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The Effect of Organizational Learning Capability as a Mediating Variable in the Relationship between Green Intellectual Capital and Business Sustainability: Evidence from the Manufacturing Sector

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Abstract

Sustainability is aimed to foster the balanced of economic, social and environmental development. However, only economic dimension is receiving more attention in business organization. In fact, the present economic activity has contributed to rather serious environmental crises. This environmental destruction seems to affect our ability in sustaining prosperity and achieving social equity. Thus, there has been an increase interest in green intellectual capital towards attaining the goal of business sustainability in the last decades. Green intellectual capital refers to a new form of innovation and approach in the attempt to understand and solve issues related to the environment. Furthermore, the role of green intellectual capital on business sustainability is better supported by organizational learning capability to mediate the relationship between green intellectual capital and business sustainability. Hence, the motivation of this study derives from the above facts that the green intellectual capital and business sustainability approach are still new in Malaysia. The developed hypotheses were tested based on the data gathered via mail survey to managers of SMEs in the Malaysian manufacturing. Data collected from 168 managers were analyzed using the Smart PLS 3.0 statistically techniques. Three main findings revealed. Firstly, green structural capital and green relational capital have significant relationship with organizational learning capability while green human capital did not. Secondly, organizational learning capability has a significant relationship with business sustainability. Thirdly, organizational learning mediates the relationship between both green structural capital and green relational capital and business sustainability, while green human capital

did not. This current study, has contributed to the body of knowledge where this is the first study that links green intellectual capital on business sustainability. In addition, no research done on organizational learning capability as mediating in the relationship between green intellectual capital and business sustainability. Finally, this paper provides several implications and limitations.

Keywords: Green Intellectual Capital, Green Human Capital, Green Structural Capital, Green Relational Capital, Organizational Learning Capability, Sustainability, Manufacturing, Malaysia

Introduction

The present economic activity has contributed towards rather serious environmental crises, such as intolerable climate change, scarcity of clean water and food, diminishing fuel, as well as unstable and slump in economy across nations (Abdullah, Abu Bakar, Mohd Jali, & Ibrahim, 2017). An estimated 60% of the ecosystem worldwide have been reported to experience degradation and it seems to affect our ability in sustaining prosperity and achieving social equity (Gong, Simpson, Koh and Tan, 2018). Generally, a business becomes sustainable when the organization can pursue economic and social development without damaging the environment (Galpin, Whitttington & Bell, 2015). Most organizations are slow to adopt sustainability practices as they fail to realize the importance of sustainability (Leaniz & del Bosque, 2013).

It is, therefore, essential for organizations to understand the pressing environmental issues in order to minimize the impacts of economic activity by adapting innovation (Rantala, Ukko, Saunila & Havukainen, 2018) and by placing more focus on sustainability solutions in their business processes (Ray & Grannis, 2015). From the stance of economy, intangible asset has become an important concern, even more than intangible asset (Agostini, Nosella & Filippini, 2017; Allameh, Abbasi & Shokrani, 2010). According to Stewart (1997) the terms 'intangible asset' and 'knowledge resource' have been commonly defined as an intellectual capital (IC). GIC is the summation of knowledge, capabilities and relationships of the company that is related to the green innovation and protection (Chen, 2008).

However, IC or organizational knowledge alone is less useful if learning does not take place in an organization. In other words, if there is a large amount of knowledge present in an organization, but less attention is given whether the employees are capable to learn and develop an existing knowledge, it will decrease the organizational survival and competitiveness. Furthermore, Nattrass & Altomare (1999) highlighted that organizational learning capability (OLC) is important to enhance sustainability. OLC is the organizational's capability to process knowledge and to modify its behaviour to reflect the new cognitive situation (Gomez, Lorente & Cabrera, 2005).

The conception of this paper is novel because many prior studies have solely focused on IC and performance while none has empirically explored the correlations between elements of GIC towards business sustainability (BS). In addition, no research done on OLC as mediating in the relationship between GIC and BS. Hence, the motivation of this study is derived from the above facts that the GIC approach is still new and at its embryonic stage in Malaysia; a developing country. As such, this study intends to bridge the identified gap. This study intended to examine the approach of GIC and OLC in manufacturing SMEs. It is also expected to give exposure to the managers for GIC and OLC implementation in their business. This study was motivated by major research objectives as follows:

RO1: To examine the relationship between green intellectual capital and organizational learning capability.
RO2: To examine the relationship organizational learning capability and business sustainability.
R03: To examine the mediating effect of organizational learning capability in the relationship between green intellectual capital and business sustainability.

