

A Framework and Tools for Indigenous Knowledge Human Capital Measurement in a Young Generation

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Abstract

Indigenous knowledge-indigenous vegetable knowledge is fragile to lose with several reasons, but it plays important roles in food and income earning for local. Human capital (HC) measurement would be a part of human capital processes to determine the level of HC. This study aims to propose an indigenous knowledge human capital measurement framework and tools to monitor the HC in young generation. The framework for indigenous knowledge human capital measurement is different from frameworks used to measure HC under organizational and human resource department contexts. The framework comprises four elements to be measured—formal HC (HC processes and learning resources), tacit HC (knowledge, skills and experience), behavior HC and values of HC (attitudes to the purposes and benefits of the HC). The framework was transferred into tools for measuring. There were two questionnaires to use with elementary students and their parents. The in-depth interview session will be used to evaluate the values of HC with the students, and a learning resource checking list to evaluate a part of formal HC. The study has been conducted with design science research in order to design the framework and tools, and to evaluate the tools. The questionnaires were evaluated with reliability test by using Cronbach' alpha coefficient with the results at 0.3 to 0.97. The study was taken place with the elementary school students at Yangdaeng School in Sanamchaikate district, Chacheonsao province in eastern region of Thailand, their parents and their teachers.

Key Words: Human Capital, Human Capital Measurement, Indigenous Knowledge, Young Generation.

Introduction

Human capital is an important resource for every person, organisation and society because it is an important resource to perform activities, especially, knowledge driven activities and organisations. Human capital (HC) is considered as knowledge, skills and experience of humans. These elements can be used to increase the effectiveness of people's activities or to support the achievement of their goals. Consequently, people and organisations have paid highly intention in human capital development or creation in order to increase the capabilities of their staff employees. In order to develop the human capital, organisations or communities need to monitor particular human capital of employees or members in order to ensure that organisations would have resources to perform activities and for business growth. Generally, human capital

measurement is mainly focused on processes of human capital creation and resources used in the processes rather than the human capital embedded in humans. Meanwhile, human capital creation is focused on schooling or formal education, and human development programmes (Marrveijid and Timmers, 2003), and learning processes (Hatch and Dyer, 2004). Those things indicate that only what people intake instead of what people have as human capital which can be useful for them. For Indigenous Knowledge (IK) HC, it is hard to be measured by formal education and human development department. This is because indigenous knowledge would not be taught in formal schools, and not a part of human resource department under organisational context. As a result, human capital measurement would be focused on both dimensions—what people intake and what people retain. For IK-HC measurement, common items to measure both dimensions would be based on the nature of IK and areas of IK.

Literature Review

Human Capital

Human capital (HC) is an intangible asset which can be classified as an intellectual capital which is embedded in humans (Baron and Armstrong, 2007). Human capital is considered as knowledge in the form of tacit knowledge including skills, competencies, experience (Hatch and Dyer, 2004) and talents (Davenport, 1999). Furthermore, Becker (1962) considered HC includes behaviour, reputation and beliefs. The behaviour is actions and words of people which are the results of their practices, beliefs and ethics (Davenport, 1999). This type of HC is useful for individuals, as organisations do not only considering employees' education and experience when they recruit new employees, but they would also consider behaviour and characteristics that match a particular job (Ehrenberg and Smith, 2003). Furthermore, several researchers have considered HC from the educational perspective in terms of the parents' education, and the education and learning investment of their offspring (Becker, 1962; Baron and Armstrong, 2007). Thus, HC can be viewed in several forms, (both explicit and tacit forms), which can be classified into three types according to its definition and characteristics as follows;

First, formal education is an explicit form of HC (Schultz, 1961). Human capital in this form includes materials or equipment invested for education and parents' education (Coleman, 1988). This form of HC can be referred to as 'explicit knowledge' and 'declarative knowledge' which shows the knowledge or HC particular individuals possessing or intake. However, they do not show that those people can use such knowledge or HC to perform activities (Nahapiet and Ghoshal, 1998).

Second, tacit human capital is concerned with skills, competencies, experience and talent that are embedded in humans (Davenport, 1999; Baron and Armstrong, 2007). This kind of HC is referred to as the understanding and abilities of people' to do something. It can be compared with "know how" or procedural knowledge which is embedded in human procedures, work processes and routines (Badaracco, 1991). This kind of knowledge or HC emerged as a result of work experience and practice over a certain periods of time (Sanchez, 1997; Skyrme, 1999). It is referred to HC that people retain.

