017; Ambrose et al., 2010; Ferrer et al., 2010; Ferguson et al., 2005).

The sustainability of cooperation network development is influenced by numerous factors. Some of external factors, such as environmental uncertainty (Govindan, 2017 and Mani et al, 2017), the government regulations, and the interdependency between the stakeholders (Sambasivan et al., 2011) encourages companies to maintain the development of dynamic ability in managing the company's resources. The effectiveness of company resources management is closely connected with the assistance of the external parties, among others are government as well as product suppliers and distribution agents.

Eco-friendly production is another critical concern to consider by companies, including Small and Medium Enterprises (SME) engaging in natural-colored hand-drawn batik with international market orientation. The Indonesia government enforces several regulations on product standardizations and certifications in order to ensure product quality. Specifically, for hand-drawn batik in Indonesia, quality certification is imperative. The requirement of "Batikmart" certification promotes quality consistency with regard to the particular aspects of non-fading color, non-shrinking shape, and non-polluting waste management.

The influence of interdependency to the sustainability of cooperation between companies and their partners has been largely examined by previous researchers. The correlation between business relational connection, or introduced in this study as social sustainability in supply chain, and firm performance was observed by Chan et al (2016). The findings suggest that high interdependency reflects high business attachment, promoting sustainable cooperation network between them. However, the strategic information system, being the concrete evidence of data and information integrated management, as a moderating variable appears as a novelty aspect in this research. Companies with strategic information system development as an orientation view information as a strategic value that needs to be managed. In that way, they may develop the capability of giving immediate response to changes that take place in every entity within a supply chain. From the data, Indonesia's e-readiness index, network e-readiness index, and human development index are relatively low compared to several other ASEAN countries (Mindcomonline, 2015). This condition inspires the Indonesia government to design industrial reinforcement programs on the basis of local economy.

The study and empowerment of SME is set as a top priority of Indonesian economy development program, both in micro and macro sectors. In connection to this, the study of business sustainability through the capability of cooperation network development for SME is highly relevant. This research considerably underlines the testing of social sustainability concept within the supply chain, which is considered as a critical and strategic resource that may influence the sustainability of company business. The mechanism of relational capability management in supply chain is indivisible from the study of technology and information system developments that will promote the effectiveness of relational management process within the supply chain. Therefore, three objectives are proposed for this research, i.e. (1) to analyze the influence of antecedent factors in social sustainability; (2) to identify the influence of social sustainability in supply chain towards firm performance; (3) to test the role of strategic information system as a moderating variable in the correlation between social sustainability in supply chain and firm performance.

2. LITERATURE REVIEW

2.1 Institutional Theory

Institutional theory highlights the significance of the environment and how the pressure of environmental factors of an organization promotes the adaptive organizational practices (Klassen and Vereecke, 2012). Previous researches have observed how firm performance is influenced by environmental factors, namely culture, business environment, interdependency, government regulations, history, and tradition (Ball & Craig, 2010; Klassen & Vereecke, 2012; Govindan, 2017). Several researchers explicitly analyzed the external factors of an organization, comprising social, economy, and political factors, that influence organizational practices (Govindan, 2017) in making decision and determining strategic option. The researchers pointed out further on the context of dynamic changes in business environment as a consequence of technological advancement, shifting social values, and changes in business regulation that need to be put into consideration in managing the coordination between the companies and suppliers. Such measure is necessary since environmental factors of business will eventually affect company strategy, process, and structure.

However, there are a few researches associating external organizational factors with social sustainability in supply chain. Govindan (2017) identified environmental and social relation factors with the suppliers, whereas Mani et al (2017) analyzed the antecedents of business environment and politics. With a view to express different standpoint, this research accentuates more on the organizational environmental determinants or factors that influence the capability of companies in managing social sustainability in supply chain. Those factors include the uncertainty of business environment,

specifically in the industry of natural-colored batik, Indonesian government's regulations mandating the importance of eco-friendly batik, and interdependency between companies around the supply chain of natural-colored hand-drawn batik products.