Green Intellectual Capital (GIC) and Organizational Learning Capability (OLC)

Green intellectual capital (GIC), a term first introduced by Chen (2008) refers to the summative of environmental knowledge, skills, capabilities, experiences, attitudes innovations and the cooperation of the organization related to green innovation or green protection. The author further claimed that most of the organization disagree with the environmental trend nowadays due to it is the main challenges for future organizational development. This environmental trend leads many organizations to carry out GIC to identify the environmental issues to gain competitive advantage Chen (2008). The classifications of GIC in this study are divided into three categories: green human capital (GHC), green structural capital (GSC) and green relational capital (GRC) as suggested by Chen (2008).

Previous researcher has its own human capital (HC) definitions. Most accepted definition stated that human capital (HC) is defined as the summation of tacit knowledge, abilities, skills and experience that embedded in their employees (Bontis, 1998; Sullivan, 1999; Sveiby, 1998). Additionally, HC is recognized as one of the key element of the intellectual capital (IC) towards organization's competitive advantage (Mehralian, Rasekh, Akhavan & Ghatari, 2013). Meanwhile, structural capital (SC) consists of explicit knowledge that is embedded into systems, databases and programs of the organization that support productivity and performance of the employees in the organizations (Edvinsson & Malone, 1997). Organization with good structure and skill employees can provide quality service and consequently improve organization's performance (Amrizah & Nawal, 2013). Lastly, Edvinsson and Malone (1997) view relational capital (RC) as the networking that is developed among customers. Meanwhile Bontis (1998) define RC as all the relationships that an organizations establishes with customers, stakeholders, suppliers, community as well as government. The main purpose in establishing relationship with various parties is to generate wealth (Stewart, 1997).

Given the fact that intellectual capital (IC) and organizational learning capability (OLC) are important for organization development. However, very few studies focus on the relationship and how these two factors are related to each other (Hsu & Fang, 2009). The link between IC and organizational learning were lauded through the research done by Nahapiet and Ghoshal (1998) whereby they postulated that everyone or groups were held different resources or knowledge in the organizations and exchanged resources is needed to be combined through collective learning. Liyanage and Poon (2002) further recommended that the higher OLC lead to better performance where both IC and learning is aimed to improve organizational efficiency. Hsu and Fang (2009) further asserted that IC can improve OLC. This is aligned with Nonaka & Takeuchi (1995). Thus, based on these discussions, there hardly seems in the literature on the relationship between green intellectual capital (GIC) and OLC. Behind this reason, this study offers the following hypothesis.

H1: There is a relationship between green intellectual capital (GIC) and organizational learning capability (OLC).

H1a: There is a relationship between green human capital (GHC) and organizational learning capability (OLC).
H1b: There is a relationship between green structural capital (GSC) and organizational learning capability (OLC).
H1c: There is a relationship between green relational capital (GRC) and organizational learning capability (OLC).

Organizational Learning Capability (OLC) and Business Sustainability (BS)

The growth of OLC has given a great attention to many scholars. They have agreed that, knowledge is very important source to achieve better performance, success and competitiveness (Drucker, 1993; Lei, Slocum & Pitts, 1999; Vilani Sachitra & Siong-Choy, 2018) innovation performance (Garba Muddaha, Yeoh Khar Kheng & Yaty, 2018), organization's performance (Goh, Elliott & Quon, 2012). Besides that, previous study by Prieto and Revilla (2006) shows OLC to respond to market changes. OLC as the capability of an organization to process knowledge in order to create, acquire, transfer and integrate knowledge, and to modify its behavior to reflect the new cognitive situation with a view to improve its performance as suggested by Gomez et al. (2005). Later, Bahadori, Hamouzadeh, Qodoosinejad and Yousefvand (2012) pointed out that OLC has been considered as an active process that will result in knowledge transfer, openness, integration capabilty and experimental.

The Brundtland Report defines sustainability as meeting the needs of people today without compromising the ability of future generations to meet their own needs (Brundtland, 1987). Under this umbrella, the concept of sustainability in business is comprised of three pillars, which are: economic, social, and environmental dimensions (Leaniz & del Bosque, 2013).

Given the fact that the organizational's performance is mainly depends on knowledge, techniques and capabilities (Nonaka & Takeuchi, 1995). Various scholars suggest that in order to sustain competitive advantage, organization should acquire knowledge by learning. In a similar tone, Senge (1990) mentioned that organizational learning is a vital sources for competitive advantage by unlocking the potential of learning among individuals and groups in the organization. In other word, learning can be seen as a key weapon to increase productivity, innovativeness and competitiveness in uncertainties market. The study by Hult, Hurley and Knight (2004) argue that organizational learning capability (OLC) enable product operation and enhance the organizational performance. In k-based economy, tacit knowledge that embedded in human brains such as in the forms of skills, experience, and personal capability is seen more powerful resources.