Third, behaviour human capital is concerned with the actions, words and values of individuals which they do or say in order to response to internal and external events. Behaviour can be both words and motion (Sarafina, 2001). Becker (1962) explained that behaviour is considered HC because behaviour can be used to perform activities. Each activity and position requires different behaviour (Ehrenberg and Smith; 2003). Thus, people have to develop themselves to have some particular behaviour for particular activities. Behaviour HC is also referred to HC that people retain.

It can be seen that human capital is referred to education, learning materials, knowledge and behaviour. Those can be classified into both tangible and intangible elements, or HC that people intake and HC people that retain in respectively. For local areas of HC, they would have particular knowledge and behaviour as human capital that is value to communities' members to live quality. Those types of human capital would

be obtained with particular activities or methods, and can be viewed in different forms according to the characteristics of local knowledge or indigenous knowledge, and local behaviour.

Indigenous Knowledge

Indigenous knowledge (IK) refers to traditional and local knowledge possessed by groups of people living in a particular area for a long period of time (Langill, 2007). IK is not limited only to aboriginal people (Storey, 2005), and not concerned with old-fashioned or static knowledge (Langill, 2007). It is dynamic and collective, holistic, implicit (Obomsawin, 2001), and subjective (Sefa Dei, Hall and Rosenberg, 2000).

First, indigenous knowledge is dynamic and collective. It is involved with long-term occupancy in a particular area together with adaptation to local conditions, including culture, environment and the local people's requirements for living. It is the integration of historical knowledge and new knowledge. It is derived through the collaboration and interaction of people and the environment (Sefa Dei, Hall and Rosenberg, 2000). As a result, IK is unique to each particular culture and environment.

Second, indigenous knowledge is holistic. It is derived from the integration of complex components including individual components, local ecosystems and social context—the beliefs and spiritual insights of the local community. IK becomes meaningless when it is isolated from social context and the local environment (Sefa Dei, Hall and Rosenberg, 2000; Castellano, 2000).

Third, IK is implicit and requires traditional methods for its capture and transfer. It encompasses the skills, experience and insights of people (Obomsawin, 2001). It is located in people's minds, activities, community practices and culture, such as community values, beliefs, rituals and traditional songs and stories (Kroma, 1995). It passes on to generations through traditional methods—oral transmission, teaching and learning from community elders, and direct experience (Sefa Dei, Hall and Rosenberg, 2000).

Lastly, indigenous knowledge is subjective in nature. This is because it is rooted in personal and direct experience and it is associated with a long-term understanding of the local environment and culture (Sefa Dei, Hall and Rosenberg, 2000). It is concerned with first-hand experience (Obomsawin, 2001). It is acquired by observation because it is repetitious, it occurs and is revealed through intuitive vision (Castellano, 2000).

On this basis, IK is focused on occupancy and practice, and is more concerned with tacit and procedural knowledge which cannot be easily transferred or created. IK can be acquired through observation in a natural environment. In other words, IK is associated with cultural, social and economic aspects of the local way of life. IK is difficult to encode and acquire through conventional methods and formal education. As a result, IK requires particular processes of transfer and acquisition which are concerned with the context and culture of particular communities. As a result, human capital in the aspect of IK would be created and measured in different ways from general human capital or human capital in an organisation aspect.

Human Capital Measurement

Human capital measurement is concerned with abstract measurement. It needs to measure knowledge or skills that people do have, and values of use such knowledge or human capital. There are several researchers proposed HC measurement frameworks. For instance, Lepak and Snell (1999) proposed a framework to measure human capital through knowledge and use of knowledge for organisations. Elias and Scarbrough (2004) intended four approaches for HC measurement-strategic values to business and customers, outcome of investment, and employees' competencies. Phillips (2005) summarized that human capital can be measured with five common areas including employees' abilities, creativity, productivity, attitudes, and employers' investment in human capital development. Baron and Armstrong (2007) introduced HC measurement framework to focus on values of human capital through skills for particular

business activities. Meanwhile, some researchers propose more concrete frameworks for the measurement, such as Cantrell, Benton, Laudal and Thomas (2006) introduced to measure human capital through human investment or human capital investment. Controversy, the Chartered Institute of Personnel and Development (CIPD) proposed that there was no fixed method to measure human capital. Human capital can be measured through values of human capital, effective of human creation processes or the return of investment (Baron, 2011).

