Practice of green intellectual capital. Evidence from Malaysian manufacturing sector

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Abstract. Very few studies have examined the connection between both intellectual capital (IC) with natural environment called as green intellectual capital (GIC). Regrettably, poor attention are given on GIC among both academicians and practitioners. This absence factor of natural environment can be acceptable in the past, but nowadays the natural environment become major challenge in the achievement of competitive advantage. More specifically, competitive advantage strategies in the current and future highly depends on the resources and capabilities that ease activity of environmental friendly. This approach arguing that the natural environment become a new and business opportunities and organisations that are willing to change their business operation to these challenges will obtain the economy’s survival in the future. Therefore, this study intends to report on the perceptions of manufacturing SMEs in Malaysia on GIC. There are eighteen variables on GIC that formed a part of a questionnaire using a seven-point interval scale. A total of 168 respondents returned the questionnaires and was analysed using the Statistical Package for Social Sciences (SPSS) approach. The results of the study revealed that the existence of green human capital (GHC) and green relational capital (GRC) in the organisation. Nonetheless, green structural capital (GSC) become lowest factors among three dimensions of GIC.

1. Introduction

Increasing population in the current pattern together with the industrial production growth and consumption level contribute to unsustainable environment. Current research by Gong [1] showed that many environmental destruction occurred which contributed to negative consequences on sustainability as the whole where it causes inability to sustain prosperity and achieving healthy well-being of people and communities. This absence factor of natural environment can be acceptable in the past, but nowadays the natural environment become major challenge in the achievement of competitive advantage. More specifically, competitive advantage strategies in the current and future highly depends on the resources and capabilities that ease activity of environmental friendly. This approach arguing that the natural environment become a new and business opportunities and organisations that are willing to change their business operation to these challenges will obtain the economy’s survival in the future.

Apart from that, this environmental shift has led business to create new thing (i.e: innovation) which is no longer optional but it is necessary and important to all organisations alike [2] to reduce the environmental impact of their products [3]. Despite this increasing trend towards sustainable business practice, the internal capabilities that contribute to green protection as well green product creation of
the organisations are still unexplored [5-7].

In relation to this, the Chen’s (2008) work become one of the significant efforts to reveal the importance of green intellectual capital (GIC) to reach competitive advantage. GIC is all tangible assets or knowledge related to the green innovation or protection. The classification of GIC are green human capital (GHC), green structural capital (GSC) and green relational capital (GRC) claiming that all GIC elements have positive relationship on the firm’s competitive advantage. GHC refers to the skills, knowledge, attitude or commitment among employees related to environmental issues plays a vital role in the innovation of environmental development. In similar vein, GSC refers to company image, culture, information technology system, database containing the great information in environmental aspects such as water and energy consumptions and record of pollution are part of the organizational commitment towards environmental management and environmental strategies development. Besides that, GRC also plays a key part in the organisation’s environmental management. GRC is the collaboration of other stakeholders regarding to environment development and strategies.

Hence, the motivation of this study derives from the above facts that the GIC approach is still new and at its embryonic stage in Malaysia; a developing country. This study is carried out to capture the perceptions of manufacturing SMEs on the GIC in their organizations.

2. Literature review

Intellectual capital (IC) is the set of all intangible assets [8] owned by the organisation which has become more important than tangible assets in knowledge-based economy [9]. Based on resource-based view of the organisations [10-11] developing strong intangibles provides organisations with opportunities for improving business performance [12-16], gaining competitive advantage [17-20], innovating [21-22] and as a organisation’s survival [23]. Based on the above facts, existing literature has repeatedly demonstrated the relationship between IC and various organisation’s performance. Regrettably, connection between both intellectual capital (IC) with natural environment called, as green intellectual capital (GIC) is uncommon and given poor attention among both academicians and practitioners. Furthermore, very few studies done on GIC [24, 4, 25, 26, 29, 30, 32]. This field is still in beginning stage, these connections forms as a future path in business development.

3. Methodology

We collected data from SMEs manufacturing organisations in Malaysia. The list taken from Federation of Malaysian Manufacturers (FMM) 2017 as sampling frame. This study was used questionnaire-based survey for data collection.

3.1. Sampling

Probability and convenience sampling was used in this study. The first phase of data collection was within two-month duration using hardcopy approach. 400 SMEs manufacturers in the FMM directory were selected for postal mailing of questionnaires and distributed among top managers of manufacturing SMEs in Malaysia. The questionnaires together with return envelopes were sent out via post to the SME manufacturers. Each return envelope was coded with a number. Only 36 questionnaires were returned back. The second phase of data collection using email survey. The respondents given a clear instruction of objectives of this study and confirm the name and designation of the respondents before mailing the questionnaires to them to increase the response rate validation. Another 440 questionnaires survey was distributed and the respondents were asked to return the complete questionnaires within two weeks. For those who were unable to complete questionnaire within the given time, we send two email reminders and last reminder using phone call. Within two months period, we received 140 questionnaires. The total is usable questionnaires are 176. However, eight set of questionnaires have incomplete filled and thus were exclude from final analysis. 168 usable questionnaires were included for further analysis with a effective respond rate of 21.08%.