Becker and Huselid (1998) suggest that OLC through the knowledge development which are hard to copy, valuable and rare contribute to sustainable competitive advantage. Moreover, a strong OLC through management support on knowledge exploitation and development can lead to achievement of organizational performance (Goh et al., 2012). Furthermore, according to Nattrass and Altomare (1999) OLC is important to enhance sustainability in the organization due tothe potential of OLC encourage a holistic approach to environmental management and sustainability. Based on these discussions, this study offers the following hypothesis.

H2: There is a relationship between organizational learning capability (OLC) and business sustainability (BS).

Organizational learning Capability as a Mediator between Green Intellectual Capital and Business Sustainability

Studies had also been conducted to examine organizational learning capability (OLC) as a mediator within various business variables. This can be seen in previous studies done by (Agostini et al., 2017; Akgun, Keskin & Bryne, 2007; Allameh, Abbasi & Shokrani, 2010). For example, in a study done by Hsu and Fang (2009), they examined the relationship between intellectual capital (IC), OLC and new product development performance. They found that human capital and relational capital improved new product development performance through OLC. Akgun, Keskin and Bryne (2007) on their study in examining the mediating effect of organizational learning capability on emotional capability and product innovativeness pointed out that organizational learning capability has a partial mediating effect between emotional capability and product innovative. Nattrass & Altomare (1999) highlighted that organizational learning capability (OLC) is important to enhance sustainability. The role of green intellectual capital (GIC) on business sustainability will be better if it is supported by organization learning capability (OLC) to mediate the relationship between GIC and BS. Thus, this study implied the following hypotheses:

H3: Organizational learning capability (OLC) mediates the relationship between green intellectual capital (GIC) and business sustainability (BS).
H3a: Organizational learning capability (OLC) mediates the relationship between green human capital (GHC) and business sustainability (BS).
H3b: Organizational learning capability (OLC) mediates the relationship between green structural capital (GSC) and business sustainability (BS).
H3c: Organizational learning capability (OLC) mediates the relationship between green relational capital (GRC) and business sustainability (BS).

Research Methodology

This study adopts quantitative research method. A seven-point Likert scale was used for all items in GIC questionnaire, where 1 indicates strongly disagree to 7 indicates strongly agree. The questionnaire was adopted from Huang and Kung (2011) and it had a total of 18 items. Meanwhile, the questionnaire for BS and OLC was both measured using a 5 point Likert scale measurement ranging from '1' for 'strongly disagree' to '5' for 'strongly agree'. Questionnaire for BS was adopted from Chow & Chen (2012) with 22 items in the measure. While questionnaire for OLC was adopted from Gómez et al. (2005) with 17 items in the measure. The targeted respondents consisting of the most knowledgeable individuals, including directors, human resource managers, production managers, research and development (R&D) managers, as well as assistant managers from SMEs manufacturing organizations in Malaysia. A total of 168 usable questionnaires were returned. All usable data were subsequently coded and analysed using Smart PLS 3.0 Structural Equation Modelling statistically techniques. The summary of the key constructs is given in Table 1.

Table 1
Summary of Key Constructs, Sources of Questions and the Number of Items

Variable	Dimension	No of Items	Source
GIC	Green Human Capital (GHC)	5	(Huang & Kung, 2011)
	Green Structural Capital (GSC)	8	
	Green Relational Capital (GRC)	5	
BS	Economic	6	(Chow & Chen, 2012)
	Social	6	
	Environmental	10	
OLC	Managerial Commitment	5	(Gómez et al., 2005)
	System Perspective	3	
	Openness and Experimentation	5	
	Knowledge Transfer and Integration	4	

Data Analysis: Demographic
A total of 168 manufacturing organizations involved in this study. Table 2 describes the demographic profile of the respondents.