Regarding the literature review, it is argued that human capital measurement can be measured in both abstract forms—knowledge or skills, behaviour and values of human capital—and concrete forms—human capital processes and investment. It can be grouped into three main groups—human capital measurement, human capital investment and values of human capital.

First, it is concerned with measurement any forms or types of human capital itself. Regarding human capital types, human capital comprises both abstract elements and explicit elements. The abstract forms of human capital consist of tacit human capital and behaviour human capital. The tacit human capital is concerned with knowledge which can be measured via knowing, understanding and competencies of people (Davenport, 1999; Baron and Armstrong, 2007). Regarding the common areas for human capital measurement noted by Phillips (2005), tacit human capital can be measured through capabilities—knowledge, experience, competencies and creativity, and explicit forms of HC can be measured through education levels. In addition, explicit HC also includes parents' education (Coleman, 1988). In terms of behaviour, Ingham (2007) pointed that behaviour can be measured from new behaviours that people perform with apply new skills or HC.

Second, for human capital investment, it is concerned with budget used for HC creation or processes. This investment includes education and training, and materials or equipment, facilities and human resources used for HC processes (Fitz-enz, 2009). Furthermore, Blair (2011) suggested that HC investment includes indirect cost that employers have to pay during employees on the training processes. Meanwhile, Phillips (2005) suggested that total HC investment would cover all investment of human resource functions including recruiting and selection, orientation and development, compensation and benefits, and labour relationships. It can be seen that HC investment is more concerned with human resource department or HC creation in organisations. In order to measure HC of people in general context, HC investment would focus on investment in education and training, learning resource and cost of parents or people themselves spending while on training with referring to indirect cost.

Lastly, measuring values of human capital would be concerned with evaluation of the effects of human capital investment. There are mainly focusing on income earning and profit generating (Fitz-enz, 2009). According to common HC measurement concluded by Phillips (2005), the values of human capital measurement would focus on productivity which is output of employees. It can be measured from output of particular processes per hour or average products per employee. In terms of revenue or gross productivity, it would be measured from earning or income per employee.

In short, HC measurement is concerned with both measuring HC itself which refers to direct HC measurement, and HC investment and HC values which refer to indirect measurement. The direct HC measurement is more concerned with tacit and behaviour HC, whereas indirect HC measurement is more concerned with formal HC. However, to measure HC in the area of indigenous cannot use the framework and common HC measurement which are focused on the organisations and human resource management or department contexts.

Conceptual Model and Research Questions

According to the literature review, HC measurement in organizational context is focused on education, HC processes, HC investment and HC values in terms of productivity and profits of organisations rather than

HC itself. Measuring HC in a general context and indigenous knowledge HC are necessary to be adjusted the common items that would be appropriate to the particular contexts and the nature of IK. Indigenous knowledge cannot be measured HC investment and values of HC as the context of the human resource department. This is because people holding HC would not have formal investment for HC creation. In terms of values of HC, indigenous knowledge HC would not be focused on productivity from particular activities and explicit benefits for organisations. Indigenous knowledge is holistic in nature. It would be focused on the achievement with the purpose or benefits of the particular indigenous HC at the present and in the future.

A framework for indigenous knowledge HC measurement covers HC people intake and retaining. HC people intake is associated with formal HC and retaining HC is referred to tacit HC, behaviour HC and values of HC. Formal HC would be measured HC processes which include particular activities for IK creation and transferring, and learning resources or materials.

Fitz-enz (2009) noted that HC processes are part of HC investment which has to measure both elements in the processes including materials and equipment, facilities and resource persons, and output and their quality. Tacit HC comprises knowledge areas and experience, and behaviour HC. Knowledge, experience and skills can be measured through people’s understanding and abilities to perform activities, and behaviour can be measured through the way people acting, talking, and giving values or belief that are related to the particular HC. Meanwhile, values of HC would be measured through attitudes forward the purposes and benefits of HC. This measurement is referred to measure what benefits occurred and what would be happen in the foreseeable future regarding HC measurement concept of Fitz-enz (2009). Figure 1 shows the relationship of all component of the measurement framework.

