

A Nexus Between Green Intellectual Capital, Supply Chain Integration, Digital Supply Chain, Supply Chain Agility, and Business Performance

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Abstract:

Purpose: This study aims to examine and analyze the nexus between Green Intellectual Capital (GIC), Supply Chain Integration (SCI), Digital Supply Chain (DSC), Supply Chain Agility (SCA) dan Business Performance (BP). It also aims to examine and analyze the mediating influence of several variables: (a) the mediating role of SCI on the relationship between GIC and BP, (b) the mediating role of DSC on the relationship between GIC and BP dan (c) the mediating role of SCA on the relationship between GIC and BP.

Design/methodology/approach: Quantitative approach is carried out using a survey to the owners or managers, and owners and managers of courier service SMEs in two provinces, namely East Java and Daerah Istimewa Yogyakarta (DIY). These two provinces are known to have a courier service SMEs in a large amount because of its population density and large business transaction. The number of respondents analyzed are 183 SMEs. This study uses purposive sampling with certain criteria. The approach of the model is using Structural Equation Modelling with AMOS 23.

Findings/major contribution: This study provides the main contribution that green intellectual capital has a positive influence on supply chain integration, digital supply chain, and supply chain agility. It also found that supply chain integration and digital supply chain has an influence on business performance, while supply chain agility does not have a significant positive influence on business performance. Finally, regarding the mediation analysis, this study confirms that supply chain integration, digital supply chain, and supply chain agility each mediates the influence of green intellectual capital on business performance.

Research limitations/implications: Selecting respondents using purposive sampling is feared to not be able to generalize the population in the two provinces, namely East Java and DIY. The study also uses a self-administered survey, especially on assessing business performance, thus it is feared that there might be a bias, although it has been compared to similar competitor SMEs. Courier service SMEs also have limitation in implementing digital SC, thus they do not quite understand the questionnaire asked even though the researcher has provided assistance during the research.

Managerial implication: Companies need to improve GIC and DSC through various strategies and policies such as training, workshop, and other intellectual development routinely and intensively. It can be done by cooperating with other parties such as universities and the government. This step should be taken in order to achieve harmony in all activities of supply chain management (SCM). Companies should also carry out an effective and efficient learning process for companies to move more agile and dynamic, therefore BP can increase sustainably and not static.

Theoretical implication: This study provides a theoretical contribution, especially on the nexus between GIC, SCI, DSC, SCA, and BP. DSC becomes a very interesting strategic aspect when it is implemented to the current era, where all of the business process cannot be separated from digital-based technology.

Originality/value: Studies in Asia, moreover in Indonesia, which integrates GIC and associate it with business performance mediated by SCI, DSC, and SCA is still rare. In this era, there is a need of an increase of digital competition in all human resources of courier service SMEs in Indonesia, especially when the SMEs have not had a good SCM system. Digital supply chain requires GIC, and they must be fast and agile to adapt to technology and environmental turbulence.

Keywords: Green Intellectual Capital (GIC), Supply Chain Integration (SCI), Digital Supply Chain (DSC), Supply Chain Agility (SCA), Business Performance (BP)

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1. Introduction

The impact of the Covid pandemic has changed people's patterns and lifestyles. In the new normal era, people are required to work at home and do a lot of transactions online to avoid the further spread of the Covid 19 virus. This condition has caused online shopping transactions increase rapidly. The courier industry has experienced a very drastic increase. Various kinds of delivery service innovations are offered in various ways. The trend of increasing transactions has actually occurred since the beginning of the pandemic, which occurred when people began to panic with the outbreak of the Covid 19 virus. Increase of global economic and business growth has an impact on supply chain management which increasingly requires serious handling since global transportation & logistics companies dominate the delivery of goods by sea, land, and air. As a result, courier companies in Indonesia must move quickly and agilely to seize this opportunity.

Besides the innovative products and derivatives, companies must provide excellent service, especially in terms of speed of delivery time and on time. People are increasingly selective in choosing business transactions with courier services. In the future, the one-day delivery system or same-day delivery will be more attractive to the public during the pandemic (Fitri, 2020). Likewise, people are increasingly demanding the delivery of goods and services in order to have a level of security, cleanliness, hygiene and also a safe and environmental friendly products. Thus, companies must improve systems and work practices that are pro-environment (Arqawi, Zaid, Jaaron, Al-hila, Al-Shobaki & Abu-Naser, 2019; Albort-Morant, Leal-Millán & Cepeda-Carrión, 2016; Muafi & Uyun, 2021; Sandoval, Torres-Guevara, Ormazabal & Jaca, 2021). Companies need human resources who understand the implementation of greening in every business process activity (Pinzone, Guerci, Lettieri & Redman, 2016; Rohilla, 2017; Mandip, 2012; Jaboor & de Sousa-Jabbour, 2016; Jabbour & Santos, 2008; Jabbour, de Sousa-Jabbour, Govindan, Teixeira & Freitas, 2013; Jabour, 2013; Jabbour, Santos & Nagano, 2010). Supply chain mitigation is currently needed (Petersen & Lemke, 2015) because operational and service needs demand strict and constantly changing requirements from technology and service aspects (Willis, Genchev & Chen, 2016; Wiguna, Rachmawati, Rohman & Setyaning, 2021) although greening behavior from employees is still required.