Table 2
Demographic Profile

Characteristics	Frequency (N=168)	Percentage (%)
Gender		
Male	126	75
Female	42	25
Age		
Less than 25	4	2.4
25-35	46	27.4
36-45	64	38.1
46-55	35	20.8
More than 55	19	11.3
Level of Education		
Sijil Pelajaran Malaysia (SPM)	1	0.6
Diploma	17	10.1
Bachelor Degree	104	61.9
Master Degree	39	23.2
PhD	3	1.8
Others	4	2.4
Race		
Malay	50	29.8
Chinese	102	60.7
Indian	13	7.7
Others	3	1.8
Permanent Employees		
Less than 5	7	4.2

Characteristics	Frequency (N=168)	Percentage (%)
5-50	23	13.7
51-150	51	30.4
More than 150	87	51.8
Number of years		
Less than 5 years	17	10.1
5 - 10 years	17	10.1
11 - 15 years	37	22.0
16 - 20 years	45	26.8
More than 20 years	52	31.0
Position		
Director	16	9.5
General Manager	18	10.7
Manager	103	61.3
Assistant Manager	8	4.8
Executives	15	8.9
Others	8	4.8
Type of Business		
Sole/Proprietor	9	5.4
Partnership	19	11.3
Private Limited	135	80.4
Others	5	3
Industry		
Food/Beverages	17	10.1
Electrical/ Electronics	58	34.5
Machinery/ Engineering	15	8.9
Metal/Metal Products	19	11.3
Petrochemical/ Chemical	4	2.4
Paper/Printing/ Publishing	14	8.3
Plastic/Plastic Products	3	1.8
Wood/Wood Products	10	6.0
Rubber Products	13	7.7
Palm Oils Products	3	1.8
Packaging/ Packaging Materials	1	0.6
Textile/Clothing/Bag/ Shoes	4	2.4
Household/ Houseware	2	1.2
Pharmaceutical/Cosmetics/ Toiletries	2	1.2

Characteristics	Frequency (N=168)	Percentage (%)
Others	3	1.8
Location		
Johor	16	9.5
Kuala Lumpur	21	12.5
Pahang	8	4.8
Perlis	1	0.6
Selangor	85	50.6
Kedah	3	1.8
Penang	13	7.7
Terengganu	3	1.8
N. Sembilan	3	1.8
Perak	15	8.9

Measurement Model

The convergent validity and discriminant validity have been used in measuring the model. The AVE values of all constructs exceeded 0.5. Next, the table also postulates the CR values, where the internal consistency of measurement is display. CR values of all constructs had been above 0.8, which exceeded 0.7 and higher. Hence, convergent validity is achieved.

Table 3
Measurement Model

Constructs	Items	Loadings	AVE	CR
GHC	GHC1	0.863	0.768	0.943
	GHC2	0.912		
	GHC3	0.935		
	GHC4	0.895		
	GHC5	0.779		
GSC	GSC1	0.855	0.844	0.964
	GSC2	0.828		
	GSC3	0.892		
	GSC4	0.921		
	GSC5	0.914		
	GSC6	0.878		
	GSC7	0.897		
	GSC8	0.777		
GRC	GRC1	0.903	0766	0.963
	GRC2	0.910		
	GRC3	0.910		
	GRC4	0.944		
	GRC5	0.931		
BS	BS1	0.660	0898	0.747
	BS2	0.837		
	BS3	0.668		
	BS4	0.654		
	BS5	0.743		

Constructs	Items	Loadings	AVE	CR
	BS6	0.730		
	BS7	0.623		
	BS8	0.90		
	BS9	0.876		
	BS10	0.762		
	BS11	0.861		
	BS12	0.652		
	BS13	0.760		
	BS14	0.772		
	BS15	0.641		
	BS16	0.820		
	BS17	0.632		
	BS18	0.814		
	BS19	0.777		
	BS20	0.721		
	BS21	0.840		
	BS22	0.754		
OLC	OLC1	0.715	0.840	0.743
	OLC2	0.654		
	OLC3	0.652		
	OLC4	0.712		
	OLC5	0.611		
	OLC6	0.727		
	OLC7	0.765		
	OLC8	0.737		
	OLC9	0.770		
	OLC10	0.740		
	OLC11	0.731		
	OLC12	0.704		
	OLC13	0.843		
	OLC14	0.760		
	OLC15	0.685		
	OLC16	0.684		
	OLC17	0.546		

Next, discriminant validity is examined using Heterotrait Monotrait ratio of correlations (HTMT) criterion. One item was deleted (GHC5) to satisfy the discriminant validity. A shown in Table 4, all the values fulfil the criterion of HTMT0.85. It means that discriminant validity is achieved for the construct of this study and valid to be used for assessing structural model in next section.

Table 4
Heterotrait-Monotrait Ratio (HTMT)

	BS	GHC	GRC	GSC	OLC
BS					
GHC	0.642				
GRC	0.743	0.826			
GSC	0.649	0.843	0.833		
OLC	0.829	0.534	0.634	0.452	

Structural Model

Next, data analysis was then undertaken to test all hypotheses. The values of standard beta, standard error, and one-tailed t-value are presented in Table 4.4. Based on the finding, all hypothesis are accepted. Table 5 illustrated the overall hypotheses testing of the said relationship.