2.2 Dynamic Capabilities Theory

Any companies striving for improvement need to have strategic capability of managing their strategic resources deemed valuable for their competitiveness. In its course, researches on sustainability of supply chain management view social sustainability in supply chain as a strategic resource that requires effective management to develop firm performance. Dynamic capabilities theory reveals the possible means companies may carry out to build competitiveness and increase firm performance within the context of dynamic and volatile market change (Beske, 2012). Therefore, to respond to dynamic market change, companies are required to integrate their business with the corresponding associates for the reconfiguration of their internal and external competencies.

Teece (2007) believed that dynamic capabilities theory emerges from the development of resource-based view (RBV) theory. By RBV theory, Barney (1991) signified the importance of resources characterized as rare, valuable, and hard to imitate by competitors. For such rationale, companies need to promote sustainable competitiveness. Nevertheless, in the recent business context, the dynamic environment is unstable. In other words, the current competitiveness of a company may be of little worth in the future. Therefore, business competitiveness and routines need to be built up over time. The ultimate objective of dynamic ability is to generate long-term competitive advantage (Teece, 2007). The business environment of batik industry tends to be dynamic due to rapid market evolution, specifically with regard to design and technology innovations that may construct social changes.

2.3 Supply Chain Sustainability

Business sustainability serves as the long-term business objective that must be attained through the capability of responding to the existing business context changes. This capability requires support from business entities within supply chain. The sustainability of supply chain turns to be a critical issue and a new empirical concept in business sustainability (Mani et al, 2017). Supply chain sustainability is described as a managerial endeavor of material, capital, and information between companies and every entity within supply chain, i.e. all elements directly and indirectly involved in the business process from upstream to downstream (Hoejmose, Brammer and Millington, 2013). Among other researchers, Govindan (2017) and Mani et al (2017) suggested that sustainability in supply chain is interchangeable with corporate social responsibility (CSR). Chan et al (2016) expressed that

social sustainability is the elaboration of CSR's empirical concept. In the study of organizational behavior, social sustainability indicates company's social responsibility towards purchase decisions. A number of past researchers have examined other designations (knowned conative concept) for social sustainability in supply chain, namely PSR/Project Social Responsibility (proposed by Carter and Jennings, 2004), LSR/Logistics Social Responsibility (Murphy and Poist, 2002), and CSR/Corporate Social Responsibility (Hutchins and Sutherland, 2008).

2.4 Determinants of Social Sustainability in Supply Chain

Govindan (2017) mentioned that social sustainability in the supply chain as a backbone in addition to environmental and economic factors. He found an increase of publication in researches analyzing sustainability supply chain management issued within the period of 1996 to 2013. It implies that most researchers in the past had a strong motivation in studying supply chain management sustainability. Looking further back, the theoretical concept of sustainability in supply chain management was initially proposed by Carter and Roger (2008). Sustainability Supply Chain Management is defined as a strategy of collaboration between companies and business entities within supply chain for environmental, economic, and social managements in order to improve the supply chain in a long term, not only by the performance of a company in an individual sense but also that of all relevant entities (Carter and Roger, 2008; Govindan, 2017).

2.4.1 The Correlation of Environmental Uncertainty and SSSC

Environmental uncertainty refers to changes and uncertainty of customers' demand and needs (Chen and Paulraj, 2004). Whereas Flynn et al. (2010) defined market uncertainty as a variative condition of demand on higher product quality with a more speedy and reliable delivery. Dealing with market uncertainty requires a more accurate reporting on real demand, otherwise it may lead to a more variative supplies at the upstream level. The variation of stock availability in every company will incline towards the ineffectiveness of product supply process. Flynn et al (2010) found out that product unavailability will cause delay in immediate response to demand.

A more dynamic market change has inspired companies to constantly improve their dynamic capability development. The concept of dynamic capability was firstly introduced by Teece, Pisano and Shuen (1997), and according to Beske, Land and Seuring (2014), it is a derivative concept from RBV theory. As Beske, et al (2014) conveyed, dynamic capability is a set of capabilities that can only be carried out by companies in harmony with learning process and business experience

they undergo. Govindan (2017) also signified the requirement of dynamic capability development in line with the current market change to establish social sustainability in supply chain in a highly competitive food industry. In light of those arguments, the following hypothesis is proposed:

H1: When the business environment is getting unpredictable, the social sustainability in supply chain is higher.