The rarity of Green Intellectual Capital (GIC) studies which related to SCM in improving performance is being a trigger for this study to fill research gaps and being updated, especially when it is associated with courier service SME in the new normal era in Indonesia. The focus of this study is examine Green Intellectual Capital (GIC) in relation to business performance (Business Performance – BP) which requires the role of Supply Chain Integration (SCI), Digital Supply Chain (DSC), and Supply Chain Agility (SCA) in courier service SMEs in Indonesia. This model is at the same time being novelty for researchers and fill the research gap because;

1. Studies integrate GIC and business performance mediated by SCI, DSC, and SCA in Asia is still rare, especially in Indonesia (Muafi & Kusumawati, 2021; Martín-Rubio, 2021; Martín-Rubio, Tarquis & Andina, 2016; Creelman, 2010; Flynn, Huo & Zhao, 2010). The role of the GIC supply chain is needed in the SME business activities of courier services, especially in providing services to customers and other business transactions (Wisner, Tan & Leong, 2012; Olaore & Adebisi 2013).
2. The rarity of SMEs implementing the GIC model is associated with business performance with the support of SCI, DSC, and SCA mediation (Creelman, 2010) in the new normal era even though they have a high urgency in continuous BP improvement (Pirogova, Plotnikov, Makarov & Grafov, 2020).
3. In the new normal era, the need for SC integration requires very high cooperation and collaboration in the company's internal integration, supplier integration, and consumer integration (Huo, Ye, Zhao & Shou, 2016) in the courier service industry which is faced with intense competition which have an impact on cross-functional performance (Wong, Boon-itt & Wong, 2011, 2013; Flynn et al., 2010; Qin, 2019; Li, Ragu-Nathan, Ragu-Nathan & Rao, 2006; Giménez & Ventura, 2003).
4. In the new normal era, it requires to increase digital competence in all courier service human resources SME in Indonesia, especially when SMEs do not yet have a good supply chain management (SCM) system (Muafi, Siswanti, Diharto & Salsabil, 2020). DSC requires intellectual capital and must be able to quickly and agilely adapt to technology (Ageron, Bentahar & Gunasekaran, 2020; Ullah, Wang, Bashir, Khan, Riaz & Syed, 2021; Dubey, Gunasekaran & Papadopoulos, 2017). Besides, the discussion of DSC is mostly studied qualitatively and only a few have discussed it quantitatively (Saryatmo & Sukhotu, 2021).
5. In the current era, technology has become the SC keyword in courier service SMEs. Therefore, it requires the speed and agility of the supply chain process to be able to quickly and agilely adapt in the face of technological disruption, changes in market tastes, fulfills customer wants and needs, and improves competitiveness with rapidly changing products and services (Rasyidi & Kusumastuti, 2020; Ahammad, Glaister & Gomes, 2020; Shakil, Mollah, Rahman & Habib, 2020; Lau & Lee, 2000).
6. A major challenge for courier service SMEs in Indonesia is the high cost of digitalization investment (Soh & Markus, 1995; Cooper & Zmud, 1990; DeLone, & McLean, 2003). It requires the commitment of courier service SMEs in managing the digitalization of the SCM system, starting from upstream to downstream activities. When the company does not implement it, the customer would be left behind.
7. Adverse impacts in business digitization need to be considered and anticipated such as; (a) fraud, security transactions, false information (fictitious stores, inappropriate goods), transaction security, and personal data security, (b) business models based on cross-country and real time information transactions (Dwipayana, 2016) will require the implementation of HC supply chain in implementing the SC model that on target (Kumar, 2003).

2. Literature Review

2.1. Green Intellectual Capital (GIC) and Supply Chain Integration (SCI)

One of the important assets in the company is intellectual capital (IC). Several previous studies and business actors develop intellectual capital on environmental basis (Yong, Yusliza, Ramayah & Fawehinmi, 2019; Yusliza, Yong, Tanveer, Ramayah, Faezah & Muhammad, 2020). GIC includes three aspects, namely green human capital, green structural capital, and green relational capital (Yong et al., 2019; Chen, 2008). The potentials of GIC are believed to be able to create an integrated supply chain system (Shou, Hu & Xu, 2018; Huo et al., 2016; Jacobs, Yu & Chavez, 2016; Yusliza et al., 2020). Several previous studies have empirically proven that GIC has significant effect on SCI (Shou et al., 2018; Huo et al., 2016; Ataseven, Nair & Ferguson, 2018; Song, Shi & Song, 2019; Huo, Han, Chen & Zhao, 2015; Siriyanun, Mukem & Jermisittiparsert, 2019). Antaseven et al. (2018) and Wang and Huo (2018) emphasizes that human resources with intellectual capital must be utilized optimally in building SCI.

SCI is a supply chain process by integrating several aspects of the company such as company internal integration, supplier integration, and customer integration (Huo et al., 2016). Internal integration is needed so that all operating

functions within the company have responsibilities which later have an impact on cross-functional performance so they meet customer needs and desires in increasing customer satisfaction (Wong et al, 2011, 2013; Giménez & Ventura, 2003). Qin (2019), Flynn et al. (2010) and Li et al. (2006) suggest supplier integration is important. Companies need to establish and maintain long-term relationships as part of the company's strategy and increase long-term benefits. Flynn et al. (2010), using the contingency and configuration approach, find that SCI has close relationship with operational and business performance. Internal and customer integration is more strongly associated with improving performance than supplier integration. Likewise, customer integration is needed so that companies looking for potential market opportunities (Wong et al, 2011; 2013; Zhao, Huo, Flynn & Yeung, 2008). The company's GIC role is needed to integrate these three aspects. Optimizing the role of GIC in building an integrated supply chain system will greatly benefit the company because it is proven to be able to increase performance and competitive advantage of the company (Siriyanun et al., 2019; Wang & Huo, 2018; Chen, 2008). The results of this study are also supported by Chalal and Bakshi (2014) that the three components of Green IC have a significant effect on competitive advantage and BP. Companies will be able to increase efficiency in business processes and reduce waste at lower costs (Santoshraj, 2017; Ayuni & Muafi, 2020).

H1: GIC has positive effect on SCI

H2: GIC has positive effect on BP

2.2. Green Intellectual Capital (GIC) and Digital Supply Chain (DSC)

Digitalization is a new phenomenon that has entered into all life aspects, including the SME business. The literature in recent years has discussed a lot about digitalization in company management, from marketing, HRM, operations to SCM. A topic that is still hot and rarely discussed in the literature, especially in the Indonesian context is DSC. DSC is the development of information systems and technology adoption to strengthen supply chain integration and agility to improve customer service and sustainable organizational performance (Ageron et al., 2020; Huang & Kung, 2011). Several previous studies have stated that to form a DSC, IC is needed so that it is able to adapt to technological developments (Ullah et al., 2021; Ageron et al., 2020; Dubey et al., 2017; Lau & Lee, 2000). IC plays a very significant role in DSC implementation.

