

## The influence of digital customer experience and electronic word of mouth on brand image and supply chain sustainable performance

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### ABSTRACT

Digitalization plays a crucial role on current competitive market and it is associated with the utilization of digital technologies to change business model and to deliver new value-producing opportunities to the current business environment in an aim to move towards a digital business. Therefore, to address new business model, the purpose of this study is to explore the effect of digital customer experience and electronic word of mouth on sustainable performance of supply chain through brand image and supply chain image. In this study, data is collected from employees of Indonesian ICT companies. Clusters were formulated, and respondents were selected randomly. Three hundred and fifteen (315) responses were analysed with the help of structural equation modelling. The results indicate that digital customer experience and electronic word of mouth played positive role on promoting brand image. Brand image had positive role to promote supply chain image which influences positively on sustainable supply chain performance. Therefore, this study is important for Information Communication and Technology (ICT) industry to implement various e-commerce practices to promote digital customer experience and electronic word of mouth.

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## 1. Introduction

Digitalization plays crucial role in the current competitive market (Leetaru, 2008). Most of the business markets heavily depend on digitalization and it is one of the most essential elements of business market. Digitalization is the utilization of digital technologies to change a business model and to deliver new value-producing opportunities to the current business environment; it is also a procedure for moving towards a digital business. Basically, it is the way of new innovation in business model. Introduction of new technology for the sake of digitalization brings innovativeness to the business activities which makes faster transactions and physical transfer of goods. Therefore, it also has the effect on supply chain activities. Generally, supply chain digitalization comes under electronic supply chain (e-supply chain) (Poirier & Bauer, 2000). Digitalization facilitates supply chain activities of business (Castorena et al., 2014; Dim & Ezeabasili, 2015; Wang & Lu, 2016; Vendrell-Herrero et al., 2017).

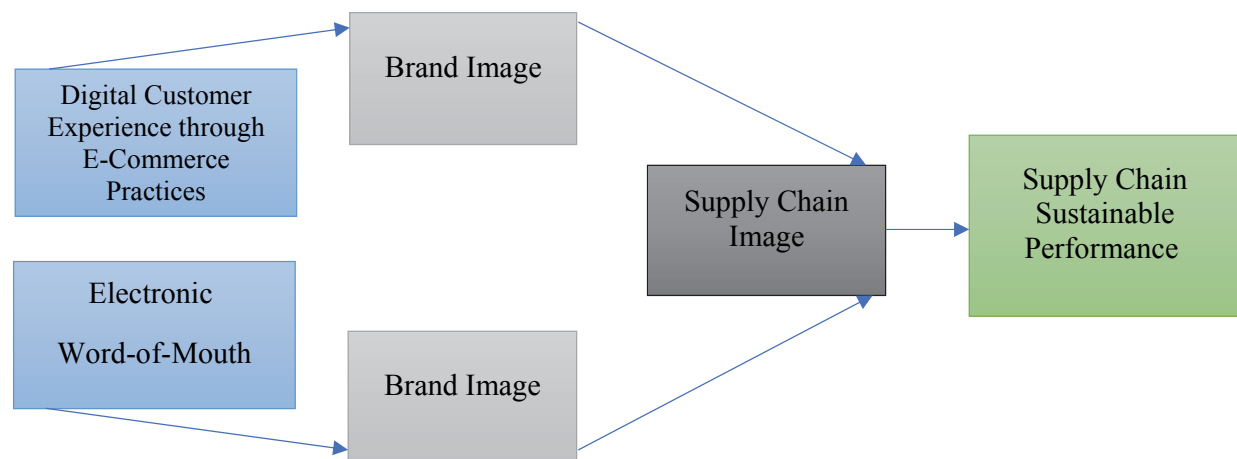
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Supply chain has central importance for every business activity (Peng et al., 2016; Quarshie et al., 2016; Richter & Walther, 2016). These activities play crucial role in customer satisfaction (Duru & Chibo, 2014; Purnama, 2014; Nazal, 2017; Taqi et al., 2018; Nadeem et al., 2018) which may have significant effects on sustainable business outcomes. In this competitive environment, companies are moving towards higher performance of supply chain activities. Higher performance of supply chain activities depends on digitalization. Therefore, digitalization is one of the important elements of supply chain. However, firms experience important risk when they implement digital supply chain arrangements to manage the collaboration with their partners (Xue et al., 2013). Generally, digitalization is based on electronic commerce (Chaudhuri & Mukhopadhyay, 2014; Nauwelaerts & Chakri, 2016; Tanoos, 2017; Chowdhury et al., 2018) which is expensive to develop. These companies experience financial constraints to adopt digitalization in supply chain activities. Companies also face various technological issues related to digitalization.

