

Knowledge and Trust Issues for Intellectual Capital Measurement

B. ZadJabbari, P. Wongthongtham
Curtin University of Technology
GPO Box U1987 Perth WA 6845 Australia
Tel. +61 8 9266 1835
behrang.zadjabba@postgrad.curtin.edu.au
P.Wongthongtham@cbs.curtin.edu.au

Abstract: Trust in intellectual capital has become an increasingly important factor. External trust such as trust between business and customer (B to B and B to C), business and supplier, and trust between customer to customer, also internal trust such as trust between employees vertically and horizontally is seen as crucial to the expansion of intellectual capital in a business. Although there is an interest in measuring and reporting the relationship between intellectual capital and business performance and some measurement models have been proposed, in most of these models such as BSC, Skandia, IC audit, Intangible asset monitor, MVA and EVA, Knowledge and an asset produced by the knowledge are assumed as the fundamental sources of wealth and the role of trust has not been investigated. The concept of trust indicates business component faith to the shared knowledge between them. The key to success in business is obtaining and maintaining the trust (internal and external) of the participants in the markets. Trust also affects on knowledge sharing and in order to increase knowledge sharing, the participants must have good faith to the shared knowledge resources. Otherwise, participants are more likely to share knowledge with the business competitors. In this paper, we extend the value of intellectual capital from the knowledge to “knowledge and trust” as the two important variables in intellectual capital. Sustainable business performance will be discussed and demonstrated the platform of this sustainability can be created by the knowledge and trust. Additionally, most current intellectual capital measurement models are assessing the business performance in static environment. However, the intellectual assets consist mainly of dynamic elements. Knowledge and trust are dynamic elements and we should discuss them in a dynamic environment and in a specific time slot. Therefore, in this paper variables are analysed in dynamic modelling systems. Also, in current business performance models most of the data resources are internal where external data resources are also important. We point out in this paper that improving external variables such as trust within customers can affect on business performance.

Keywords: Knowledge, Trust, Intellectual capital measurement, Business performance

1. Introduction

Trust and trust technology have come into the account in intellectual capital measurement. External trust such as trust between business and customer (B to B and B to C), business and supplier, and trust between customer and customer, also internal trust such as trust between employees vertically and horizontally is seen as crucial to the expansion of intellectual capital in a business. In this paper, trust and knowledge sharing will be discussed as two basic variables in intellectual capital. Also, the role of trust in different kinds of intellectual capital measurement models will be discussed.

1.1 Trust

Mayer defines trust as “the willingness of a party [trusting agent] to be vulnerable to the actions of another party [trusted agent] based on the expectation that other [trusted] will perform a particular action important to the trusting, irrespective of the ability to monitor or control that other party.” (Mayer 1995). Three dimensions of trust identified are ability (expertise, information, competence, expertness, dynamism), integrity (fairness in transaction, fairness in data usage, fairness in service, morality, credibility, reliability, dependability), and benevolence (empathy, resolving concerns, goodwill, responsiveness) (Bhattacharjee 2002).

Trust plays an important role in determining the success of business. Trust affects on both internal and external data where in the external data resources trust improves the business performance in different ways and in all parts such as suppliers, customers, between customers and branding. In a relation between suppliers and mother organisations, trust is the basis of just in time (JIT) method to decrease inventory cost. Also trust affects on a way of paying (such as credit card payment), price mitigation and many other issues. Trust between customer and organisations can decrease promotion cost and customer replacement cost and increase income. In the same way, trust between organisation and customer can transfer between customer to customers and the level of trust between customers is a key factor in this issue. The new methods of promotion now are using this

section to improve promotion effectiveness. In the internal resource data, trust also plays a very important role where in vertical view trust is important to leadership and in horizontal view trust is important for knowledge sharing and team working. As a result, level of trust in different parts of business should be put in business performance methods and it plays a key role.