The study of industrial digital chains is a big green challenge in the 21st century. This is useful for understanding and managing green information flows. Knowledge of human, relational, and structural capital including technological aspects will help to better understand and manage the effects of traceability on sustainability (Martín-Rubio, 2021; Martín-Rubio et al., 2016). It is important since it is useful to reduce the distortion of information related to the supply chain (Lee, Padmanabhan & Whang, 1997). When GIC improves, HR would be more careful in measuring green intangible nature with smart sensors (Martín-Rubio, 2021; Martín-Rubio, et al., 2016; Lee, et al., 1997). There are several strategic components in IC that can be closely related to the digitalization component. When there is synchronization between elements, it would have an impact on digitizing interactions with customers, digitalization of value chain management, and digitalization which is useful for operational activities (Pirogova et al., 2020).

Ullah et al. (2021) state that GIC is able to have a greater positive impact on companies if it is supported by information technology capabilities. Developing intellectual capital requires quality human resources so that companies need to select human resources who have competencies related to technology and knowledge management to find and map valuable information for the company (Schniederjans, Curado, & Khalajhedayati, 2020). Therefore technology training for employees is very important (Haq, Gu & Huo, 2020). Schniederjans et al. (2020) emphasizes the importance of knowledge and information management in building quality human resources to improve DSC. Even Wei, Ke, Lado, Liu and Wei (2020) find that in 190 companies in China, DSC management could be improved through the role of top management in the company, namely the beliefs and participation of top management.

DSC can be developed if information technology is utilized in supply chain management and information can be well integrated within the company (Wei et al., 2020). Therefore, human resource management in order to be able to develop DSC must be based on the digitalization of human resource management and the digital disruption of human resource management (Strohmeier, 2020). On the other hand Dubey et al. (2017) emphasizes the importance

of environmental-based management in the supply chain and one of its forms is through DSC. Therefore, preparing HR with the best GIC is one of the best ways to build DSC because the company will face several challenges

H3. GIC has positive effect on DSC

2.3. Green Intellectual Capital (GIC) and Supply Chain Agility (SCA)

In the technology era which is developing so fast, issues related to the relationship between HR and the supply chain become very interesting to study more deeply. One of the most important HR aspects in developing supply chain is IC (Mubarik, Bontis, Mubarik & Mahmood, 2021). IC is a resource of knowledge and skills possessed by the company, especially in HR (Bontis, Ciambotti, Palazzi & Sgro, 2018). The human resources needed are not only educated, but also talented and keep up with technological developments (Shakil et al., 2020; Hohenstein, Feisel & Hartmann, 2014). Talented technology and human resources are needed to build a reliable supply chain that is able to survive in the disruptive era known as SCA (Ahammad et al., 2020). These conditions require companies to prepare human resources management who have high competence, talent, and skills.

IC has a vital role in increasing company agility (Ahammad et al., 2020; Mubarik et al., 2021). One form of IC that fits the business climate in this era is GIC (Yong et al., 2019). Technological developments and business conditions entering the disruptive era require companies to be more agile in keeping pace with the market and outperform competitors. One aspect that must be managed properly so that it has agility is the supply chain (Rasyidi & Kusumastuti, 2020; Ahammad et al., 2020; Shakil et al. 2020). Some previous literature states that increasing SCA can be done with good IC management (Mubarik et al., 2021; Ahammad et al., 2020; Rasyidi & Kusumastuti, 2020). Good HR management should focus on the skills and capabilities needed by the company (Ahammad et al., 2020).

On the other hand, increasing SCA through GIC can be developed if the company has a flexible resource component. One of the important components that must have high flexibility are employees (Rasyidi & Kusumastuti, 2020). Employees are required to be able to face various challenges both internal and external and are required to adapt in various conditions. This ability will foster agility (Rasyidi & Kusumastuti, 2020). Abdallah and Ayoub (2020) find that increasing the ability of human resources in a company, especially technological aspect, is proven able to improve SCA. Chen (2019) and Shakil et al. (2020) also recommend that the integration of information technology and trust can improve a company's SCA. This finding is supported by Haq et al. (2020) that IC development to improve SCA can be done with intensive training for HR.

H4. GIC has positive effect on SCA

2.4. Supply Chain Integration (SCI) and Business Performance (BP)

SCI is concerned with strategic collaboration and management between organizations and within organizations in supply chain (Hendijani & Saei, 2020). SCI can also be considered as an approach to integrate information between suppliers, manufacturers, distributors, and customers (Tian, Otchere, Coffie, Mensah & Baku, 2021; Hendijani & Saei, 2020). In general, SCI can be grouped into two things, namely internal integration and external integration (Li, 2015). Several previous studies have found that implementing SCI can improve company performance (Hendijani & Saei, 2020; Wei, Yin & Chen, 2021; Zhou, Xia, Feng, Jiang & He, 2020; Tian et al., 2021; Wiengarten, Li, Singh & Fynes, 2019; Chen, Liu, Wei & Gu, 2018).

Companies with efficient internal integration can create a conducive environment to support supply chain integration to improve organizational performance because organizational structure and culture can serve as a strong foundation for forming SCI (Tian et al., 2021). Wiengarten et al. (2019) reveal that the more integrated the supply chain in a company, the better its performance. Sundram, Chhetri & Bahrin (2020) emphasize that integrated supply chain, information and technology are able to have a positive and significant impact on supply chain performance and company performance.

Hendijani and Saei (2020) analyze the relationship between SCI and BP. The results conclude that there is a direct significant relationship between SCI and BP. This relationship also appears to be moderated by demand uncertainty so that BP also increases. In another finding, Wei et al. (2021) divide SCI into internal integration and external integration. He finds that both internal and external integration are able to influence BP. Zhou et al. (2020) and

Zhang, Pan, Jiang & Feng (2020) also added that environmental orientation also has a significant effect on BP. Likewise, the findings confirm that the management of environmental orientation in SCI or green SCI is able to increase BP.