Digitalization plays an important role on creating good words of mouth. Digital customer experience has significant effect on customer satisfaction (Joshi, 2018) by providing better customer value (Bolton et al., 2018; Klaus, 2014). It provides better experience for customers through digitalization (Betzing et al., 2018) which influence on brand image, significantly. It also creates positive word-of-mouth among customers having significant effect on supply chain since better customer experience always has positive effect on business activities (Merrilees, 2016). Both the customer digital experience and word of mouth influence on brand image, positively. Better brand image always shows positive effect on supply chain image. As the brand and supply chain play important role on each other's (Brun & Castelli, 2008; Nze et al., 2016; Kimengsi & Gwan, 2017; Cheng et al., 2018; CHE & Sundjo, 2018).

Brand image and supply chain image play important role on the performance of sustainable supply chain since the brand image has relationship with supply chain (Kim & Cavusgil, 2009) which is the key to the sustainable business performance. Thus, the objective of this study is to explore the effect of digital customer experience and electronic word of mouth on the performance of the sustainable supply chain through brand image and supply chain image. The relationship between digital customer experience, electronic word of mouth, brand image, supply chain image and supply chain sustainable performance are shown in Fig. 1.



**Fig. 1.** Theoretical framework of the study showing the relationship between digital customer experience, electronic word of mouth, brand image, supply chain image and supply chain sustainable performance

This study has special focus on Indonesian Information and Communication and Technology (ICT) companies. ICT companies are important for any economies (Pradhan et al., 2018) and they contribute on gross domestic product, significantly. However, these companies are facing problems due to rapid changes in digital technology (Cloud service) and lack of infrastructure for ICT (Das et al., 2016).

Supply chain in ICT plays an important role for growth of the companies, thus, for better performance, these companies need to have sustainable supply chain performance.

## 2. Theoretical Outlook and Hypotheses Development

Electronic commerce (e-commerce) has changed over the last 30 years. Initially, e-commerce was associated with the enablement of various commercial transactions through digital communication (Gebrina, 2009). In 1970s, organizations started to send commercial electronic documents like various purchase orders through electronic methods. The growth as well as the acceptance of various credit cards, PayPal services, automated teller machines (ATM) and online telephone banking in the 1980s were considered as various forms of e-commerce. Online shopping was developed in the United Kingdom (Aldrich, 1979). From onwards 1990s, e-commerce simply means enterprise resource preparation, data mining as well as data warehousing (Reynolds & Mofazali, 2000).

The idea of E-commerce is involved with the formation of a suitable infrastructure which would facilitate the essential functionality. Such infrastructure must play two main roles. It should help the businesses exploit the total number of customers. The internet also helps suppliers communicate directly with buyers (marketing by developing the profile of customers) and in the future it will be the fruitful expansion of individual links with customers that will decide the e-enterprise' achievement (Galant et al., 2002). This whole process requires good technology in which industry 4.0 plays an important role in the recent decades (Imran et al., 2018).

The idea of electronic commerce (e-commerce) raised up in the dynamism of information, technology and communication era. Though, the quick increase of the internet has completed the likelihood of the e-commerce more promising. It is now extensively specified that the internet as well as e-commerce would change traditional business and consumer life (Männistö, 1999). E-commerce has an important relationship with brands. It has the ability to create a good brand image. The customers having good digital experience through e-commerce have good views about the brand.

