Exploration of Dimensions and Measurement in Intellectual Capital Modeling

Sulastri[1], Yuki Fitria[2], Chichi Andriani[3]

[1] Universitas Negeri Padang, Padang, Indonesia, ✉sulastri. feunp @ gmail.com
[2] Universitas Negeri Padang, Padang, Indonesia, ✉yukifitria@fe.unp.ac.id
[3] Universitas Negeri Padang, Padang, Indonesia, ✉chichi.andriani @ gmail.com

Abstract

This study aims to explore groups of intellectual capital items that can measure well the values of company intellectual capital, especially SMEs in Padang. Then developed an intellectual capital model that can be implemented for SME's, especially in Padang. The population in this study is all micro, small and medium enterprises (SMEs) that are under the guidance of the Cooperative and MSME Office in Padang. In 2017 there were 2,953 MSMEs spread across 11 sub-districts in Padang City. The number of samples was determined through a purposive technique and a proportional sampling area cluster, so that a sample of 341 people was obtained. The data collection technique in this study was used a questionnaire using Intellectual capital dimensions and sub dimensions. Techniques analysis of data in this study used confirmatory analysis (CFA). From the results of data processing the results obtained, that; Of the total 29 items of intellectual capital tested, only 22 items can be used to measure the dimensions of intellectual capital at SMEs, especially in Padang. Where for the human capital dimensions is measured by 7 statement items, for the customer capital dimensions there are 3 statement items. Next there are 12 statement items to measure structural capital.

Keywords: *intellectual capital, human capital, customer capital, structural capital*

Introduction

Today's globalization has tightened competition in organizations in all fields. This forces organizations to change the way they do business, usually labor-based to knowledge-based business (Tjiptohadi and Agustine, 2003). With knowledge-based through the application of intellectual capital, it is believed that the organization could be more effective in achieving its goals compared to only basing on the role of financial capital.

The ability of intellectual capital of employees can be seen from the quality of ideas, information, knowledge and expertise as well as the commitment they have. If the competency has a great opportunity to be actualized and integrated into the management process, then this intellectual capital is believed to significantly increase the ability of assets to increase profits, performance, job satisfaction, customer satisfaction and those interested in the organization, (Orhan and Kenan, 2015) .

Ideally intellectual capital is implemented by all types of companies, including Micro, Small and Medium Enterprises (MSME). From the results of Ngah & Ibrahim's research (2009), it is known that intellectual capital in SMEs could contribute to the product innovation process that encourages SMEs performance improvement. In line with Daou *et al* (2013) in general intellectual capital has a positive impact on the performance of SMEs.

The existence of SMEs is vital in a country, reflecting the role of the entrepreneurial world in a process of better economic growth. Like Indonesia, the intensity of the existence of SMEs is expected to be able to develop and contribute positively to increasing the number of Gross Domestic Product (GDP), and broadly in the process of improving the welfare and regional economy in the future. Yet globalization is pushing for high levels of competition that business people need to be more innovative. However, factually the ability of innovation and

competitiveness is the weak point of most SMEs, as well as SMEs in Padang City. Whereas, SME is the main support for the economy of the people of Padang City. This is proven by more than 1.2 million SMEs performers who absorb millions of labor force (Masni, 2014). Therefore, in order to improve the competitiveness of SMEs, especially in the city of Padang, SMEs should implement intellectual capital.

Intellectual capital is generally carried out by companies in developed countries. Most business people, especially in Indonesia, have not yet found the right answer about what value the company has (Abidin, 2000). Likewise with the SMEs in the city of Padang. Their knowledge is still limited to the intellectual model, whereas if the intellectual capital can be applied to companies in Indonesia, it will be able to increase their competitive advantage through the creation of products that are increasingly innovative and favorable in the eyes of consumers (Abidin, 2000).

Accordingly, this research was conducted in the purpose of exploring and proposing groups of intellectual capital items to measure the values of the company's intellectual property, especially SMEs in the city of Padang. Then it will help to develop an intellectual capital model which could be implemented for SMEs, especially in the city of Padang.