H5. SCI has positive effect on BP

2.5. Digital Supply Chain and Business Performance

Digitalization changes the way organizations function and has the opportunity to increase competitiveness and capture new market share. Digitization creates superior benefits for companies and has received a lot of attention from companies around the world (Attaran, 2020; Wong, Leong, Hew, Tan & Ooi, 2020). The development of digital technology requires companies to implement digitalization in various aspects, such as supply chain management/SCM (Attaran, 2020). The application of digitization in the supply chain is known as DSC. DSC is the utilization of digital technology for planning and executing supply chain functions and creating new business models (Zhang & Sakurai, 2020; Farahani, Meier & Wilke, 2017).

Büyüközkan and Göçer (2018) and Zhang and Sakurai (2020) state that DSC is a technology system based on excellent collaboration and communication capabilities for hardware, software, and digital networks. All of them are used to support and synchronize interactions between organizations by making services more valuable, accessible, and affordable in a way that is consistent, agile and effective results. Saryatmo and Sukhotu (2021), Nasiri, Ukko, Saunila and Rantala (2020) Adam, Ibrahim, Ikramuddin and Syahputra (2020) and Wong et al. (2020) conclude that the application of DSC has positive effect on BP. Adam et al. (2020) analyze the application of DSC to SMEs and find that some SMEs provide a more valuable experience with the consumers and it increases customer satisfaction and loyalty and make BP better. Kamble, Gunasekaran & Gawankar (2020) analyze DSC in the agricultural business and it is proven that the application of DSC is able to increase BP.

H6. DSC has positive effect on BP.

2.6. Supply Chain Agility (SCA) and Business Performance (BP)

SCA has received a lot of attention in recent years both in literature review and in managerial implementation (Al Humdan, Shi & Behnia, 2020) especially during the Covid 19 pandemic. SCA is the ability to be agile in the supply chain process. Companies that are able to implement SCA will be more adaptable and flexible to change (Benzidia & Makaoui, 2020; Fayezi, Zutshi & O'Loughlin, 2017). Agility in SCM means the ability to manage suppliers, internal companies and consumers well and quickly (Chen, 2019; Dubey, Altay, Gunasekaran, Blome, Papadopoulos & Childe, 2018). In today's disruptive era, agility in all aspects (Claudio, Cosgriff, Nino & Valladares, 2021), including supply chain, is important so that companies are able to survive in the midst of intense competition.

Several findings have been empirically proven to conclude that SCA have a positive effect on BP (Al Humdan et al., 2020; Benzidia & Makaoui, 2020). Chan, Ngai and Moon (2017) reveal that the application of SCA and strategic flexibility is able to have a positive impact on BP. SCA is also empirically proven to be able to mediate the relationship between strategic flexibility and BP. Therefore, agility and flexibility are components that support each other in an effort to improve company performance. Good performance always requires agility (Yusuf, Menhat, Abubakar & Ogbuke, 2020). BP covers several aspects that develop simultaneously such as finance, business, and employee performance. Achieving these goals requires agility in carrying out various aspects of the company, including the supply chain (Benzidia & Makaoui, 2020). Alzoubi and Yanamandra (2020) explained that SCA can be studied in three aspects; alertness, decisiveness, and flexibility. These three aspects were also empirically proven to be able to increase BP.

H7. SCA has positive effect on BP

H8. SCI mediates GIC on BP

H9. DSC mediates GIC on BP

H10. SCA mediates GIC on BP

3. Methodology

This study uses a survey type by optimizing the data based on the distribution of questionnaires and interviews with several respondents. It is conducted in two provinces in Indonesia, namely East Java and Special Region of Yogyakarta. East Java has the second largest population in all of Indonesia and has a very diverse industry. Meanwhile, Special Region of Yogyakarta is known as an education city with a relatively large number of students. The courier industry is growing rapidly in the two provinces, especially in the Covid 19 pandemic era. These two provinces are also known as provinces that have contributed greatly to the World Bank's Logistics Performance Index in the last three years where Indonesia is ranked 46th globally (Christian, 2019). Courier service SMEs in Indonesia are increasingly competing to change their business strategies to capture several market opportunities and one of them is by utilizing information technology (Azka, Puspa & Wibawa, 2020). The sampling technique uses non-random sampling purposively.

The courier SME criterias used has; (1) number of employees < 10 people to 100 people; (2) net income of at least 1.5 million; (3) < Rp 10 million to 1 billion assets; (4) been operating for at least 5 years. The target respondents are 200 courier service SMEs. The results of the data recapitulation turned out that the answered questionnaires are complete and can be processed are 183 courier SMEs. The Likert scale technique is used with a choice of a scale of 7 (Very strongly agree) to a score of 1 (Very strongly disagree) referring to Flynn, van Schaik and van Wersch (2004) on the variables GIC, SCI, DGC, and SCA. Specifically for the BP variable, it has a Likert scale option (1/very low to 7/very high) where respondents are asked to compare the BP they manage with similar competitor companies for the last 5 years.

This study uses a Structural Equation Modeling approach with the Amos 26 technique. The AMOS 23 analysis technique is conducted to test the hypothesis. The results of the validity and reliability testing are all fulfilled (Hair, Black, Babin & Anderson, 2010). Furthermore, Table 1 is used to clarify explanations related to the variables used, operational definitions, and indicators. The indicators/items are modified using the combination of a number of experts that can be seen in Table 1.

No	Variables and references	Operational definition	Indicators/items	Measurement scale	
1.	GIC Yusliza et al. (2020); Yong et al. (2019).	The combination of intangible assets and resources includes processes, capacities, creativity and innovation, systems and knowledge from SME leaders and employees to increase environmental-based stakeholder value.	Consists of 5 indicators/items: <ul style="list-style-type: none"> • Contribution of assets to protect the environment, • Contribution of creativity and green competence, • environmental management system, • environmental protection innovation • competence is directed at customer value 	Score 1 Very strongly disagree	Score 7 Very strongly disagree
2.	SCI Huo et al. (2016); Qin (2019); Flynn et al. (2010)	Supply chain processes by conduct three integration activities; internal, suppliers and consumers.	Consists of 5 indicators/items: <ul style="list-style-type: none"> • establish intensive relationships with suppliers • choose the best supplier • synchronization of SME activities with main supplier activities • exchange operational information with suppliers on a regular basis • explore new working relationships with suppliers 	Score 1 Very Strongly disagree	Score 7 Very Strongly disagree