As it is found by various studies that branding and e-commerce has link with each other (Lowry et al., 2008; Penttinen & Turunen, 2017). E-commerce influences positively on branding and provides the access to brand and help to popularity of brand in no time. Better access to the brand and popularity of brand creates a good image in the market and among the customers which has the ability to boost supply chain for the related products. It provides electronic business solution to facilitates performance (Davis & Vladica, 2005) and develops a good brand image among customers. It is proved by various studies that brand has significant link with e-commerce activities and customers' digital experience (Bilgihan, 2016; Morgan-Thomas & Veloutsou, 2013; Nguyen, 2001; Strebinger & Treiblmaier, 2006).

**H<sub>1</sub>:** Digital customer experience through e-commerce practices has positive effect on brand image.

Consistent with digital customer experience, electronic word of mouth also has similar effect on brand image. Word of mouth is the procedure of transmission information from one person to another and plays an important role in customer decisions process associated with the purchase decisions (Richins & Root-Shaffer, 1988). In commercial conditions, word of mouth includes consumers sharing attitudes, views, or reactions related to businesses services and products with various people. Word of mouth marketing is powerful, multi-layered, and classically hard to effect (Dellarocas, 2003; Ha, 2002; Phelps et al., 2004). Positive word of mouth is measured by an influential marketing medium for organizations to influence consumers. Functions of word of mouth communication grounded on social interacting as well as trust: people trust on friends, relatives and others in their social network. It is proved that people seem to trust apparently unbiased opinions from people outside their instant social network, such as online reviews (Duan et al., 2008). This form is known as online word of mouth or electronic word of mouth which is heavily based on e-commerce.

Positive electronic word of mouth has significant effect on brand image. Word of mouth is ranked the most important information cause when various consumers are doing a purchase decision (Litvin et al., 2008) which shows positive influence on brand image. With the help of Web-based consumer opinion platforms, the internet allows clients to share their views, ideas, thoughts and experiences regarding goods as well as services with a gathering of other consumers which effect positively (Hennig-Thurau et al., 2004). Therefore, positive word of mouth has significant role on creating awareness about a specific product among the general public. Electronic word of mouth creates good brand image through e-commerce practices. It ultimately influences on the performance of specific product by increasing the sales of particular product. Increase in the sales of product automatically boosts supply chain activities which influences positively on supply chain activities and sustainable supply chain performance among companies.

**H<sub>2</sub>:** Electronic word of mouth has positive effect on brand image.

In a similar way, both digital customers experience through e-commerce and electronic word of mouth has positive role to boost brand image, brand image has positive role to boost supply chain image among ICT industry. Good brand image leads towards better supply chain image which ultimately has positive effect on sustainable supply chain performance. Branding has also relationship with supply chain image (Czinkota et al., 2014; Farquhar, 1994; Tsou et al., 2009; Zhang et al., 2013, Mihardjo et al., 2018). Thus, literature provides some significant evidence that branding has important relationship with supply chain activities.

Good supply chain image leads towards sustainable supply chain performance. Better supply chain activities sustain the supply chain performance (Attaran & Attaran, 2007; De Brito et al., 2008; Golicic & Smith, 2013) which increases the customer satisfaction level (Nadeem et al., 2018). Increase in sustainable performance increases the overall performance of ICT companies. Here the information technology plays a key role to develop connection between digital customer experience, word of mouth, brand image, supply chain image and supply chain sustainable performance. Therefore, literature provides the importance of brand image, supply chain image and supply chain performance which means that brand image has relationship with supply chain image and increases the sustainable performance related to supply chain. By following the instructions of Baron and Kenny (1986), these findings from the literature reveals that brand image mediates the relationship between digital customer experience through e-commerce practices and supply chain image. Moreover, it is revealed that brand image mediates the relationship between digital word of mouth and supply chain image.

**H<sub>3</sub>-** Brand image has positive effect on supply chain image.

**H<sub>4</sub>-** Supply chain image has positive effect on sustainable supply chain performance.

**H<sub>5</sub>-** Brand image mediates the relationship between digital customer experience through e-commerce practices and supply chain image.