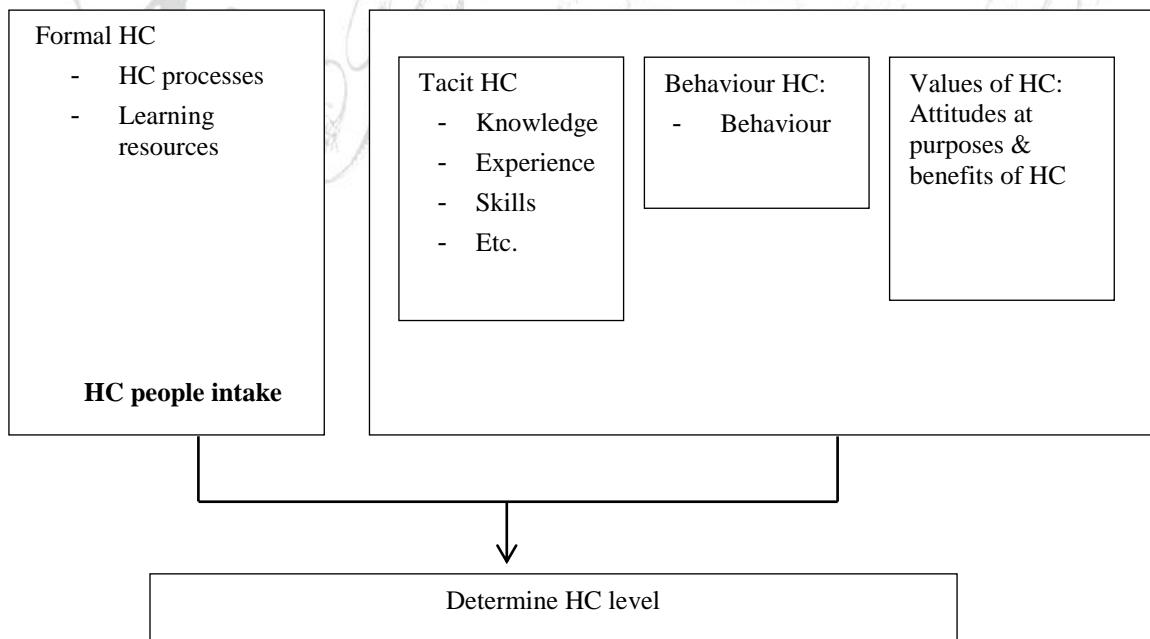


Figure 1 Indigenous knowledge HC measurement framework

In brief, HC in the context of life outside the organizational environment would be measured based on HC itself, HC processes and its values based on purpose and benefit of the HC to people who hold the HC instead of the values for an organisation and return of investment. To measure indigenous HC, it is

necessary to consider the nature of indigenous knowledge and its creation processes in order to determine items for measurement. Therefore, the research questions of this study are 1) what are Common items for indigenous vegetable human capital measurement? and 2) what kind of tools can be used for indigenous vegetable human capital measurement?

Research Methodology

This research was conducted as design science research that allows researchers to design the framework and indigenous knowledge HC questionnaires. This is because design science research in management is focused on development knowledge and interventions, and systems to solve construction problems (Denyer, Tranfield, Aken, 2008). Vaishnavi and Kuechler (2004) determined design science research processes for any kind of research areas with six processes—identify problem, define objectives of solution, design and development, demonstration (use a design stuff), evaluation and communication (dissemination). The problem of this study is what common measurement for indigenous knowledge HC is. The objective is to design the measurement framework and tools which were designed based on literature review and indigenous knowledge HC creation model proposed by Jonjoubsong and colleagues (2015). The tools to measure IK/HC consist of 3 types—questionnaires, in-depth interview and a learning resource checklist. The questionnaires have been used to measure three types of HC—HC processes, tacit HC and behaviour HC—and the in-depth interview would be used to evaluate values of HC. Meanwhile, a learning resource checklist would be used to measure learning resource (formal HC). The questionnaires would be used with elementary school students who have been involved with an indigenous knowledge HC creation project at Yangdaeng school in Khu Yai Mi sub-district, Sanamchaikate district, Chacheonsao province, in the east-central region of Thailand, and their parents. The measurement framework was evaluated through the framework redesigning in the research project, and the questionnaires were evaluated through reliability of questionnaire method. Meanwhile, the in-depth interview and learning resource checklist were test through internal reliability with test-retest method. For the communication, this study would be disseminated in a conference and/or a journal. The participants of this study were students and teachers at Yangdaeng elementary school and the parents of these students. The researchers were facilitators and participant observers. For data analysis, the reliability of questionnaires was analysed with Cronbach's alpha coefficient. This is because Cronbach's alpha coefficient can be used to tell the reliability of questions with both dichotomous (two possible answers) and rating scale answers (Santos, 1999). In terms of research quality, this research focuses on reliability, credibility and human ethics concepts. For credibility, this research looks at participant engagement and a triangulation for data collection as suggested by Stringer (1999). For human ethic issues, the research project has been done under the research ethic explanation of Ryen (2004), the research ethic guideline of the office of national research of Thailand and the approval of Huachiew Chalermprakert University's human ethic committee.