No	Variables and references	Operational definition	Indicators/items	Measurement scale	
3.	DGC Ageron et al. (2020); Ullah et al. (2021); Huang and Kung (2011)	SC digitization in strengthening the integration and agility of SC SME couriers so it will increase stakeholder value.	Consists of 5 items/indicators: <ul style="list-style-type: none"> • online exchange of information, • monitor and interact with customers in real time, • IT integration • Easier exchange of information with customers and suppliers online • optimally digitizing SC overall to stakeholders 	Score 1 Very Low	Score 7 Very high
4	SCA Mubarik et al. (2021); Ahammad et al. (2020); Rasyidi and Kusumastuti (2020)	SC agility owned by courier service SMEs in time acceleration, new product introduction, product development, service acceleration and product delivery	Consists of 5 items/indicators <ul style="list-style-type: none"> • speed up production time • introduce new products to the market quickly • product development on a regular basis • speed up service • speed up product delivery 	Score 1 Very Low	Score 7 Very high
5.	BP Prakash, Jha, Prasad and Singh (2017); Muafi and Kusumawati (2021); Mwita (2019)	SME performance includes financial and non-financial measures in the last 4 years	Consists of two indicators: <ul style="list-style-type: none"> • Quality and customer satisfaction, timeliness in the service process, market share, production costs, profits 	Score 1 Very Low	Score 7 Very high

Table 1. Variable, operational definition, indicator/item, and measurement scale

4. Result

4.1. Respondent's Characteristics

Respondents in this study are divided into several characteristics including gender, last education, income, and the age of the company.

The age of the respondents in this study consisted of 158 men and 25 women which show that the majority of respondents are men (86.3%), has an age of 20-30 years (59%), has high school education (65.6%). Furthermore, the majority of respondents' monthly income has an income of 3.1 – 5 million (54%) with a company age of 6-10 years (52%).

4.2. Validity and Reliability Test

The data in this study certainly do not violate the statistical assumptions in SEM (Structural Equation Model). Statistical assumptions that must be fulfilled in SEM include validity as measured by a factor loading value of more than 0.5 and a t-statistic value of more than 1.96. Furthermore, reliability is measured by composite reliability (CR) values above 0.6 and AVE above 0.5 (Fornell & Larcker, 1981) as can be seen in Table 3.

Table 2 shows that the loading factor values for all indicators are in the range of 0.679 – 0.932 and the t-value is in the range of 9.884-20,936. It indicates that all indicators are valid because they have a loading factor value > 0.5 and the t-value on all indicators has a value > 1.96. Next, test the reliability with reference to the value of composite reliability (CR) and AVE. The CR value for each variable in this study is greater than 0.7 and the AVE value is greater than 0.5, so that all variables in this study are reliable.

4.3. Goodness of Fit Test

The goodness of fit (GoF) test shows the feasibility of the research model. The research model is feasible if it meets several criteria grouped into 3 types, namely absolute fit index (RMSEA and CMINDF), incremental fit index (CFI and TLI) and parsimony fit index (PGFI and PNFI) as can be seen in Table 4 (Hair et al., 2010).

Characteristics		Frequency	Percentages
Gender	Man	158	86,3%
	Woman	25	13.7%
Age	20 - 30 years	108	59%
	31 - 40 years	53	29%
	41 - 50 years	19	10%
	> 50 years	3	2%
Education	Elementary	4	2.2%
	Junior high school	5	2.7%
	Senior high school	120	65.6%
	Diploma	23	12.6%
	Bachelor	28	15.3%
	Magister	3	1.6%
Net Income	1.5 million	20	11%
	1.6 million – 3 million	43	23%
	3.1 million – 5 million	98	54%
	> 5 million	22	12%
Firm Age	5 years	48	26%
	6 – 10 years	95	52%
	> 10 years	40	22%
Total		183	100%

Table 2. Respondents Distribution

Variables	Indicators	Factor Loading	t-value	Composite Reliability	AVE
Green Intellectual Capital No of Item: 6	GIC1	0.884	18,179	0.96	0.81
	GIC2	0.903	19,191		
	GIC3	0.924	20,429		
	GIC4	0.932	20,936		
	GIC5	0.896	a		
	GIC6	0.852	16,724		
Supply Chain Integration No of Item: 5	SCI1	0.860	a	0.94	0.77
	SCI2	0.866	15,349		
	SCI3	0.899	16,785		
	SCI4	0.882	16,293		
	SCI5	0.891	16,495		
Business Performance No of Item: 5	BP1	0.857	10,244	0.89	0.62
	BP2	0.887	10,586		
	BP3	0.758	9,884		
	BP4	0.750	12,330		
	BP5	0.679	a		

Variables	Indicators	Factor Loading	t-value	Composite Reliability	AVE
Supply Chain Agility No of Item: 5	SCA1	0.767	11,694	0.92	0.71
	SCA2	0.866	14,029		
	SCA3	0.825	13,110		
	SCA4	0.905	19,030		
	SCA5	0.834	a		
Digital Supply Chain No of Item: 5	DSC1	0.796	a	0.91	0.66
	DSC2	0.875	13,573		
	DSC3	0.856	13,165		
	DSC4	0.715	10,282		
	DSC5	0.802	11,945		

Note: “a” means that the regression weight was fixed at 1.00. not estimated

Table 3. Validity and Reliability

GOF test Categories	Measure	Acceptable Values	Values	Note
Absolute Fit	CMINDF	2.00 or below	1.910	Fit
	RMSEA	0.08 or below	0.071	Fit
Incremental Fit	CFI	0.90 or above	0.948	Fit
	TLI	0.90 or above	0.940	Fit
Parsimony Fit	PGFI	0.60 or above	0.647	Fit
	PNFI	0.60 or above	0.776	Fit

Table 4. Goodness of Fit Test

The GoF test in this study uses 6 criteria including CMINDF with a result of 1,910 which is in accordance with the criteria, namely below 2.00. RMSEA with a result of 0.071 which is in accordance with the criteria, which is below 0.08. CFI with a result of 0.948 which already meets the criteria, which is above 0.90. TLI with a result of 0.940 which already meets the criteria, which is above 0.90. PGFI with a result of 0.647 which already meets the criteria, which is above 0.60. PNFI with a result of 0.776 which already meets the criteria, which is above 0.60. So that the model in this study has good feasibility.