**H<sub>6</sub>-** Brand image mediates the relationship between digital word of mouth and supply chain image.

**H<sub>7</sub>-** Supply chain image mediates the relationship between brand image and sustainable supply chain performance.

### **3. Data Collection Procedure and Analysis Method**

In this study, data is collected from employee of ICT companies. The employees involved in distribution of the company products were selected to collect the responses since these employees were involved in supply chain activities. The data collection of this study is based on three major steps. Moreover, the process of data collection was majorly based on three key steps;

1. Indonesia was divided into 15 clusters.
2. 10 clusters were selected randomly.
3. Respondents were selected randomly from ICT companies.

According to Krejcie and Morgan (1970), 382 sample size is sufficient if the population is 100,000. By following the instructions, the current study selected 568 sample size. Total of 568 questionnaires were distributed. All the questionnaires were distributed with the help of self-visit to the ICT companies. From these 568 questionnaires, 315 valid responses were returned and used for data analysis. Collected data were analysed with the help of structural equation modelling (SEM) and by using partial least square (PLS). It is recommended in literature by different researchers (Hair et al., 2017; Hair Jr et al., 2016; Henseler et al., 2009).

#### 4. Results

Results of this study are analysed by using partial least square and, first, missing values, outliers and normality of the data were examined and it is found that data were free from missing values and any case of outlier. In case of normality, partial least square (PLS) is the most suitable to analyse the data which is not normal (Hair Jr et al., 2016). Missing values, outliers and normality of the data are shown in Table 1.

**Table 1**  
Missing Value, Outlier and Normality of the Data

	No.	Missing	Mean	Median	Min	Max	SD	Kurtosis	Skewness
DCE1	1	0	3.275	3	1	7	1.51	-0.465	0.102
DCE2	2	0	3.234	3	1	7	1.783	-0.579	0.444
DCE3	3	0	3.523	3	1	7	1.859	-0.783	0.311
DCE4	4	0	3.482	3	1	7	1.902	-0.81	0.392
DCE5	5	0	3.527	3	1	7	1.689	-0.443	0.295
DCE6	6	0	3.491	4	1	7	1.8	-0.723	0.239
EWOM1	7	0	3.45	4	1	7	1.807	-0.934	0.12
EWOM2	8	0	3.653	4	1	7	1.858	-0.793	0.206
EWOM3	9	0	3.707	3	1	7	1.853	-0.755	0.319
EWOM4	10	0	3.631	3	1	7	1.912	-0.738	0.382
EWOM5	11	0	3.541	3	1	7	1.871	-0.715	0.379
EWOM6	12	0	3.55	3	1	7	1.807	-0.552	0.364
BI1	13	0	3.581	3	1	7	1.882	-0.779	0.306
BI2	14	0	3.482	3	1	7	1.757	-0.434	0.454
BI3	15	0	3.527	4	1	7	1.909	-0.94	0.206
BI4	16	0	3.468	3	1	7	1.795	-0.609	0.325
SCI1	17	0	3.658	4	1	7	1.786	-0.667	0.253
SCI2	18	0	3.09	3	1	7	1.483	-0.133	0.578
SCI3	19	0	3.176	3	1	7	1.513	0.418	0.877
SCI4	20	0	3.23	3	1	7	1.451	0.759	0.912
SCSP1	21	0	3.144	3	1	7	1.473	0.384	0.746
SCSP2	22	0	3.113	3	1	7	1.398	0.481	0.663
SCSP3	23	0	3.194	3	1	7	1.52	0.275	0.7
SCSP4	24	0	3.144	3	1	7	1.469	0.493	0.812
SCSP5	25	0	3.032	3	1	7	1.434	-0.286	0.424
SCSP6	26	0	3.189	3	1	7	1.389	0.318	0.612

Fig. 2 shows the first step of PLS-SEM; measurement model. In this step, factor loadings were examined shown in Table 2. All the items have maintained factor loadings of above 0.7 and composite reliability (CR) is also above 0.7. Average variance extracted (AVE) above 0.5 confirms the convergent validity. AVE and CR are shown in Table 3.