Literature Review

Attention to the concept *of intellectual capital* has increased in this decade. This is indicated by the increasing number of research related to intellectual capital. Even previous researchers have also done a lot of research on intellectual capital. Figure 1 below shows the studies that have been conducted to examine the concepts and implications of intellectual capital, as follows:
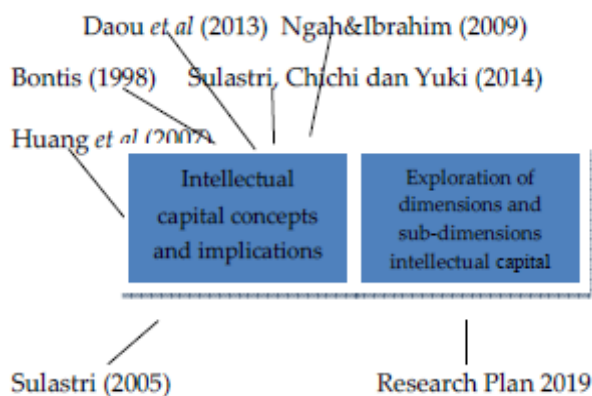

Figure 1. Research Roadmap

Based on the above figure, it can be seen that some previous researches are the basis of this research. Bontis (1998) conducted research under the title *Intellectual capital: an exploratory study that develops measures and models*. This research aims as a preliminary study to develop items and constructs to enable measuring intellectual capital empirically. Then the results are classifying intellectual capital in three dimensions which are explained by 53 sub-dimensions. Furthermore Sulastri (2005) by referring to Bontis research (1998) [7] conducted research on intellectual capital in the form of a dissertation, which is measuring intellectual capital (human capital, structural capital and customer capital) in a go public manufacturing companies on the BEJ with the Human Resources Accounting (HRA) approach. Almost in line with Bontis research, Huang *et al*. (2007) conducted research under the title; *An Evidence-Based Taxonomy of Intellectual Capital*. This research aims

at grouping IC items based on empirical evidence in the form of manager responses from questionnaire questions.

There are some researches on intellectual capital conducted at SMEs. As Ngah& Ibrahim's research (2009) links intellectual capital and innovation to the performance of SMEs in Malaysia. Furthermore Daoun *et al* (2013) implications of intellectual capital in SMEs in Mexico based on the perspective of resources and a dynamic view of capabilities. Finally Sulastri, Chichi and Yuki (2014) conducted research related to the application of intellectual capital at Padang State University.

Some experts define intellectual capital in various literatures. Among them is the definition put forward by Bontis (2001) in Khalid Al-Jinini et al (2019), defining intellectual capital as a collection of intangible assets and the flow of knowledge of a company. Furthermore, according to Guthrie (2000) the term intellectual capital *is* used for all non tangible or non-physical assets and resources of an organization, which includes processes, capacity of innovation, patterns and invisible knowledge of members, collaboration networks and organizational relations.

From several definitions of intellectual capital, it can be concluded, that intellectual capital refers to a combination of intangible resources, covering a variety of knowledge, experience and expertise related to employees expertise, good relations with customers, and the company's information technology capacity which significantly contribute to the process of creating value that is able to provide a competitive advantage for the company.

Dimensions of Intellectual Capital

Some research shows that intellectual capital consists of three main elements that is human capital, structural capital and customer capital (Stewart 1998, Bontis 2000). The dimensions of Intellectual Capital can be described as follows;

Human Capital

Human capital indicates the knowledge possessed by each employee that is used in the production process or completion of employees tasks (Sulastri, 2018). In the human capital found an intellectual power that comes from the people owned by the company namely employees who are competent, committed, and motivated in working.

Structural capital

Structural capital in general is said as the infrastructure owned by the company allowing the company to function optimally and to adjust to any changes that occur (Sulastri, 2018). Structural capital as a mechanism and structure owned by the organization which employees could optimally elaborate the individual human capital they possess, in order to achieve high individual work performance in an effort to achieve the best performance of the organization (Bontis, 2001).

Customer / Relational Capital

Relational capital include good relations between the company and all stakeholders (Choong, 2008). Essentially relational capital is in organizational knowledge that is born from the external environment to strengthen internal resources (Sulastri, 2018). Thus relational capital is a harmonious relationship of association network owned by the company with its partners, which are coming from the suppliers, customers and government and society.

Taxonomy of Intellectual Capital Dimensions

The attention of experts towards the conceptual intellectual capital has increased in the current decade. But there is still a lack of consensus on the components and definitions of intellectual capital. The concept of intellectual capital is multidisciplinary, thus triggering differences in understanding business variations

related to different disciplines. This has led Huang, *et al* (2007) to conduct research to classify items in the intellectual capital dimension based on empirical evidence derived from manager responses through questionnaires.