Indigenous Vegetable Human Capital Measurement

Common Items for indigenous Vegetable Human Capital Measurement

The indigenous knowledge HC measurement framework was transferred to common items for measuring indigenous vegetable HC based on indigenous vegetable knowledge, its benefits and its creation processes proposed by Jonjoubsong, Thammabunwarit and Lertkamolruk (2015). The measurement was divided into two parts—indigenous vegetable HC and HC values. The indigenous vegetable HC was measured by questionnaires and the respondents were the students, their parents and teachers. The HC values were measured by in-depth interview with the same respondents as priori part. The common items to measure indigenous vegetable knowledge are as in table 1 with the comparison with the common HC measurement denoted by Phillips (2005).

First, formal HC can be measured through HC process and HC creation resources. According HC creation model of Jonjoubsong, Thammabunwarit and Lertkamolruk (2015) the processes comprise knowledge

transmission—schooling and parenting—and learning processes—informal education. Schooling would be concerned with complementary activities, such as extra training programmes, after school activities (school gardening and school lunch cooking etc.), and special training programmes regarding to the nature of indigenous knowledge. Parenting is concerned with the informal transmission through daily activities, such as gardening and cooking. HC creation resources include all learning equipment and information provided by both schools and/or parents. Second, tacit HC would be measured through knowledge, experience & skills which comprise four areas: types of indigenous vegetables, IV cultivation and harvesting, cooking and eating IV. Third, behaviour would be focused on action and motivation to learn and to do activities regarding knowledge of indigenous vegetables—type of indigenous vegetables, IV cultivation and harvesting, cooking and eating IV. Lastly, the values of HC would be concerned with benefits of indigenous vegetables which can be summarized to four groups: food, herbal medicinal and income. Regarding the study on indigenous vegetable in Southeast Asia of Price and Ogle (2009), they defined that indigenous vegetables have two main values—direct values and indirect values. The direct values are concerned with actual benefits which are as food, medicinal food, income and animal food. The indirect values are biodiversity and gender issues. This is because they found links between indigenous vegetables and gender issues. In this study has focused the values of HC only on the direct benefit as food because the study has focused on HC with a young generation at an elementary school level.

Table 1: Comparison of the elements of indigenous HC measure with common HC measurement denoted by Phillips (2005)

Human capital & values	Indigenous HC measures	Common HC measures of Phillips (2005)
Formal Human Capital	HC process - Schooling - Parenting - Informal learning	HC investment
	HC creation resources - Learning resources	HC investment
Tacit Human Capital	Knowledge, experience & skills - Vegetable types - Cultivation & harvesting - Cooking & eating	Innovation, creativity, capabilities—knowledge, experience, competencies
Behaviour Human Capital	Behaviour - Learning behaviour - Planting, cooking & eating indigenous vegetables	Attitudes—engagement, leadership perception
Human Capital Values	Attitude at purposes and benefits of indigenous knowledge HC	Attitudes—satisfaction & commitment, productivity, Employee benefits

In short, common items for to measure indigenous vegetable human capital can be group into four groups. The formal HC is concerned with HC processes and learning resources, tacit HC is focused on knowledge, skills and experience, and the behaviour HC is associated with learning behaviour and behaviour related to indigenous vegetables. Meanwhile, the values of HC are focused on attitudes over the purpose and benefits of indigenous vegetables. These common items were transformed into questionnaires and test as following.

Questionnaires and Reliability

The questionnaire is focused on formal HC and behaviour HC and comprises two sets—for students and for their parents. The questionnaire for students divided the questions to measure three types of HC. The questionnaire for students had reliabilities for each part as following;

- 1) The first part of the questionnaire is dichotomous questions to measure formal HC with HC processes—indigenous vegetable gardening, harvesting, cooking and marketing. There is 10 yes/no-questions which has the reliability with Cronbachs' alpha coefficient ranges at 0.64.
- 2) The second part of the questionnaires is also dichotomous questions to measure tacit HC. The questions have been divided into four groups of questions— types of indigenous vegetables, cultivation and harvesting, and cooking and eating. The questions are based on 37 indigenous vegetables which are the list of indigenous vegetables that Sanamchaikate alternative agricultural group determined as major types of the indigenous vegetables in the area. The reliability of the four groups of questions ranges at 0.89, 0.95, 0.81 and 0.97 respectively.
- 3) The last part of the questionnaire is 4-rating scale question to measure eight behaviours about indigenous vegetable activities including willing to help parents in indigenous vegetable gardening and cooking, eating indigenous vegetables, participating indigenous vegetable activities and school, and talking about indigenous vegetable. This part has the reliability with Cronbachs' alpha coefficient ranges at 0.74.