The mathematical equation of each criteria are as follows:

$$\text{CMINDF} = \frac{\text{chi-square}}{\text{degree of freedom}} = \frac{536,650}{281} = 1,910$$

$$\text{RMSEA} = \sqrt{\frac{x^2 - p(p+q)/2 - q}{(n-1)p(p+q)/2 - q}} = \sqrt{\frac{536,650 - 5(5+105)/2 - 105}{(183-1)5(5+105)/2 - 105}} = 0,07$$

$$\text{CFI} = 1 - \frac{(n-1)F_h - df_h}{(n-1)F_l - df_l} = 1 - \frac{(183-1)2.949 - 281}{(183-1)28.449 - 385} = 0,9$$

$$\text{TLI} = \frac{\left(\frac{x_1^2}{df_1}\right) - \left(\frac{Xh^2}{df_h}\right)}{\left(\frac{x_1^2}{df_1}\right) - 1} = \frac{\left(\frac{5.247,81}{385}\right) - \left(\frac{536,650}{281}\right)}{\left(\frac{5.247,81}{385}\right) - 1} = 0,93$$

$$\text{PGFI} = \frac{df_h}{df_l} \text{GFI} = \frac{281}{385} \cdot 0,808 = 0,6$$

$$\text{PNFI} = \frac{df_h}{df_l} \text{NFI} = \frac{281}{385} \cdot 0,898 = 0,7$$

Details:

χ^2 = chi-square model

q = number of estimated parameters

p = number of variables

n = number of samples

χ^2_1 = chi-square from independence model

χ^2_b = chi-square from hypothesized model

df_1 = degree of freedom from independence model

df_b = degree of freedom from hypothesized model

F_b = Value of F minimum from hypothesized model

F_1 = Value of F minimum from independence model

4.4. Hypothesis Testing

The next analysis is examine the relationship between variables in the SEM-Model. This study analyzes 5 variables, namely Green Intellectual Capital (GIC), Supply Chain Integration (SCI), Digital Supply Chain (DSC), Supply Chain Agility (SCA), and Business Performance (BP). The results of the 10 hypotheses using the SEM method can be seen in Table 5 and Table 6 and the path analysis model in Figure 1.

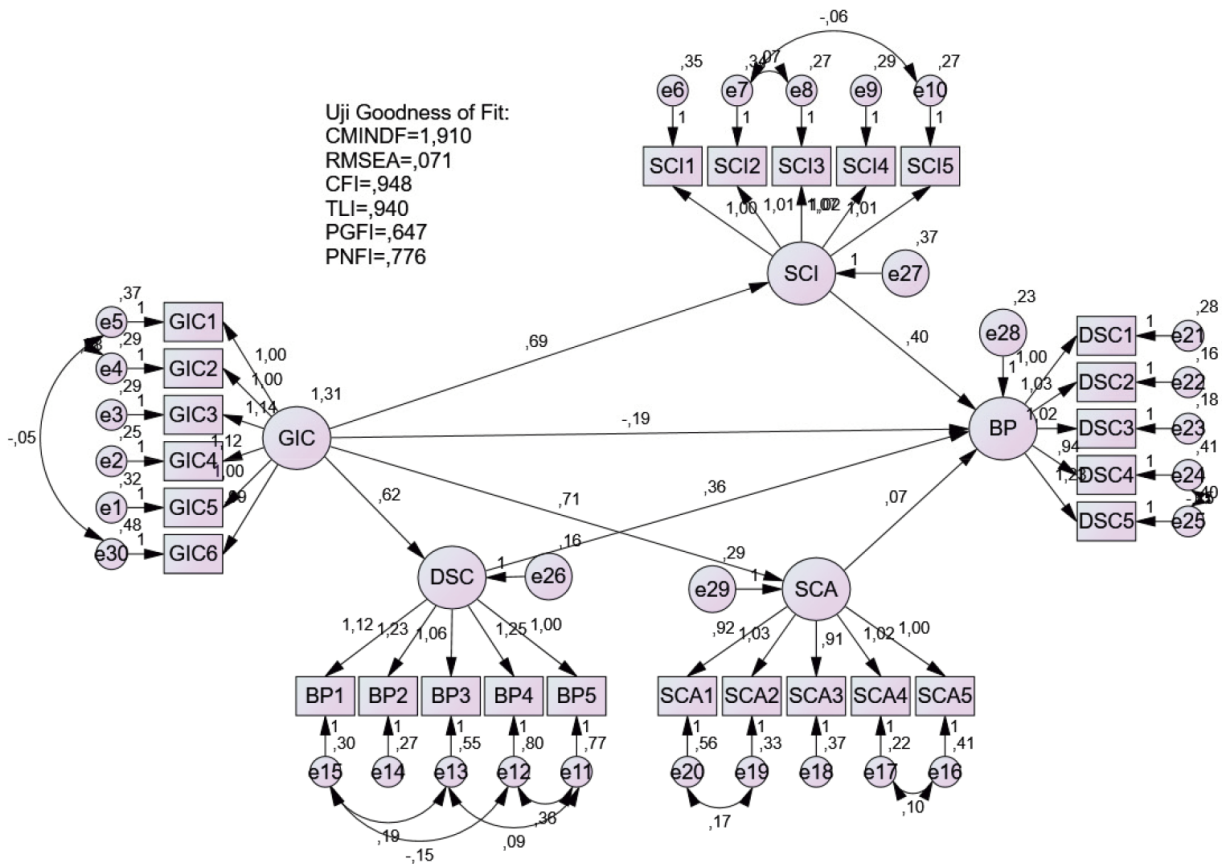


Figure 1. A Nexus between Green Intellectual Capital, Supply Chain Integration, Digital Supply Chain, Supply Chain Agility and Business Performance

Hypothesis		Estimate	t-value	P-Value	Note
H1	GIC has positive effect on SCI	0.692	11.903	0.000*	Supported
H2	GIC has positive effect on BP	-0.193	-1.158	0.129	Rejected
H3	GIC has positive effect on DSC	0.620	9.772	0.000*	Supported
H4	GIC has positive effect on SCA	0.705	12.005	0.000*	Supported
H5	SCI has positive effect on BP	0.397	5.153	0.000*	Supported
H6	DSC has positive effect on BP	0.364	2.739	0.006*	Supported
H7	SCA has positive effect on BP	0.075	0.866	0.386	Rejected

Note. *sign <0.05

Table 5. Regression Weight

The direction of the relationship between variables is indicated by the estimate value. While the significance of the relationship between variables is indicated by the t-value above 1.96 or the P-value below 0.05. Table 5 shows that H1, H3, H4, H5, H6 are supported and H2 and H7 are not supported.