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Table 1. Taxonomy of Intellectual Capital

Dimensions IC	Sub-dimensions
Human capital	HC1 Employees' know-how/expertise
	HC2 Employees' level education/vocational qualification
	HC3 Employees' work-related compotence
	HC4 Employees' creativity/innovati veness
	HC5 Employees' work-related knowledge
	HC6 Employees' job satisfaction
	HC7 Key employee turnover
	HC8 Leadership qualities of managers
	HC9 Employees' training
	HC10 Employees' profitability (e.g. revenue per employee, etc.)
	HC11 Incentive programme/compensation scheme
	HC12 Employees' previous job experiences
	HC13 Employees' motivation
	HC14 Employees' loyalty
	HC15 Employee recruitment costs
Structural capital	SC1 Exploitation and management of patents, copyrights and trademarks
	SC2 Organizational culture in written form
	SC3 IT systems and their usage in your company
	SC4 Networking systems with customers, suppliers, databases, etc.
	SC5 Management (including financial) control system
	SC6 Internal communication system
	SC7 Documentation of knowledge in manuals, databases, etc.
	SC8 Data systems providing access to relevant information
	SC9 Execution of corporate strategies
	SC10 Effectiveness of expenditure on R&D
	SC11 Development of new ideas/products/services
	SC12 Implementations of new ideas/products/services
	SC13 Length of time for product design/product development
	SC14 Quality of product/service supplied
	SC15 Life-cycles of products
	SC16 Society's image of the company
Customer capital	CC1 Market demands for products/services
	CC2 Customers' loyalty to your company/product e.g. repeat sales
	CC3 Company's distribution channels allowing customers access to products/services
	CC4 Opportunities for business alliances/partnerships/ collaborations
	CC5 Opportunities for licensing/franchising agreements
	CC6 Favourable contracts obtained due to company's unique position
	CC7 Customers' satisfaction (e.g. via survey) with company/product
	CC8 Timeliness of product/service delivery
	CC9 Customer complaints and responses to complaints
	CC10 Customer acquisitions (new customers)
	CC11 Customer profitability
	CC12 Market share
	CC13 Growht in businessor service volume
	CC14 Dependence on key customers
	CC15 Updated customer list/profile

Source; Huang *et al*, (2007)

Huang, et al (2007) classified intellectual capital in three dimensions: human capital, structural capital and relational/customer capital. Where the list of intellectual capital items considered in Huang et al's research was taken from the publication of research results related to IC, including Guthrie et al. (1999), Kaplan and Norton (1992), Brinker (1997), Draper (1998). From the results of these studies found 56 items which able to be used to measure intellectual property in a company. However, the research conducted by Huang et al only used 46 items.

This study was a replica of the research of Huang *et al* (2007). By using intellectual capital items contained in the research of Huang et al, a confirmatory analysis will be conducted to classify these items which are expected to be implemented in better measuring the intellectual property of SMEs companies. The details of items that could be classified as items of the three components (dimensions) of intellectual capital can be seen in the table 1.Based on Table 1 above, it can be seen that there are 15 sub-dimensions for measuring human capital dimensions, 16 sub-dimensions for measuring structural capital dimensions and finally there are 15 sub-dimensions for measuring customer capital dimensions.

Methods

The early stages of this research aims at exploring and proposing groups of intellectual capital items to measure the values of company intellectual property, especially SMEs in the city of Padang. Then, with the use of items of intellectual capital contained in the study of Huang et al and Bontis (1998) compiled a questionnaire for this research, which confirmatory analysis (CFA) will be carried out to group the items that are expected to be implemented in the better measurement of the intellectual property of SMEs.

The population in this study is all micro, small and medium enterprises (MSME) that are under the guidance of the Cooperative and UMKM Office in Padang. In 2017 there were 2.953 MSMEs spread across 11 sub-districts in Padang City. The number of samples is determined through a *purposive* technique and cluster area proportional sampling. Each MSME will be represented by a minimum of two people to be sampled spread across 11 districts in the city of Padang proportionally. Therefore, this study will use a sample of 341 people. After the 341 questionnaires are distributed to all samples, only 321 units were eligible to be used.

Results and Discussion

Results

Data analysis in this study uses Confirmatory Analysis (CFA). This analysis is used since basically intellectual capital has 3 dimensions; human capital, structural capital and customer capital. After the research data has been collected, the confirmatory factor analysis will be carried out with Amos, on the valid and measurable dimensions and sub-dimensions of intellectual capital for SMEs, especially in the city of Padang. Since methodologically the correlation value reflects the validity of the question items yet conceptually the value represents the measured dimension. Almost the same case was performed by Huang, *et al* (2007) through his research entitled *An Evidence-based Taxonomy of Intellectual Capital*. Huang *et al* in his analysis used Factor Analysis in as much as they wanted to form a conditional intellectual capital construct.

According to Hair et al (2010), Confirmatory Factor Analysis (CFA) is part of SEM (Structural Equation Modeling) which is useful for testing how measured variables (indicators) are proper at describing or representing a number of factors, which in CFA a factor can also be called a construct. Thus, the constructs in this study are 3 dimensions of intellectual capital, namely: human capital, structural capital and customer capital. The statement items of each construct are the indicators of the construct, where the construct of human capital, consist of 8 items of questions (indicators), the customer capital construct is determined by 8 items of statements, and the last construct of structural capital consist of 13 items of statement (indicator). Then the

purpose of the CFA of this study is to see; 1) whether the indicators conceived are unidimensional, correct, and consistent; (2) what dominant indicators shape the construct under the research.