The concept of trust is related to different and various fields including philosophy, sociology, business, computing. The notion of trust involves having confidence in the other parties; hence, having an expectation without risks will not result in loss. In business contexts, an individual is dealing with a business enterprise that has advantages over them, in the forms of scale, resources, information and expertise. Sole traders have an evident economic incentive to maximise their profit at the expense of the other party. In the case of corporations, it has been institutionalised through the legal requirement that directors and employees make decisions based on the best interests of the organisation, not of the parties it deals with. As a result, trust in the context of business is not grounded in culture, but is merely what a party has to depend on when no other form of risk amelioration strategy is available.

Trust can be founded in different ways. The most common way is a direct relationship. Some other ways such as direct experience (like a prior transaction), referred trust (trust provided by someone else), signifiers or images of trustworthiness (like brand effect) affect on trust level. In this paper we will focus on data transaction between trusting and trusted agents and will consider the role of trust level in making intellectual capital in data transaction between agents (increasing market capital, social capital and human capital with increasing trust level in data transaction).

1.2 Knowledge and knowledge sharing

There is no universal definition of knowledge and knowledge management. Knowledge is a combination of the data and information being made by human thought (Smith, 2005). Knowledge management is the process through which organisations generate value from their intellectual and knowledge-based assets (Santosoz, 2005). The impact of knowledge and knowledge sharing is part of this research's objective. Figure 5 shows an overview of knowledge sharing and similarity of the shared knowledge with original knowledge.

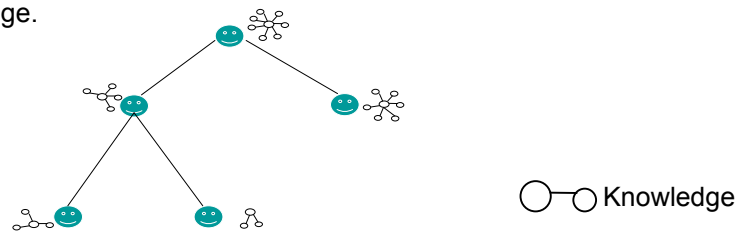


Figure 5 Overview of knowledge sharing similarity

An ontology can be applied to evaluate quality of sharing knowledge by checking its similarity in a knowledge transformation between agents. Also as most uses, ontology can be used to represent fact and relations on the domain of knowledge.

1.3 Trust in Intellectual Capital

Sudarsanam et. al. define intellectual capital as “the group of knowledge assets that are attributed to an organisation and most significantly contribute to an improved competitive position of this organisation by adding value to defined stakeholders” (Sudarsanam et. al., 2003). Although measuring intellectual capital is very important to manage business and maximise growth, these kinds of assets remain outside mainstream discussion in business, economy, and policy and are rarely reported in financial statements. It is necessary to improve the quality of information on intellectual capital measurement to contribute to the decision making process of corporate managers, investors, and policy makers. Intellectual capital in this research is consists of Social capital, Human capital, and Market capital and the role of trust in these three capital has been investigated in this part of the paper.

1.2.1 Social Capital

The idea of social capital and its role in economic development has been increasingly growing. Fukuyama describes social capital as an ability of people to work together for common purposes in groups and organisations (Fukuyama, 1995). Putnam indicates that “social capital is features of social life-networks, norms, and trust-that enable participants to act together more effectively to pursue shared objectives. He adds social capital, in short, refers to social connections and the attendant norms and trust”(Putnam,1995). Deardorff's Glossary of International Economics identifies social capital as the networks of relationships among persons, firms, and institutions in a society, together

with associated norms of behaviour, trust, cooperation, etc., that enables a society to function effectively (<http://www-personal.umich.edu/~alandear/glossary/s.html>). As it is seen in different definitions trust is the basic variable in social capital and Coleman claims that it is reasonable to argue that widespread trust and trustworthiness are themselves an important part of the normative dimension of social capital (Coleman, 1988). However, many studies have focused on trust which most people in a community or nation have to each other to measure of social capital. In recent years with some new kinds of communication tools especially virtual communication tools, effects of social capital on economic such as e-commerce, politic and society such as e-communities have increased. As a result, the measurement and computation of trust to secure interactions between autonomous agents is crucial for the success in new digital environment. Social capital is going to play a main role in digital environment and make an integrated approach between social science and computer science to evaluate role of trust in developing digital environment as well as traditional environment. In sum, social capital is on the basis of trust and more researches are required to investigate the role of trust in intellectual capital and the effect of trust in business performance.