2.4.2 The correlation between the regulation on eco-friendly batik product and SSSC

The increase of productivity in numerous industrial sectors frequently causes negative impact towards environment quality (Chen and Paulruj, 2004), due to over exploration and over exploitation of natural resources (Tan and Lau, 2010). There is a high demand on green or eco-friendly products. It applies as well in hand-drawn batik industry where the manufacturer of which tend to prefer chemical and synthetic dyes that is mostly known for its highly negative environmental impact. Government's policy as a respond to such demand shifts the mindset of SME to operate green manufacturing, and natural coloring is an ideal solution owing to its nearly zero environmental risk. The use of natural dye sourcing from leaves, stems, and flowers leaves no hazardous waste as artificial coloring agents do. The orientation of environment-aware production will create competitiveness and promote the development of relational capital by companies (Vachon & Klassen, 2006; Chen and Chang, 2013). Environmental concerns in the last decade compels the enforcement of regulation on environmental protection and consumer environmentalism to deal with serious pollution resulting from industrial activities. Based on that argument, the next hypothesis is proposed as follows:

H2: The regulation on the certification of "Batikmark" for eco-friendly products has a positive and significant influence towards social sustainability in supply chain.

2.4.3 The Correlation between Interdependency and SSSC

The interdependency between entities in supply chain is critical, yet a compelling issue as a research subject of several studies discussing the relational connection within supply chain. Such interdependency reflects the confidence shared by each party in the supply chain with regard to their network of cooperation. Sambasivan et al (2011) identified three constructs that frame interdependency, namely (1) task interdependency, (2) goal interdependency, and (3) reward interdependency. They defined task interdependency as a means of every member in a group to exchange information from one to another, which is interpreted as a primary task of all members to create cooperation sustainability. Goal

interdependency, as the achievement of each cooperating individual's performance, is strongly influenced by supports from and roles of others. Reward interdependency is the balanced distribution of cooperation outcome. Alternatively stated, equal benefit received by the individuals will promote future cooperation potential. Referred to by Sambasivan et al (2011) as mutual interdependency, such concept portrays the actualization of cooperation sustainability through mutual commitment, trust, and effective communication. Thus, the third hypothesis of this research is formulated as follows:

H3a; b and c: High interdependency between companies or business entities in supply chain (as demonstrated by task interdependency, goal interdependency, and reward interdependency) will create higher social sustainability in supply chain.

2.5 The Correlation between SSSC and Supply Chain Performance

Social sustainability in supply chain indicates the nurture of relation between business entities within supply chain (Chan et al., 2016). The literal meaning of cooperation sustainability is revealed to motivate the entities in fostering business relation based on mutual benefit and support. The emergence of relational sustainability is indicated by a dependency of needs. Manufacturers requires raw materials in a satisfying quality whereas distributors or marketers takes the role of delivering products to the end-consumers. Every player is entailed to create a chain of value that will bring benefit for each of them or the relevant party. Social sustainability in supply chain is commonly discussed in marketing studies, among others is relational capability between companies and customers, as conducted by Chu and Wang (2012), that measure such theme through several quality indicators, i.e. relational connection, trust, commitment, adaptability, motivation to share information and fair cooperation (Maignan et al, 2002; Welford & Frost, 2006; Branco and Rodrigues, 2008). Similarly, Chan et al (2016) identified the specific characteristics of social sustainability in supply chain, namely trust, commitment on data and information sharing, mutual cooperation, commitment on relational connection, and adaptability among relevant parties. If relational connection is developed based on those factors, firm performance will improve.

Firm performance represents how an organization effectively manages its business. Chan et al (2016) views performance as a basic measure for an organization to evaluate its achievement. It will illustrate the farthest point a company may survive in a competitive market. Studies on economy and business commonly employ firm performance as an outcome construct to be examined (Rumelt, Schendel and Teece, 1994), as well as the final result to be actualized from several business models proposed by the researchers (Sambasivan et al,

2011). In this research, firm performance operates as an outcome produced by companies after promoting the capability of SSSC management that comprises the following 3 dimensions: (1) relational connection; (2) operational accomplishment; (3) revenue growth (Rai et al, 2006; Chan et al, 2016). With the reference to the conceptual correlation between social sustainability in supply chain and performance as specified by Chan et al (2016), relational sustainability will open up rich opportunities for companies to provide business solutions for a better performance. Therefore, the hypothesis proposed in regard to this matter is as follows:

H4: High social sustainability in supply chain will lead to high firm performance.