4.5. Mediation Test

Mediation test analyzes H8, H9, and H10. The mediation test in SEM-AMOS refers to the table of indirect effects - two-tailed significance through bootstrap in AMOS. The significance of the mediation effect is proven if the significance value in the indirect effect - two-tailed significance table is less than 0.05.

Hypothesis		P-Value	Note
H8	SCI mediates GIC on BP	0.002*	Supported
H9	DSC mediates GIC on BP	0.006*	Supported
H10	SCA mediates i GIC on BP	0.010*	Supported

Note. *sign <0.05

Table 6. Mediation Test

The mediating role of SCI on the relationship between GIC and BP has a significance of 0.002 (<0.05) so it is proven to be significant (H8 is supported). The mediating role of DSC on the relationship between GIC and BP has a significance of 0.006 (<0.05) so it is proven to be significant (H9 is supported). Furthermore, the mediating role of SCA on the relationship between GIC and BP has a significance of 0.010 (<0.05) so that it is proven significant (H10 is supported) (Table 6).

5. Discussion and Implication

5.1. Green Intellectual Capital and Supply Chain Integration

The study findings prove that GIC has an effect on SCI (**H1 is accepted**). It supports previous theories and studies from Martín-Rubio (2021), Yusliza et al. (2020), Yong et al. (2019), Shou et al. (2018), Huo et al. (2016), Ataseven et al. (2018), Song et al. (2019) and Huo et al. (2015). Currently, several companies have begun to realize the importance of having an environmentally-based IC (Jaboour & de Sousa-Jabbour, 2016; Jabbour & Santos, 2008; Jabbour et al., 2013; Jabbour, 2013; Jabbour et al., 2010; Huang & Kung, 2011). It can already be done from recruitment and selection to employee training (Bansal & Roth, 2000). IC can later be managed by contributing to employee performance appraisals and providing compensation that considers environmental aspects (Arqawi, et al., 2019; Albort-Morant et al., 2016; Muafi & Uyun, 2021).

Training programs centered on ecological impact and environmental awareness improve employee skills in material waste management and foster employee emotional involvement in improving environmental performance (Fernández, Junquera & Ordiz, 2003). When courier SMEs already have a good GIC, they are expected to be able

to create and manage an integrated supply chain system (Shou et al., 2018; Huo et al., 2016; Jacobs et al., 2016; Yusliza et al., 2020), particularly on IC ownership (Ataseven et al., 2018; Wang & Huo, 2018). GIC capabilities which include green human capital, green structural capital, and green relational capital should contribute to greening behavior in its ability to carry out internal company integration, supplier integration, and customer integration. When business processes runs smoothly and have an operating system that has been managed professionally, it is expected to have an impact on the operational system of suppliers and customers.

5.2. Green Intellectual Capital and Business Performance

The study findings prove that GIC does not have a significant positive effect on BP (**H2 is rejected**). This does not support the results of previous studies from Siriyanun et al. (2019), Wang and Huo (2018), Chalal and Bakshi (2014) and Chen (2008). Courier service SMEs need to identify complaints and failures felt by stakeholders so that in the future they can increasingly provide solutions and develop business systems by prioritizing GIC in improving cross-functional performance. This is very important considering that stakeholder satisfaction is a priority that must be prioritized so that they carry out re-transactions (Wong et al., 2011, 2013; Giménez & Ventura, 2003). SMEs also need to have a strategy in maintaining long-term relationships which can ultimately have an impact on operational and BP performance (Flynn et al., 2010; Qin, 2019; Li et al., 2006) and can seek potential market opportunities (Wong et al., 2011, 2013; Zhao et al., 2008). The impact can increase competitive advantage (Siriyanun et al., 2019; Wang & Huo, 2018; Chen, 2008). SMEs are also advised to increase efficiency in business processes and reduce waste so that they can achieve business, environmental, and social performance (Santoshraj, 2017; Ayuni & Muafi, 2020).

5.3. Green Intellectual Capital and Digital Supply Chain

The study findings prove that GIC has significant positive effect on DSC (**H3 is accepted**). It supports the theory and study of Ullah et al. (2021), Dubey et al. (2017) and Ageron et al. (2020). GIC must be owned by courier service SMEs because it have an impact in taking every step and action as well as policies related to planning and developing information systems. Every adoption and diffusion of digital technology must be based on greening behavior so that every business process and company operation can be efficient and think about the impact of waste. Courier service SMEs must continue to strengthen green behavior-based supply chain integration and agility so as to improve customer service and sustainable business performance (Ageron et al., 2020). Besides, it helps SMEs better understand and manage the impact of traceability on sustainability (Martín-Rubio, 2021). Courier service SMEs should also strive to reduce distortion of information (Schniederjans et al., 2020; Lee, et al., 1997) and be careful in implementing green digital (Martín-Rubio, 2021; Lee, et al., 1997). In the future, courier service SMEs should also synchronize between work units so as to facilitate digitization of customers, value chain management and operational activities (Pirogova, et al., 2020; Wei et al., 2020). Nowadays, digitalization training is very important, courier service SME customers demand cleanliness, speed, accuracy, and safety of the products ordered. The digital era demands that courier service SMEs must improve and continue to improve the quality and skills of employees, especially related to GSC.