1.2.2 Human Capital

Human capital in knowledge-based economy is the most important part of economy that gives a competitive advantage to organisations. Bontis defines human capital as the summary of individual knowledge stock of organisation's employees (Bontis, 2001). Roos claims that human capital can be generated by employee's competence including skills and education, attitude i.e. employee's behaviour, and intellectual agility i.e. innovation (Roos, 1997). Hudson defines human capital as a combination of genetic inheritance, education, experience, and attitude about life and business (Hudson, 1993). The human capital theory is grounded in the notion that individuals are investors and they invest similar to physical or financial assets in education in order to achieve higher incomes or obtain promotion in the years to come. Additionally, when a company employs people, they bring their embedded knowledge to the business and the company creates value with their knowledge. Business can improve human capital in different ways, including employee development, sharing of best practices, and product innovation. In real world, few organizations achieve all of objectives in human resource development due to poor communication and lack of effective knowledge sharing. Within the knowledge management (KM) literature, trust is often presented as one of the most important elements for successful KM practices (Ford 2003). Sveiby considers trust essential for knowledge sharing and suggests meetings among members of project groups, to promote dialog and pleasant work environments, which contribute to trust (Sveiby 2002).

In sum, trust is a key element in knowledge exchange and knowledge sharing which contribute to improve human capital. The level of trust within community can be lead to success or fail in education programs, increase or decrease experience sharing (to improve skills) and also create innovative environment.

1.2.3 Market Capital

Bontis states that customer capital is the knowledge embedded in the marketing channels and customer relationships (Bontis, 1999). Market capital is the summary of value that can be created by knowledge sharing between market components. It depends on the density of knowledge sharing and trust level between the market components. Market value is related to external image of organisations among market components as shown in Figure 1, such as suppliers, customers, non-customers (i.e. society) and other related parts. The image can be affected on market components expectations to buy or sell products and services. It affects on the market share, promotion cost, and introducing new products to market. Overall, it directly affects on income and net profit. As seen in Figure 1 the market components could form different relations.

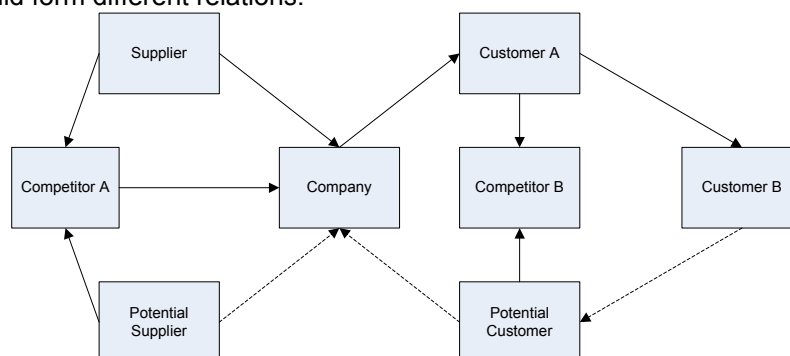


Figure 1 Relations between market components

The main key factor in this kind of investment is trust. Several studies have shown that trust has a positive influence on the behaviors and attitudes of a company's customers and channel partners. Trust encourages higher customer commitment and loyalty and more collaborative, cooperative, and interactive exchange relationships (Jap and Anderson 2003). However, customer trust is influenced not only by the actions of an organization and its representatives but also influenced by other market component dealings such as customer to customer connections. Although scholars have assessed the influence of trust between market components in the business context, in intellectual capital business performance models the role of trust and importance of trust in business performance measurement is still have not been investigated thoroughly.