2.6 The Role of Strategic Information System Development

The development of strategic information system is perceived as a tactical measure in a reconfiguration of business and cooperation processes to respond to customer requirement. As articulated by Han, Wang and Naim (2017), strategic information system reflects the capability of a company to actively invest in communication technology improvement, either internally or externally within supply chain. The primary objective of strategic information system development is to improve the achievement of value chain in the course of supply chain based on dynamic idea resources due to

adjacent relational connection within supply chain (Bagchi et al., 2005; Bhattacharya, 2017). Such development will amplify firm performance owing to the simplicity found in the reconfiguration of resources between entities inside supply chain. By this way, social sustainability will yield performance, furthermore when information and data sharing is involved. In reference to that conceptual correlation, the hypothesis on the role of strategic information system as a moderating variable is proposed as follows

H5: The development of strategic information system will create a stronger relation between social sustainability in supply chain and firm performance.

2.7 Theoretical framework and research model

This research aims to inspire the evaluation of firm performance and the exploration of SSSC's antecedent factors and the role of strategic information system as a moderating variable. Several previous researchers, such as Bagchi et al (2005), Han et al (2017), and Bhattacharya (2017), emphasized the benefit of information system development in promoting the communication between companies and their business partners. By referring to some empirical concepts proposed by past researchers (Govindan, 2017; Mani et al, 2017), the conceptual framework of this research's empirical model can be mapped out.
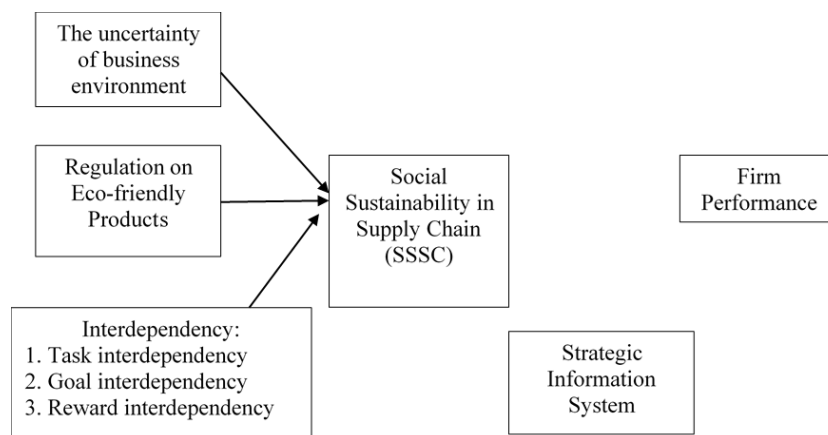

Figure 1. Theoretical framework

3. METHODOLOGY

3.1. Population, sample, and sampling

The population of this research consists of all SMEs engaging in natural-colored hand-drawn batik around three batik villages in Bantul Regency, namely Triharjo, Trimulyo, and Wukirsari. The sample taken is the SMEs participating actively in a crafts person's association of Batik community and promoting empowerment of their employees in running the business. The ground of the sampling emphasizes on the selection of respondents

having better comprehensions of information system management and corporate cooperation. From 322 SMEs of the community members, 184 of which satisfy the defined criteria of the sample target. There were 106 usable returned questionnaires, which makes a questionnaire return rate of 57%.

3.2. Data Collection Method

The data were collected gradually. There was a pre-test phase conducted to develop research instrument through (1) review on relevant past researches, (2) discussion

with professional academics having papers on supply chain management published in reputable international journals, (3) confirmation of instrument design with practitioners via Focused-Group Discussion with 30 owners of SME penetrating export market. The confirmation is deemed necessary since the participants have an understanding about information system management and development of cooperation with various entities in their supply chain.

This study applied firm analysis unit with multiple data source, taking a number of target respondents that represent the observed companies. Multiple data source is required to minimize the impact of participant bias (Rogelberg and Stanton, 2009).