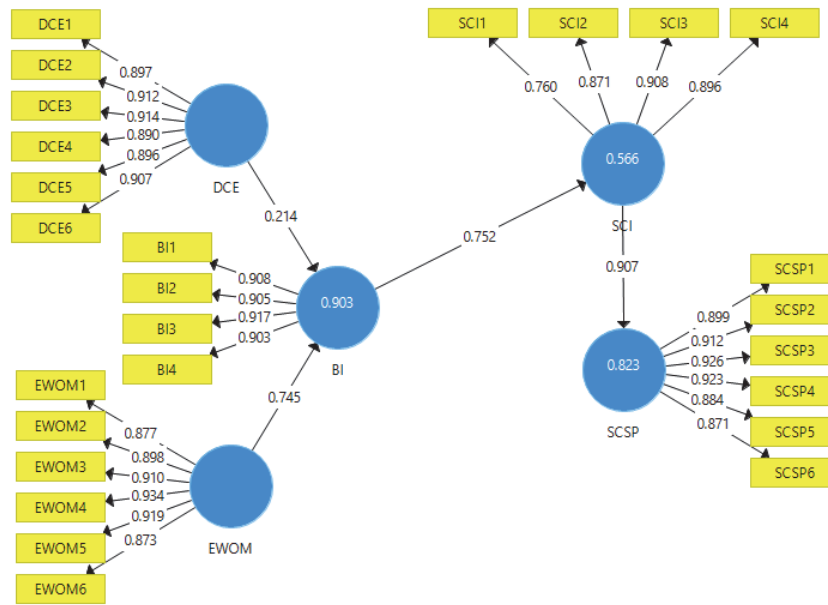


Fig. 2. Measurement Model Assessment

Table 2  
Factor Loadings

	BI	DCE	EWOM	SCI	SCSP
BI1	0.908				
BI2	0.905				
BI3	0.917				
BI4	0.903				
DCE1		0.897			
DCE2		0.912			
DCE3		0.914			
DCE4		0.89			
DCE5		0.896			
DCE6		0.907			
EWOM1			0.877		
EWOM2			0.898		
EWOM3			0.91		
EWOM4			0.934		
EWOM5			0.919		
EWOM6			0.873		
SCI1				0.76	
SCI2				0.871	
SCI3				0.908	
SCI4				0.896	
SCSP1					0.899
SCSP2					0.912
SCSP3					0.926
SCSP4					0.923
SCSP5					0.884
SCSP6					0.871

Table 3  
Reliability and Convergent Validity

	$\alpha$	rho A	CR	(AVE)
BI	0.929	0.93	0.95	0.825
DCE	0.954	0.955	0.963	0.815
EWOM	0.954	0.955	0.963	0.814
SCI	0.881	0.882	0.919	0.741
SCSP	0.954	0.955	0.963	0.815

In PLS structural equation modelling, there are three methods to determine discriminant validity. This study selected cross loadings to examine discriminant validity. It is shown in Table 4 which confirms the discriminant validity. Moreover, as discussed earlier, convergent validity is confirmed through AVE.