The questionnaire for students' parents would also measure three types of HC, but it is considered indirect measurement because the parents evaluate the level of HC of their children. The questionnaire for students' parent had reliabilities for each part as following;

- 1) The first part of the questionnaire is dichotomous questions to measure formal HC—HC processes with 10 yes/no-questions. This part has the reliability with Cronbachs' alpha coefficient ranges at 0.3.
- 2) The second part of the questionnaires is 4-rating scale question to measure tacit HC—types of IV, cultivation, harvesting, cooking and eating IV with 12 questions. This part has the reliability with Cronbachs' alpha coefficient ranges at 0.87.
- 3) The last part of the questionnaire is dichotomous questions to measure behaviour HC about indigenous vegetable with six questions. This part has the reliability with Cronbachs' alpha coefficient ranges at 0.74.

The reliability tests above indicate that both questionnaires were reliable to be used to measure indigenous vegetable HC in a young generation who attend the IV learning project at Yangdaeng elementary school in Sanamchaikate district, Chacheonsao province in the eastern region of Thailand, and their parents. The measurement would take place two times—before project started and at the end of the project in order to monitor the HC creation of the young generation.

Levels of Indigenous Human Capital

Indigenous vegetable knowledge as a human capital in a young generation would be measured from two dimensions—young generation itself and indirect dimension. The indirect dimension measures from resource used in HC processes and related people which are mainly their parents. The measurement would monitor the indigenous vegetable knowledge HC in the young generation by determine the level of all type of HC—formal HC, tacit HC, behaviour HC and the values of HC.

The level would be determined mainly from the score of the first three HC types from the young generation itself. These can be calculated as 80 per cent. Another 20 per cent come from the values of HC which is considered as attitudes of students. The evaluation from parents would be used as confirmation data. The table 2 shows the detail of scores.

Table 2 Monitoring of the indigenous vegetable knowledge HC in the young generation

Human capital & values	Indigenous HC measures	Score
Formal Human Capital	HC process (10 activities)	20
	HC creation resources (10 items)	10
Tacit Human Capital	Knowledge (4 areas with 37 types of IV)	30
Behaviour Human Capital	Behaviour (8 habits)	20
Human Capital Values	Attitude at purposes and benefits of indigenous knowledge HC	20
Total score		100

Regarding the score, the level of HC can be determined with four ranks as following:

76 - 100	High level of HC
51 - 75	Moderate level of HC
26 - 50	Low level of HC
1 - 25	Quit low level of HC

Discussion and Conclusion

Human capital (HC) measurement is necessary for any people and organisations which pay attention to human capital in order to monitor the level of human capital and to know the areas of human capital to develop or create. Human capital would be measure through HC itself, HC processes and HC values. For indigenous knowledge HC in a young generation, common items for measuring cannot follow the common HC measure in organizational and human resource department context. This is because indigenous knowledge has specific creation and transferring processes which are related with local environment and culture. This study proposed the items for measuring HC through three types of HC and its values. Formal HC is measured to the processes of schooling, parenting and informal learning, and learning resources. This part is referred to measure what HC people intake. Tacit HC is measured through particular indigenous knowledge areas. Both types of HC are measured with dichotomous questionnaires. Behaviour HC is measured through attitudes over purpose and benefit of the HC with rating scale questionnaires. Both tacit and behaviour HC measuring are referred to measure what HC people retaining. All questionnaires were test their reliabilities by using Cronbachs' alpha coefficient with the results at 0.3 to 0.97. Meanwhile, the values of HC are monitored through in-depth interview. The measurement can monitor the level of all HC type and knowledge areas, and overall level of HC for group of people. The framework and tools can be used to monitor the HC level of young generations before HC development programme in order to identify the areas of HC to be developed and monitor the HC level after the programme in order to determine the progress.

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