3.3. Operational Definition of Variables

The independent variables of this research is the antecedents of social sustainability in supply chain consisting of Environmental uncertainty (X1), regulations on green product (X2), and interdependency (testing on 3 dimensions, i.e. task interdependency (X3a), goal interdependency (X3b), and reward interdependency (X3c)). In testing those antecedents, the SSSC operates as the dependent variable. The next step was testing the influence of SSSC towards firm performance. In this phase, SSSC takes part as the independent variable, and firm performance the dependent variable. Here, strategic information system performs as the moderating variable. Table 1 elaborates further details on operational definition of research variables complete with indicators and sources of instrument development.

Table 1. Research Instrument Development

Variable	Operational Definition of Variable	Indicator	Source
Unpredictable environment	Constant changes of market, either in quality or product variation demands.	4 indicators	Beske *et al* (2014)
Regulation on green products	Regulation that obliges green production.	3 indicators	Chen *et al* (2011) Tan and Lau (2010)
Interdependency	A business attachment due to the interdependency between connected parties in supply chain in terms of obligations, objectives, and reciprocity of mutual benefit.		Sambasivan *et al* (2011)
	Dimension of Task Interdependency	4 indicators	
	Dimension of Goal Interdependency	3 indicators	
	Dimension of Reward Interdependency	2 indicators	
SSSC	A social relation between business entities within supply chain based on mutual benefit and support.	4 indicators	Chan *et al* (2016)
Performance	The outcome gained by companies from the application of sustainable social relation development.	5 indicators	Rai *et al* (2016) Chan *et al* (2016)
Strategic Information System	The development of information technology to support business communication among entities in supply chain.	5 indicators	Bagchi *et al* (2005) Bhattacharya (2017)

3.4. Data Analysis Technique

As an initial step, simple regression technique was applied to test the influence of environment uncertainty and government regulation antecedents towards SSSC. Subsequently, multiple regression was exercised to test the influence of the 3 dimensions of interdependency towards SSSC. Next, hierarchical regression technique was applied to test the role of strategic information system as the moderating variable.

4. FINDINGS AND DISCUSSION

4.1 Data Quality

To assure the constructs are truly represented by their indicators, validation test was conducted to acknowledge the capability of indicators in describing the constructs to be measured. Exploratory factor analysis was carried out considering that this is the first-ever test to be conducted

to the instruments. The statement item components were extracted by the method of principle component analysis independently based on the eigenvalues-greater-than-one rule, and the varimax rotation method was performed with the minimum factor loading value of 0.5 (Hair et al., 2005). Table 2 presents the result of the validity test. Two indicators appear to be invalid as their factor loading values are less than 0.5, i.e. task interdependency 3 and strategic information system 2, therefore excluded for further analysis.

The reliability test was conducted with Cronbach's Alpha. A variable or construct is assumed reliable if having a Cronbach's Alpha coefficient of 0.7 at the least, and between 0.6 and 0.7 to be eligible for exploratory research (Hair *et al*., 1998). Table 3 shows the result of reliability testing, with the smallest Cronbach's Alpha coefficient on strategic information system as a consequence of the research setting that covers SMEs with relatively low information system development.

Table 2. Validity Test Result

Item Code	Unpredictability	Regulation	Interdependency			SCSS	SIS	Perf.
			Task	Goal	Reward			
U1	0.833							
U2	0.884							
U3	0.865							
U4	0.777							
R1		0.741						
R2		0.797						
R3		0.842						
T1			0.727					
T2			0.746					
T4			0.734					
G1				0.684				
G2				0.844				
G3				0.855				
R1					0.692			
R2					0.762			
SCSS1						0.623		
SCSS2						0.634		
SCSS3						0.754		
SCSS4						0.777		
SIS1							0.631	
SIS3							0.624	
SIS4							0.598	
SIS5							0.642	
P1								0.635
P2								0.818
P3								0.746
P4								0.823
P5								0.792

Table 3. Result of Reliability Testing of Variables

Research Variables	Items Proposed	Valid Items	*Cronbach's Alpha*
Environment unpredictability	4	4	0.922
Regulation	3	3	0.856
Task Interdependency	4	3	0.742
Goal Interdependency	3	3	0.792
Reward Interdependency	2	2	0.708
Social Sustainability in Supply Chain	4	4	0.789
Strategic Information System	5	4	0.607
Firm Performance	5	5	0.803

4.2 Hypothesis Testing

The hypotheses were tested using hierarchical regression analysis to first acknowledge the direct effect of the antecedent variables. The further step tested the direct effect of SSSC toward firm performance, followed by testing the role of strategic information system in creating a stronger relation between SSSC and firm performance. Table 4 outlines the hypothesis testing result.