**Table 4**  
Cross Loadings

	BI	DCE	EWOM	SCI	SCSP
BI1	<b>0.908</b>	0.83	0.863	0.66	0.558
BI2	<b>0.905</b>	0.819	0.849	0.657	0.547
BI3	<b>0.917</b>	0.865	0.889	0.697	0.615
BI4	<b>0.903</b>	0.826	0.841	0.718	0.608
DCE1	0.832	<b>0.897</b>	0.844	0.738	0.694
DCE2	0.838	<b>0.912</b>	0.852	0.674	0.606
DCE3	0.831	<b>0.914</b>	0.858	0.684	0.601
DCE4	0.821	<b>0.89</b>	0.85	0.731	0.668
DCE5	0.832	<b>0.896</b>	0.858	0.743	0.659
DCE6	0.826	<b>0.907</b>	0.869	0.715	0.648
EWOM1	0.832	0.87	<b>0.877</b>	0.713	0.631
EWOM2	0.843	0.856	<b>0.898</b>	0.671	0.591
EWOM3	0.888	0.848	<b>0.91</b>	0.7	0.617
EWOM4	0.868	0.872	<b>0.934</b>	0.711	0.614
EWOM5	0.864	0.855	<b>0.919</b>	0.69	0.621
EWOM6	0.831	0.828	<b>0.873</b>	0.695	0.609
SCI1	0.749	0.714	0.722	<b>0.76</b>	0.603
SCI2	0.57	0.613	0.603	<b>0.871</b>	0.818
SCI3	0.603	0.663	0.629	<b>0.908</b>	0.844
SCI4	0.563	0.628	0.6	<b>0.896</b>	0.85
SCSP1	0.567	0.634	0.604	0.831	<b>0.899</b>
SCSP2	0.605	0.66	0.647	0.815	<b>0.912</b>
SCSP3	0.575	0.643	0.606	0.818	<b>0.926</b>
SCSP4	0.6	0.69	0.644	0.845	<b>0.923</b>
SCSP5	0.593	0.657	0.606	0.811	<b>0.884</b>
SCSP6	0.531	0.59	0.576	0.792	<b>0.871</b>

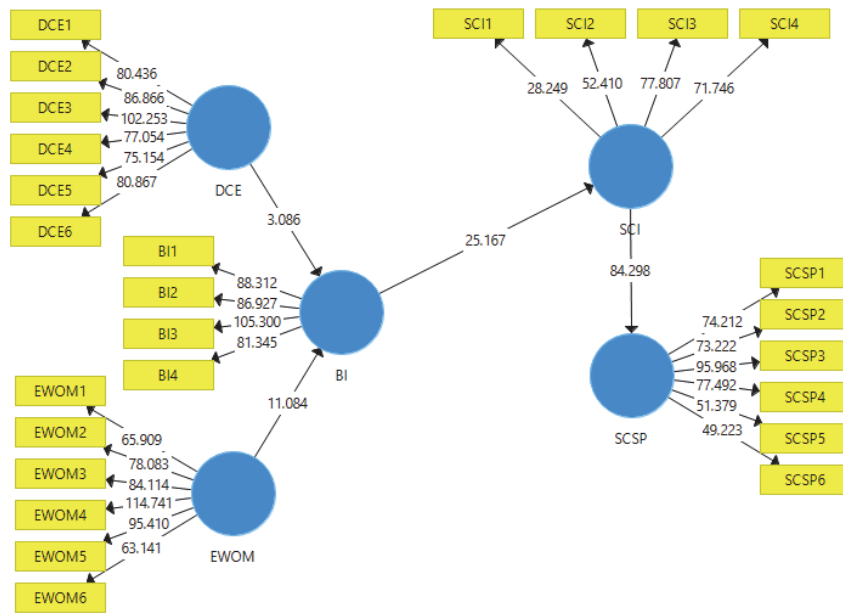
The hypotheses developed in literature review were tested by using PLS bootstrapping techniques which is one of the suitable techniques in SEM. Fig. 3 shows PLS structural model and Table 5 and Table 6 show the results of PLS structural model. It is found that all the relationships have t-values above 1.96 which confirm the relationships. Moreover, all the mediation effect also has t-value above 1.96 which confirms mediation effect. Thus, these results supported all seven hypotheses.