1.4 Related Work in Business Performance Measurement

The relationship between intellectual capital and business performance has been investigated since early 1990's and some models have been proposed.

1.4.1 Balance Score Card (BSC)

Balance Score Card (BSC) model was one of the business performance measurement methods presented to change traditional aspect about business performance. The BSC was proposed in the early 1990s in performance management framework by Kaplan and Norton (Kaplan and Norton, 1992). The BSC aims to consider four perspectives shown in Figure 2 including (1) learning and growth, (2) internal business process, (3) customer as the major stakeholders in a business, and (4) value creation in financial. The BSC extends traditional measurable tangible in traditional financial perspective of an organisation with clients (customer capital), internal business process (structural capital), and leaning and growth (human capital) (Kaplan and Norton, 1992). This method is one of the methods measuring knowledge asset in organisations and considers intangible assets in the business performance. Also BSC relates organisation strategies with core competencies that are very important to the business success.

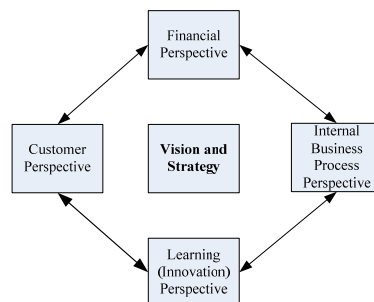


Figure 2 Balance Score Card (BSC) model

The four perspectives are used to capture the essence of the organisation's strategy materials and to reflect achievement of strategic objectives. New generations of the BSC are more strategic relevance and relating to target setting as well as validation of strategic objectives.

1.4.2 Skandia Navigator Model

Skandia is the first company that included intellectual capital in its traditional financial report to its shareholders in 1994 (Bontis, 2000). This model like BSC focuses on intellectual capital and has a new accounting taxonomy including financial, customer, process, renewal and development, and human capital. This model highlights the importance of human capital and defines knowledge as a core competitive advantage in knowledge based economy. The model proposes some indices to measure and assesses knowledge, skill, and innovativeness. Another part of this model is structural capital that includes organisational processes, procedures, technologies and information sources. Customer capital includes value of relationship with customers, suppliers and market, and organisational capital.

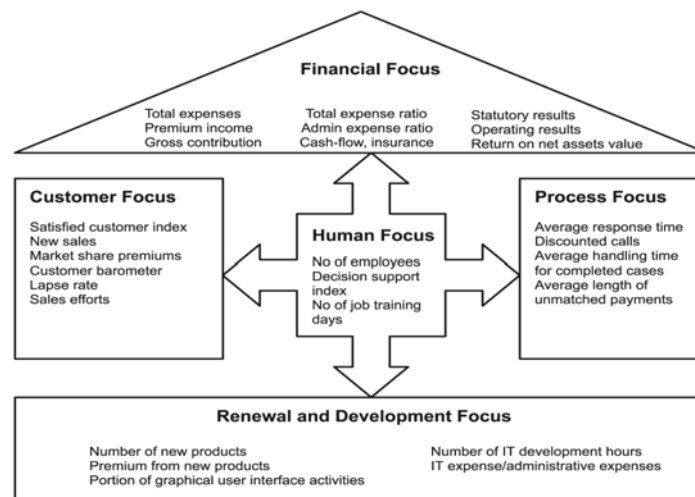


Figure 3 Skandia Navigator model (Baker, 2001)

As can be seen in Figure 3, indices use direct counts, dollar amounts, percentages and even survey results. Edvinson and Malone encourage monetary measurement to produce an overall intellectual capital value of an organisation (Edvinson and Malone, 1997). Their examination found 21 indices in which they believe the indices can act as intellectual capital measurement for a fiscal year (Bontis, 2000).