5.4. Green Intellectual Capital and Supply Chain Agility

The study findings prove that GIC has positive effect on SCA (**H4 is accepted**). It supports the theory and study of Mubarik et al. (2021), Ahammad et al.(2020)and Rasyidi and Kusumastuti (2020). Human resources who has SC are needed, especially those who have mastery of technology and great talent to keep pace with the speed of digitalization (Shakil et al., 2020; Hohenstein et al., 2014). Currently, courier service SMEs are faced with a highly volatile and hostile SCA. Changes and the speed of information flow require SMEs to strengthen GIC to face the disruptive era of information technology so that they can be more agile and superior to competitors. Abdallah and Ayoub (2020) state that the capabilities of HR from the technological aspect are proven to be able to improve SCA. Haq et al. (2020) even recommend that courier SMEs have a routine and integrated program in training and development, especially from the digitalization aspect because it will help companies to improve SCA in the future.

5.5. Supply Chain Integration and Business Performance

The study findings prove that SCI has positive effect on BP (**H5 is accepted**). It supports the theory and previous studies from Tian et al. (2021), Hendijani and Saei (2020), Wei et al. (2021), Zhou et al. (2020), Wiengarten et al. (2019) and Chen et al. (2018). In managing SC, courier service SMEs need to coordinate and collaborate between and within work units so that they can run business processes successfully and a conducive work environment. Likewise, it is necessary to identify and coordinate accurate information from stakeholders, especially suppliers, producers, distributors, and customers. Sundram et al. (2020) suggest that in SCI it is also necessary to involve and integrate with good IT skills so that they have more speed and accuracy of information related to SC in improving SC and BP performance. Courier SMEs also need to consider other factors such as demand uncertainty from consumers who have very volatile demand disruptions (Hendijani & Saei, 2020) in addition to environmental factors (Zhou et al., 2020; Zhang et al., 2020).

5.6. Digital Supply Chain and Business Performance

The study findings prove that DSC has an effect on BP (**H6 is accepted**). It supports theories and previous studies from Attaran (2020), Farahani et al. (2017), Büyüközkan and Göçer (2018), Saryatmo and Sukhotu (2021), Nasiri et al. (2020), Adam et al. (2020) and Kamble et al. (2020). It is undeniable that disruptive technology and consumer tastes that demand fast and on time require courier service SMEs to respond with the same movement. This requires a DSC. The future business model should move dynamically and proactively by prioritizing speed and accuracy in responding to the demands of a changing environment. SMEs need to prepare good hardware, software, and digital networks so that there is integration and synchronization between related work units so that they can provide services that satisfy stakeholders. Services to stakeholders must be accessible, affordable, consistent, agile, and easily understood by stakeholders. In the SMEs context, Adam et al. (2020) recommend the importance of SMEs owning and using digitalization in order to be able to increase customer satisfaction and loyalty and make BP further increase.

5.7. Supply Chain Agility and Business Performance

The study findings prove that SCA has no significant effect on BP (**H7 is rejected**). It does not support previous theories and studies from Chen (2019), Benzidia and Makaoui (2020), Fayezi et al. (2017) and Dubey et al. (2018). SMEs should be more agile in this digital era, especially during the Covid-19 pandemic. The environment and consumer demands are moving very fast and uncontrollably. Each courier service SME is currently competing to offer their services quickly and on time as well as safely and hygienically. The trend of online shopping lifestyle should be caught because it has the opportunity to increase transactions and volume delivery of goods. Currently, Indonesian people prefer to choose online transactions because of security and convenience factors. During this Covid 19 pandemic, all companies are competing to gain the highest market share. Even new players are starting to emerge and continue to shift old players. Fast delivery times and efficient shipping costs are the main reason consumers choose courier Courier services SMEs in East Java and Special Region of Yogyakarta have methods and company rules that are too rigid which eventually becomes an obstacle to moving agilely and moving forward so that the impact will have an effect on lowering BP (Yusuf et al., 2020). Therefore, it is suggested by Alzoubi et al. (2020) that if the 3 components in SCA (alertness, decisiveness and flexibility) are met, BP will increase drastically. This finding also implies that alertness, decisiveness, and flexibility can be applied by courier service SMEs in Indonesia by trying to keep SMEs having a business model that is alertness, decisiveness, and flexibility by focusing on SCM.

6. Conclusion, Limitation And Future Research Direction

1. Green Intellectual Capital has a significant positive influence on Supply Chain Integration; (2) Green Intellectual Capital does not have a significant positive influence on Business Performance; (3) Green Intellectual Capital has a significant positive influence on Digital Supply Chain; (3) Green Intellectual Capital has a significant positive influence on Supply Chain Agility; (4) Supply Chain Integration has a significant positive influence on Business Performance; (5) Digital Supply Chain has a significant positive influence on Business Performance; (6) Supply Chain Agility does not have a significant positive influence

on Business Performance. The results of mediation analysis conclude that: (a) Supply Chain Integration mediates the influence between Green Intellectual Capital on Business Performance; (b) Digital Supply Chain mediates the influence between Green Intellectual Capital on Business Performance; and (c) Supply Chain Agility mediates the influence between Green Intellectual Capital on Business Performance.

2. This study only examines courier service SMEs in two provinces in Indonesia, namely East Java and Special Region of Yogyakarta, so it is feared that they will not be able to generalize the population. Moreover, the sampling is conducted by using a purposive technique. The sampling technique should be done randomly.
3. Respondents use data across work units which sometimes do not reflect the real answer, especially regarding data on GIC, SCI, DGC, SCA and BP. Not all courier service SMEs understands DSC well, they tend to sometimes only implement existing digital systems and rarely innovate and diversify DGC. While, consumer demands continue to increase and are volatile. In the future, there should be a regular and intensive schedule to improve the competence of employees and managers, especially from the digitalization aspect.
4. This study uses self-reports to answer the questionnaire, so it is feared that there will be bias, especially in the BP variable even though it has been asked to compare it with BP owned by similar competitors.
5. Considering other variables outside of research models that can be used for sustainable BP improvement, such as Green HRM (Muafi & Kusumawati, 2021; Muafi, & Uyun, 2021; Mwita, 2019), SC resilience (Mubarik et al., 2021), innovation culture (Muafi et al., 2020) and Knowledge Management (Martín-Rubio, 2021) and other aspects in order to continue to improve business sustainability in the future.

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