**Table 5**  
Direct Effect Results

	( $\beta$ )	(M)	SD	T Statistics	P Values
BI $\rightarrow$ SCI	0.752	0.75	0.03	25.167	0
DCE $\rightarrow$ BI	0.214	0.214	0.069	3.086	0.002
EWOM $\rightarrow$ BI	0.745	0.745	0.067	11.084	0
SCI $\rightarrow$ SCSP	0.907	0.907	0.011	84.298	0

**Table 6**  
In-Direct Effect Results

	( $\beta$ )	(M)	SD	T Statistics	P Values
DCE $\rightarrow$ BI $\rightarrow$ SCI	0.161	0.161	0.053	3.059	0.002
EWOM $\rightarrow$ BI $\rightarrow$ SCI	0.56	0.559	0.055	10.274	0
BI $\rightarrow$ SCI $\rightarrow$ SCSP	0.682	0.681	0.03	22.993	0



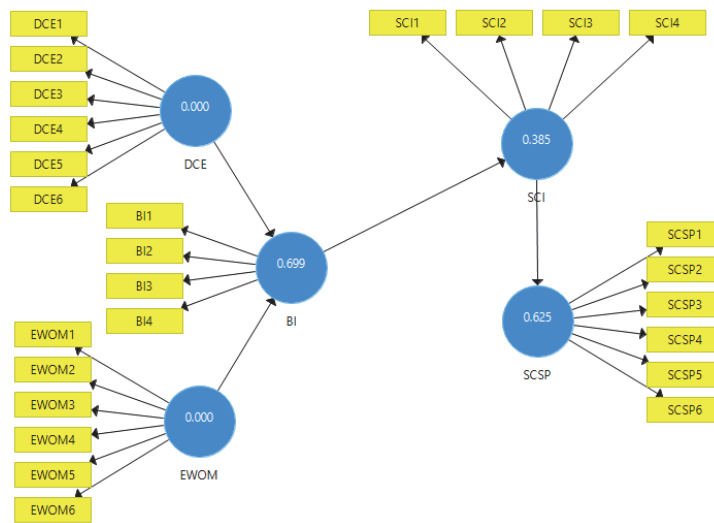
**Fig. 3. Structural Model Assessment**

Moreover, variance explained for sustainable supply chain performance is 0.823 which is shown in Fig. 2. It indicates that all the variances are explaining 82.3% variance in sustainable supply chain performance. Table 7 shows the quality of model with the help of predictive relevance ( $Q^2$ ). It must be above zero to achieve the quality of model (Chin, 1998). Fig. 4 also shows the predictive relevance ( $Q^2$ ).

**Table 7**

Predictive Relevance ( $Q^2$ )

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
BI	888	267.004	0.699
SCI	888	545.96	0.385
SCSP	1,332.00	499.763	0.625



**Fig. 4. Predictive Relevance ( $Q^2$ )**



## 5. Discussion and Conclusion

The purpose of this study was to explore the effect of digital customer experience and electronic word of mouth on the performance of sustainable supply chain through brand image and supply chain image. Findings of the analysis show that digital customer experience and electronic word of mouth played positive role on promoting brand image. Digital customer experience through e-commerce and electronic word of mouth played positive role to boost brand image, brand image had positive role to boost supply chain image and finally promoted the performance of the sustainable supply chain.

The relationship between digital customer experience and electronic word of mouth had significant positive effect on brand image with t-value of 3.086 and 11.084, respectively. Increase in digital customer experience and electronic word of mouth promoted brand image. Both digital customer experience and electronic word of mouth were heavily based on e-commerce. As it is found by various studies branding and e-commerce had link with each other (Lowry et al., 2008; Penttinen & Turunen, 2017). Therefore, e-commerce has pivotal role in digital customer experience and electronic word of mouth to promote brand image.

In line with the above findings, it has found that brand image had positive significant effect on supply chain image with t-value 25.167. Good brand image facilitates better supply chain image. As the brandings has relationship with supply chain image (Czinkota et al., 2014; Farquhar, 1994; Tsou et al., 2009; Zhang et al., 2013). Moreover, it is found that supply chain image increases the sustainable business performance. A significant positive relationship was found between supply chain image and sustainable business performance with t-value 84.298. Therefore, the combination of digital customer experience and electronic word of mouth increases supply chain sustainable performance through brand image and supply chain image in Indonesian ICT companies. Hence, Indonesian ICT companies should work to increase the brand image with the help of digital customer experience and electronic word of mouth which requires the implementation of e-commerce practices. Promotion of brand image has the ability to promote supply chain which automatically increases the overall performance.

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