In the Skandia Navigator model, a suitable taxonomy is created to measure intangible assets. It is impressive for recognising customer capital and human capital. A unique understanding of intangible assets is necessary for the organisation to choose appropriated and valid metrics. Roos claims that generic standards for measuring intellectual capital across industries are growing (Roos, 1997). The model measures indices only at a given snapshot in time and can not present dynamic entities of an organisation. Also the model can not measure the impacts of the different parts of intellectual capital (Roos, 1997).

1.4.3 IC Audit Model

This model focuses on intellectual capital including market assets, human assets, intellectual property assets, and infrastructure assets. Brooking defines intellectual capital as the combined amalgamation of these four assets (Brooking, 1996). Market assets include brands, customers, and distribution channels. Human assets include employee's knowledge, problem solving capability and skills. Intellectual property assets include the assets that can be calculated in financial terms such as copyright, design rights, etc. Infrastructure assets include technologies, process and methodologies. The implementation of this model starts with a questionnaire of 20 questions to check whether the organisation needs to develop new area of intellectual capital or not. The aim of this model is to calculate a dollar value to intellectual capital by using the following methods:

- Cost based approach takes into account the replacement cost
- Market based approach takes into account the market value
- Income based approach takes into account the income produced by the asset.

The model uses monetary approach to measure intellectual capital and this approach is more sensible for managers. However, the checklist of this model does not have a consensus across different industries. The model tries to change the qualitative results of the questionnaire to actual dollar value which is the main weakness. The assets value cannot be measured in the model. There are many subjective questions while the model aims to measure objective indices. Also dynamic entity of the intellectual capital is not mentioned in the model.

1.4.4 Intangible Asset Monitor

Sveiby proposed a conceptual framework based on the following three intellectual capital categories shown in Table 1 (Sveiby, 1997).

- Competence of employees (education, experience)
- Intangible assets related to internal structure (management, structure, systems, software)
- Intangible assets related to external structure (brand, suppliers, and customers relations)

This model claims people are the only true agents in business and all aspects of internal and external assets are embedded in human actions. Sveiby believes that the internal structure is part of traditional

accounting measurement and external structure assets are not included in the traditional financial systems (Sveiby, 1997).

Visible Equity (book value) = Tangible Assets – Visible Debt	Intangible Assets (Stock Price Premium)		
	External Structure (e.g. brands, customer and supplier relations)	Internal Structure (e.g. management, legal structure, manual systems, R&D, software)	Individual Competence (e.g. education, experience)

Table 1 Intangible asset monitor model (Bontis, 2000)

External components include customers, stakeholders, suppliers and creditors. They are usually interested in a company's position in market versus changes of the company. Internal components are more related to information systems management, trend changes and control figures. Additionally, internal components are being used as a tool by managers. Sveiby identifies three measurement indicators including (i) growth and renewal, (ii) efficiency, and (iii) stability for each of the three intellectual capital categories (Sveiby, 1997).

However, implementation of this model needs to be specific an organisational culture. Also the model does not support financial feedback systems. Lynn argues that for many organisations, making a business case means creating financial results thus this model needs to specify culture of organisation and needs a highly successful reporting system on intellectual capital (Lynn, 1998).

1.4.5 EVA

EVA was introduced by Stern Stewart (Stewart, 1997) as a comprehensive performance measurement that uses traditional accounting variables such as budgeting, financial planning, goal setting, performance measurement and incentive compensation to account for all the value that can be added or lost (Bontis, Jacobsen, Dragonetti and Roos, 1999). The model is on a basic rule that economic value added is the net result of all managerial activities (Strassman, 1999). The model compares the cash that a firm's investors start of the company with the present value of the cash. EVA depends on the cost of capital and increases when average cost of capital is less than the return on net assets. In general EVA can be calculated by the following formula:

$$\text{EVA} = \text{Net sales} - \text{Operating Expenses} - \text{Taxes} - \text{Capital Charges}$$

Although the model is on the basis of the financial theories, it can not measure intellectual capital specifically. Moreover, managers can not understand exactly what the company's intangible resources are, what the exact definition of the intellectual capital is and how to improve them.