Table 4. Hypothesis testing result

Hypothesis	Direct Effect Model		Moderating Effect Model	
	Beta standardized	t value	Beta standardized	t value
H1: Environment unpred. => SS in SC	0.407	5.305**		
H2: Regulation => SS in SC	0.299	3.932**		
H3 (a, b, c) Task Interdep. => SS in SC	0.024	0.322		
Goal Interdep. => SS in SC	0.133	1.557		
Reward Interdep. => SS in SC	0.041	0.495		
H4 SS in SC => Perf.	0.224	2.811**		
F test *R square* *Adj R square*	11.957** 0.322 0.295			
H5 SS in SC => Perf. SS in SC * SIS => Perf.			0.257	3.025**
F test *R square* *Adj R square*			12.019** 0.404 0.371	

One-tailed test; ** p<0,05; *p<0,01

4.3 Discussion

This research confirms that the uncertainty of business environment as the determinant variable of SSSC has a significant influence. Such idea corroborates the argument put forward by Beske *et al* (2014) expressing how a competitive market promotes companies to establish a more dynamic supply chain management. In such event, companies may give a faster response to market changes. The fashion industry with diversely various products and high demand of quality as the setting of this study encourages effective communication between companies and their business partners. The regulation on green products, as the requirement of "Batikmark" certification for natural-colored hand-drawn batik, also significantly influences SSSC. These empirical evidences indicated the manufacturers' high awareness of the green products demand. This result is contradictory with Chan *et al* (2016) finding about the empirical proof of manufacturing failure in managing the environmental impact of the production. As a conclusion, the enforcement of regulation on "Batikmark" certification to the natural-colored hand-drawn batik in Bantul Regency is considered effective. As the third empirical evidence, the three dimensions of interdependency towards SSSC is confirmed not influential. This reflects the poor business communication of the SMEs. From the field observation, this occurs due to the mechanism of short-term cooperation practice by the SMEs to the suppliers. As the influence of SSSC is significant towards firm performance, the information system development amplifies such impact.

5. CONTRIBUTION OF THE STUDY

This study is expected to contribute managerial implication for the practitioners, specifically for the micro-enterprises in hand-drawn batik industry. Furthermore, it is also intended to provide insight for the government to initiate trainings on cooperation network development at upstream and downstream levels. In addition to practical implication, this study is projected to make contribution to the theory development.

5.1 Practical contribution

To improve performance, companies are expected to be capable of developing business cooperation network at upstream-downstream levels based on reliable information, integrated information system that promotes mutual trust, immediate adaptability towards changes undergone by other entities within the supply chain, and fair cooperation. Government support through conducive policy, specifically for the growth of hand-drawn batik industry, is expected to actively facilitate business gathering, circulation of green production standards information, and technical training about the procedure to earn "Batikmark" certification as a requirement for natural-colored hand-drawn batik export document.

5.2 Theoretical Contribution

The empirical evidences on the influence of SSSC towards firm performance and the role of strategic information system as a moderation variable are projected to strengthen the theoretical basis of supply chain management sustainability. The business relational connection within supply chain may be identified as a

strategic and critical resource in order to promote business sustainability, mainly in fashion industry.

6. RECOMMENDATION FOR FURTHER STUDY

This research focuses on the members of Communities in three batik villages located in Bantul Regency. Whereas, there are plenty more of non-member SMEs with export market penetration. For future research, it is suggested to enlarge the sample and scope of research, keeping in mind that different sociological state may present different description of the relational sustainability management capacity within supply chain. By conducting comparison test, it will construct a picture on the role of information system and SSSC towards firm performance in a more comprehensive manner, and also lay out a contextual meaning of industrial development for each region in a more detailed narrative.

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