3.2. Measurement

As depicted in Table 1, the questionnaire contained 18 items that related to the GIC. The respondents
required to rate their existence of GIC within organisations. Three dimensions, namely, green human capital (5 items), green structural capital (8 items) and green relational capital (5 items) were used to measure GIC in organisations. Items in green human capital, green relational and green structural capital (GHC, GSC and GRC) dimensions were adapted and adopted from previous study by Huang & Kung [26].

GHC dimension intends to measure overall environmental skills, capabilities, experiences, innovations and commitments of employees in the organisation. On the other hand, GSC were utilised to measure the supportive infrastructure processes and databases related to environmental protection. As for item in the third component, namely, GRC were used to measure organisation’s relationship with their customers, suppliers, network members, and partners related to environmental protection.

A seven-point interval scale where 1 was marked “strongly disagree,” and 7 was marked “strongly agree” was used to measure the scale.

| Table 1. Summary of Key Constructs, Sources of Questions and the Number of Items |
|---------------------------------|-----------------|-----------------|
| **Variable**                    | **Dimension**   | **No of Items** |
| Green Intellectual Capital (GIC)| Green Human Capital (GHC) | 5               |
|                                 | Green Structural Capital (GSC) | 8               |
|                                 | Green Relational Capital (GRC) | 5               |
|                                 | **Source**      | **Huang and Kung (2011)** |

4. Analysis

4.1. Demographic Profile

SMEs in manufacturing sector can be categorised into three categories namely micro (have less than 5 employees), small (have between 5 to 74 employees) and medium scale (have between 75 to 200 employees). In total, 168 respondents participated in this study. Majority of the organisations have between 150-200 employees. Only 7 organisations having 5 employees. The sample was well distributed in term of years operating. More details on demographic profile of the manufacturing SMEs organisations in Table 2.

| Table 2. Demographic Profile of Respondents |
|--------------------------------------------|
| **Characteristics**                        | **Frequency (N=168)** | **Percentage (%)** |
| Permanent Employees                        |                          |                   |
| Less than 5                               | 7                        | 4.2               |
| 5-50                                      | 23                       | 13.7              |
| 51-150                                    | 51                       | 30.4              |
| 151 - 199                                 | 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              |

4.2. Perception on Green Intellectual Capital

Perceptions on GIC consisted of three indicators, with a total of 18 items. Green human capital, 5 items; green structural capital, 8 items; and green relational capital, 5 items. Table 3 shows realibility
(Cronbach’s alpha), mean, standard deviation, skewness and kurtosis values. All items and the three subscales in this result produced reliability values around 0.8 and above.

Based on Figure 1 and Table 3, there are two statements measures with mean scores closer to “neutral/not sure”. These are: (GSC 8) subscale: “This company has established a reward system for accomplishing environmental tasks” (M=3.87, SD=1.66) and (GSC 2) subscale: “This company has a high ratio of employees of environmental management from its total employees” (M=4.08, SD=1.51). Meanwhile, there are ten statements with mean score of more than 5.0. All these figures point to respondents fully convinced the existence of GIC in their organizations. In addition, the respondents identified (GHC 5) subscale: “The managers can fully support their employees to achieve their jobs of environmental protection.” (M= 5.52, SD=1.13) as the most important GIC’s indicator to their organizations. This is followed by (GHC 1) subscale: “The employees in this company involve a positive productivity and contribution towards environmental protection” (M= 5.45, SD=0.99), (GRC 2) subscale: “The customers are satisfied about this company’s environmental protection” (M= 5.39, SD=1.16), (GHC 3) subscale: “The employees of this company provide high product and service qualities towards environmental protection” (M=5.34, SD=1.01); the other statements’ mean score can be gleaned and interpreted accordingly from the table.

Looking at the mean scores, the first two statements (GSC 8 and GSC 2) subscale can be considered as the weakest aspects of GIC in the organizations. In conclusion, the respondents are positive about the GIC.