Table 5
Hypotheses Testing

Hypothesis	**Original Sample (O)**	**Std error**	**t-value**	**LL**	**UL**	**f2**	**Decision**
H1a: GHC -> OLC	0.175	0.111	1.577	-0.15	0.073	0.015	Not Supported
H1b: GSC -> OLC	-0.247	0.118	2.092	0.033	0.096	0.028	Supported
H1c: GRC -> OLC	0.659	0.09	7.281	0.405	0.405	0.213	Supported
H2: OLC -> BS	0.55	0.056	9.826	0.625	0.701	0.642	Supported

Table 6:
Testing for Mediation

Hypothesis	**Original Sample (O)**	**Std error**	**t-value**	**Decision**
H3a: GHC -> OLC -> BS	0.096	0.061	1.576	Not Supported
H3b: GSC -> OLC -> BS	-0.136	0.069	1.967	Supported
H3c: GRC -> OLC -> BS	0.362	0.074	4.898	Supported

Discussion

There are three main objectives in this study Firstly, this study found that green human capital (GHC) has insignificant relationship with organizational learning capability (OLC); thus H1a was rejected. Insignificant finding found in this study probably due to a number of reasons. Most of the past studies have done on human capital that linked to OLC. However, this study is differ which is the first study that examine the relationship between GHC and OLC. This

novel concept is still new in the Malaysia context particularly manufacturing SMEs. Thus, they have lack of skilled human capital that related to environmental protection. Moreover, manufacturing SMEs are less likely to have good human resource departments that seems difficult in recruitment and retaining the talents as compared to larger organizations.

Secondly, the finding reveal that green structural capital (GSC) has significant relationship with organizational learning capability (OLC); thus H1b was accepted. The finding of this study showing that manufacturing SMEs have good structural capital that helps to accumulate and retain information, knowledge, system and appropriate procedures on environmental protection with every customer and other stakeholders. This accumulated knowledge stored inside structural capital was used to enhance OLC as it serves as a database enabling people to examine, discuss and ultimately learn for enhancement of performance.

Thirdly, green relational capital (GRC) has positive effect on OLC; thus H1c was accepted. Significant finding of this study showing that manufacturing SMEs seek knowledge from relationships with other parties due to their little resources, knowledge and expertise to solve the issues of sustainability. By having a stable relationship, they are more accessible to the market information and business situations. They become more knowledgeable and concern about the impact of their today's activities on sustainability and enhance OLC in the organization.

The results also show that OLC influence the BS of Malaysian manufacturing SMEs; thus H2 was accepted. This relationship indicates that in order for business to sustain in the competitive market, they should give full attention on learning capability that facilitate learning in the organization. This approach will guide the organizations to react and learn for present and upcoming business problems.

In regards to mediating effect, there is no mediating effect of OLC between GHC and BS; thus H31a was rejected. The plausible reason perhaps the manufacturing SMEs are still far behind with challenges to secure and retain good human capital particularly in environmental protection because the lack of financial and physical constraints. This inability will resulting insignificant of OLC as a mediator in this context.

There is mediating effect of OLC in the relationship between green structural capital (GSC) and BS; thus H31b was accepted. Significant finding of this study showing that accumulated knowledge related to environmental protection stored inside structural capital as it serves as a database can enhance sustainability through OLC. OLC enabling employee to examine, discuss and ultimately learn for enhancement of performance.

Lastly, this study found that OLC mediates the relationship between green relational capital (GRC) and BS; thus H31C was accepted. It is believed that the good relationships among employees and other stakeholders provide a great change in knowledge sharing among them. The received knowledge will be examined, discussed and learn in order to improve sustainability.

Conclusion

ThE current study has contributed to the body of knowledge where this is the first study that examine the affects of OLC as a mediating variable in the relationship between all three dimension of GIC (GHC, GSC and GRC) with three pillars of BS (economic, social and environmental). This study hopefully contributes to managerial implications to manufacturing organization in Malaysia. This finding will guide them to maximizing valuable resources in organization through strong OLC. It will in return enhance competitiveness among others and be sustainable in the future.

Despite the findings, this study holds some limitations. First, there were relatively small studies on GIC and BS in Malaysian manufacturing industry. Thus, more research on this basic concept is needed in the future to generalize the findings. Second, it is also fruitful to focus this study on other industries. Third, this study is based in Malaysia as a developing country. Other studies can be done to other developing countries. Finally, sample size of this study was very small. Larger sample sizes needed to confirm the findings.

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