2. Knowledge and trust Issues

According to the literature review on different kinds of the business performance models and its measurement, it is understood that trust importance in intellectual capital and the role of trust in business performance in intellectual capital related models have not been investigated in detail. Trust is the most important issue to create relationship, knowledge sharing, make value in knowledge sharing and should be discussed in all kinds of intellectual capital. As it is seen in this paper, social capital, human capital and market capital are all based on trust and it can be assumed that trust is a structural variable in intellectual capital measurement. Additionally and importantly knowledge itself cannot lead to a success, as knowledge sharing and knowledge flow is of prime importance in an organisation and knowledge sharing is depends on trust between trusted and trustee agents in specific knowledge context and specific time slot. The main important issue that none of the current models has discussed is the role of trust in intellectual capital. In social capital, market capital, and human capital, trust level between agents has a high impact on business performance. There is a big gap in the current models on the trust issue. The main factors in this research are to define a consensus meaning of the intellectual capital and to define a role of trust and knowledge in the business performance. A developed framework is required to measure embedded trust between employees, employers, customers, and suppliers. Additionally, most current models measure the business performance in a static environment. However, knowledge and trust have dynamic entity and the framework should develop in dynamic environment.

3. A new model in Intellectual Capital based business performance measurement

3.1 Basic Model

On the basis of the literature review, one of the main gaps is a lack of trust and knowledge value in intellectual capital measurement. As a result, in this framework trust and knowledge are the basic variables to measure intellectual capital value as shown in Figure 4.

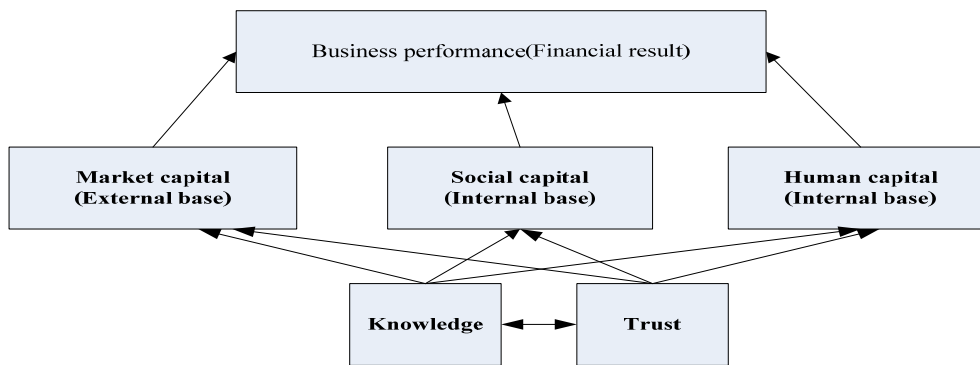


Figure 4 The basic variables to measure intellectual capital value

Social capital = f (trust, knowledge& knowledge sharing)

$$= (\alpha_s * TL) + (\beta_s * KL) + (\gamma_s * KS) + \lambda_h \quad (\text{equation 1})$$

α_s , β_s , γ_s : Dependency level of social capital to trust, knowledge and knowledge sharing
 λ is a fix number, TL: trust level, KL: current knowledge depending on education, skill, innovation,
 KS = knowledge sharing effectiveness (calculated by an ontology similarity comparison)

Human capital = f (trust, knowledge& knowledge sharing)

$$= (\alpha_h * TL) + (\beta_h * KL) + (\gamma_h * KS) + \lambda_h \quad (\text{equation 2})$$

α_h , β_h , γ_h : Dependency level of human capital to trust, knowledge and knowledge sharing

Market capital= f (trust, knowledge& knowledge sharing).

$$= (\alpha_m * TL) + (\beta_m * KL) + (\gamma_m * KS) + \lambda_m \quad (\text{equation 3})$$

α_m , β_m , γ_m : Dependency level of market capital to trust, knowledge and knowledge sharing

Business performance = f (Social capital, Human capital, Market capital)

3.2 Conceptual Framework

In the framework, intellectual capital's effect on strategic and scenario planning is discussed in dynamic environment and business PCDA cycle is evaluated as shown in Figure 7. As it is seen in the figure, knowledge and trust have dynamic entity and their effect on intellectual capital can be changed in period of time.