**Figure 1.** Mean score of GIC Perception

| Table 3. Normality, Reliability, Mean, Standard Deviation of Green Intellectual Capital |
|---|---|---|---|---|---|
| No | Items | Reliability | Mean | SD | Skewness | Kurtosis |
| Green Human Capital (GHC) | 1 | The employees in this company involve a positive productivity and contribution towards environmental protection. | .910 | 5.45 | .990 | -.619 | .386 |
| | 2 | The employees in this company have an adequate competence towards environmental protection. | .896 | 5.21 | 1.110 | -.581 | -.091 |
| | 3 | The employees of this | .889 | 5.34 | 1.088 | -.794 | .593 |
| No | Items                                                                 | Reliability | Mean | SD   | Skewness | Kurtosis |
|----|-----------------------------------------------------------------------|-------------|------|------|----------|----------|
| 4  | The cooperative degree of teamwork towards environmental protection is performed at high levels in this company. | .901        | 5.17 | 1.162 | -.864    | .686     |
| 5  | The managers can fully support their employees to achieve their jobs of environmental protection.          | .934        | 5.52 | 1.132 | -.787    | .493     |
| Cronbach's alpha                      |             |           |      |      |          | .924     |
| Green Structural Capital (GSC)         |             |           |      |      |          |          |
| 1  | This company has a superior management system of environmental protection.                                   | .947        | 4.93 | 1.336 | -.595    | .078     |
| 2  | This company has a high ratio of employees of environmental management from its total employees.            | .949        | 4.08 | 1.506 | -.133    | -.631    |
| 3  | This company makes an adequate investment in environmental protection facilities.                            | .945        | 4.71 | 1.411 | -.646    | -.230    |
| 4  | The overall operation processes towards environmental protection in this company operate efficiently.       | .943        | 4.87 | 1.356 | -.532    | -.178    |
| 5  | The knowledge management system in this company is favourable for the accumulation and knowledge sharing of environmental management. | .943        | 4.74 | 1.390 | -.293    | -.610    |
| 6  | This company has formed a committee to progress on key issues in environmental protection.                  | .945        | 4.73 | 1.607 | -.324    | -.672    |
| 7  | This company has established detailed rules and regulations of environmental protection                      | .944        | 4.756| 1.5573| -.414    | -.554    |
| 8  | This company has established a reward system for accomplishing environmental tasks.                           | .954        | 3.87 | 1.662 | -.051    | -.846    |
| Cronbach’s Alpha                       |             |           |      |      |          | .953     |
| Green Relational Capital (GRC)         |             |           |      |      |          |          |
| 1  | This company designs its products or services in compliance with the environmental desires of its customers. | .951        | 5.29 | 1.403 | -.862    | .554     |
| 2  | The customers are satisfied about this company’s environmental protection.                                    | .946        | 5.39 | 1.158 | -.321    | -.532    |
| 3  | The cooperative relationships                                                                                   | .937        | 5.10 | 1.227 | -.885    | .889     |
| No | Items                                                                 | Reliability | Mean | SD    | Skewness | Kurtosis |
|----|----------------------------------------------------------------------|-------------|------|-------|----------|----------|
|    | of this company with its suppliers towards environmental protection are stable. |             |      |       |          |          |
| 4  | The cooperative relationships of this company with its clients towards environmental protection are stable. | 0.932       | 5.18 | 1.270 | -0.903   | 0.844    |
| 5  | The cooperative relationships of this company with its strategic partners towards environmental protection are stable. | 0.933       | 5.17 | 1.330 | -0.975   | 0.730    |
|    | Cronbach’s alpha                                                      |             |      |       |          | 0.951    |

5. Conclusion

The main objective of this study was to gain insight the perception on green intellectual capital (GIC) among manufacturing SMEs in Malaysia. There are three conclusions that have been made.

Firstly, the results reveals the existence of green human capital (GHC) in the manufacturing SMEs organisations as the mean score are all above 5.0. It means that manufacturing SMEs are completely utilised their human capital to be embedded with the environmental aspects that leads to organisation performance. This can be done by various ways such as employee’s improvement programs like providing knowledge and information of environmental regulations and provide training related to environmental protection to improve the quality of the services and products. The evaluation of the employees competence associated to environmental protection also can be applied in the organisation.

Secondly, the findings reveal that the practice of GSC remain early in their development. In other words, manufacturing SMEs have long way to go to shift their business structure and process that embedded with environmental management. The plausible reasons is due to their ancient business processes that not highly depends on the information technology system. Besides that, high cost in environmental management investment such as water and energy consumptions and record of pollution system can be a reason in making any investment decisions due to their limited financial resource. In fact, this investment is required to show organisation commitments towards environmental protection strategies. It is believed that, the high commitment towards environmental protection can improve organisational image. Findings also reveals that the respondents have lowest perceptions on the rewards system. For organisation to attract their employees contribute to environmental protection mission, the employees should be rewarded as a tools to motivate them to become responsible to any environmental issues. Therefore, the organization must identify and establish many creative ways as possible to reward their employees that contribute to environmental protection, which benefits them in return.

Thirdly, another interesting finding of the study is that manufacturing SMEs in Malaysia are engaged in developing GRC in their organizations. Due to high cost in establishing high technology system related to environmental protection, manufacturing SMEs are looking forward to a cheaper approach such as collaborations as their effective environmental strategies. A rich network collaboration with stakeholders allows the development of trust and encourages organisations to implement green protection. Realizing that manufacturing SMEs have limited knowledge and expertise to solve environmental issues in the organisation, they seek knowledge from collaborations with other parties such as customers, communities, governments, suppliers and NGOs that will help them in decision making process to transform their business models in which products and services are to be redesign to produce eco-friendly products.

In conclusion, GIC become one of an effective business investment, as it is the heart of internal resource improvements towards comprehending environmental issues. As such, it is believe that the organisations with strong environment’s resources is particularly more helpful and it is found easier to penetrate their market, thus creating vast business opportunities.
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