Then through Confirmatory Analysis (CFA) using the SPSS Amos version 24.00 program, the results of the analysis can be summarized as in the following table:

Table 2. List of Elements of Intellectual Capital for SMEs

Dimensions of IC (Construct)	Sub-Dimensions (Latent)
Human Capital	HC2 Employees' training
	HC3 Employee recruitment costs
	HC4 Incentive program / compensation scheme
	HC5 Employees' level of education / vocational qualification
	HC6 Team work
	HC7 Employees' motivation
	HC8 Employees' loyalty
Customer Capital	CC1 Customers' satisfaction (e.g via surveys) with company / product
	CC2 Understand the target markets
	CC3 Care what customers want and need
Structural Capital	SC1 Employees' share knowledge
	SC2 IT systems and their usage in your company
	SC3 Increasing the quality of products / services
	SC4 Make improvements to the quality of products and services
	SC5 Quality of product / service supplied
	SC7 Increase company revenue
	SC8 Implementation of new ideas / products / services
	SC9 Support for employee creativity
	SC10 Systems allow easy to access
	SC11 Consideration of the Implementation of new ideas / products / services
	SC12 Increase total company revenue
	SC13 Growth in business or service volume

Sources; Primary Data Processing (2019)

Table 2 above are statement items (indicators) explaining each dimension (construct) of intellectual capital, since the estimated standardized loading regression ≥0.4. It implies that the construct has a high relationship with statement items (indicators) (Hair, 2010). Based on the table above it can be seen that from the 8 items of statement for human capital, there is 1 item which is HC1 with an estimate loading value ≤ 0.4, then it must be removed from the model. Further, there are 8 items of statement to explain customer capital and only 3 items that have an estimate loading value ≥ 0.4. The last, of the 13 items of statement describing structural capital, there was only 1 item of SC6 must be taken out of the model, since it has an estimate loading value ≤ 0.4. It could be seen in the following table, the statement items which should be removed/released from the model:

Table 3. Intellectual Capital Statement Items released from the Model

IC Dimensions (Constructions)	Statement Items (Indicators)
Human Capital	SC1 Employees' creativity
Customer Capital	CC4 Good relationship with customers
	CC5 Customers' loyalty to your company / product
	CC6 Punctuality in services
	CC7 Consumer satisfaction survey
	CC8 Competitive strategy to retain consumers
Strutural Capital	SC6 Efficiency of production costs

Source; Primary Data Processing (Year, 2019)

In the table above, it can be seen that several statement items must be excluded from the model, since they have an estimate loading value ≤ 0.4. That is to say, each statement item (indicator) has a weak relationship with the construct.

Discussion

This research refers to the ones that has been conducted previously, which are research by Huang *et al* (2007) and Bontis (1998), where Huang *et al* (2007) attempted to group intellectual capital items based on empirical evidence in the form of manager responses from questionnaire statements. Therefore, the statement items (indicators) can be formulated, which are 46 items that can be used to properly measure intellectual capital in banking companies and other large companies. In addition to the research of Bontis (1998), from the three dimensions of intellectual capital, there are 56 items can be used to measure those three dimensions on a company. In general, previous research formulated more on the intellectual capital items for large companies, and research that develop intellectual capital items for companies in SMEs scale are still limited.

Accordingly, by referring to the research of Huang et al (2007) and Bontis (1998), this study seeks to formulate intellectual capital items which can be used to properly measure intellectual property in SMEs scale companies, especially for Padang City. Then, based on the results of the study, it can be concluded that for the human capital dimension of 8 statement items, only 7 items could properly measure human capital in SMEs, thus only 7 items are considered important by SMEs people to measure from the human capital dimension. Furthermore, from the 8 statement items for the customer capital dimension, there are only 3 statement items which could ideally measure from the costumer capital dimension at SMEs, that is related to the level of customer satisfaction with the company's products/services, the level of understanding and the company's ability to meet the needs and wants of consumers. Finally, for the structural capital dimension, there were initially 13 statement items, however only 12 items of statement were considered important by SMEs people to measure the structural dimension of their business capital. Subsequently, there are 22 statement items in total fit to measure the intellectual property of SMEs scale companies.

Conclusions

Based on the results of data processing, it can be concluded, that; of the total 29 items of intellectual capital tested, only 22 items can be used to measure the dimensions of intellectual capital at SMEs, especially in the city of Padang. Where for the human capital dimension is measured by 7 statement items, while the customer capital dimension only measured by 3 statement items. Finally, there are 12 statement items to measure structural capital. Therefore, only 22 of these items are considered important by SMEs to measure their company's intellectual property.

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