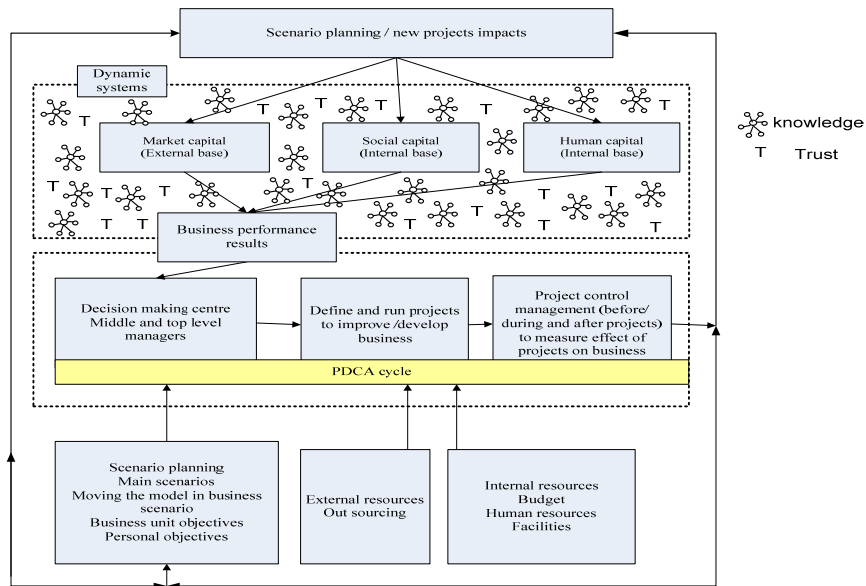


Figure 7 Overview of a conceptual framework for Intellectual Capital based business performance

3.2.1 System Dynamics:

System dynamics is a methodology for studying and managing complex feedback systems, such as one finds in business and other social systems (Harris and Williams, 2005). Bill Harris and Bob Williams have identified some key features of system dynamics as below (Harris and Williams, 2005):

- Dynamic systems model the problem, issue, or evaluation questions, not the whole program or real world.
- It is assumed that most problems have endogenous causes.
- It is assumed that events are part of patterns, which are generated by structures.
- Selection of the problem boundary is a vital step.
- Extent in time and space is generally more important than details.

3.2.2 PCDA Cycle:

PCDA Cycle was proposed by Deming (Demings, 1986), in order to,

- Plan to improve the operations
- Do changes designed to solve the problems
- Check whether the small scale or experimental changes are achieving the desired result or not.
- Act to implement changes on a larger scale if the experiment is successful.

6. Evaluation and Future work

The criteria used for evaluation and validation of intellectual capital based business performance are book value and market value. The difference between the two values is intellectual capital value which is divided into three capitals i.e. social, human and market capitals. On the basis of equations in this paper (equations 1, 2, 3), human capital, market capital and social capitals are measured accordingly.

For our future work, trust level and knowledge sharing will be simulated in digital ecosystem environment. In the simulated digital ecosystem, trust and knowledge sharing variables can be set and their effect on the intellectual capital can be shown and investigated further. Trust and knowledge sharing can be analyzed in normal distribution or any other distributions.

7. Conclusion

This paper introduced a new approach to evaluate business performance on the basis of trust and knowledge sharing. The new approach tried to measure intellectual capital in the dynamic environment and market capital, human capital and social capital as the main intellectual capital. Knowledge and trust as well as knowledge sharing investigated as the key variables to measure intellectual capital and initial model proposed to create a linkage between intellectual capital and business performance. The model is projected to validate by simulated data and more researches are required to define the coefficients in equations of intellectual capital measurement.

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