

Intellectual capital: Concepts, components and indicators: A literature review

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ABSTRACT

This paper presents a general review of intellectual capital literature, which includes definitions, components and indicators. We aim to gather a useful collection of indicators and definitions. After studying several related works from the literature, many definitions and indicators are identified and explain that choosing appropriate indicators depends on organizational targets. Every kind of organization can use this study to identify its more applicable and appropriate indicators to know about its intellectual capital. Identifying all of indicators in previous studies can help organization select right indicators for the organization.

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1. Introduction

Today, organizations have identified two kinds of assets, which are important to measure: tangible and intangible assets. Intangible assets are not recorded in financial statements but constitute a high portion of the market value of the organization. Intellectual capital is one of the concepts, which is close to intangible assets. There have been tremendous efforts to measure intellectual capital, but lots of them are not general. In other words, instruments for measuring intellectual capital are specialized. The purpose of this study is to present a comprehensive review of intellectual capital concepts, components and their indicators. For this purpose, intellectual capital is divided into three components and every component is described, individually.

As companies entered into the 1990s, knowledge has become one of the most important strategic resources and one of the key economic resource and the dominant and perhaps even the only source of competitive advantage (Ramezan, 2011; Gavius & Russ, 2009). Intellectual capital is said to be particularly important in a knowledge society (Bukh et al., 2001). Organizations should consider that the first step to change from a traditional company into a knowledge based company is to be aware of

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the knowledge of the organization, also known as intellectual capital (IC) (Montequín et al., 2006). As organizations entered into the knowledge era, organizations understood that they should use their three kinds of capital (physical (tangible), financial and intellectual capital) to gain advantages over their competitors (Wall, 2005; Andriessen, 2004). Organizations of all kinds will need to become much better both at creating new intellectual capital and at using what they already have (Bartholomew, 2008).

IC operates as the most important contributor to justify the value difference between market value and book value of many organizations (Beattie & Thomson, 2007; Bozbura et al., 2007; Mouritsen et al., 2001; Wall et al., 2004; Yang & Lin, 2009). The intellectual capital of an organization has been reported to be three to four times over its book value (Edvinsson & Malone 1997; Yang & Lin, 2009). In a study of over 1000 firms by Brynjolfsson and Yang (1997), an increase of one dollar in the quantity of computer capital (tangible asset base) installed by a firm was found to be associated with an increase of up to ten dollars in the financial markets' valuation of the firm (Peppard & Rylander, 2001). Understanding the real value of all assets provides a more accurate reflection of the worth of a company, which supports the corporate goals of transparency to shareholders, potential investors and market analysts (Ramezan, 2011).

This paper is organized as follow: section 2 represents a short review of intellectual capital historical background, importance and definitions, section 3 represents components of intellectual capital, section 4 represents conclusion of this study.

2. Intellectual Capital

Researchers have paid a great attention to the topic of intangible assets, often referred to as intellectual capital in the early 1990s. They mentioned its importance for all kinds of organizations like Microsoft, Astra, Rentokil and Oracle (Kim et al., 2010; Ramezan, 2011; Wall, 2005; Chang & Birkett, 2004 ; Alcaniz et al., 2011; Mouritsen et al., 2001). Edvinsson and Malone recommended intellectual capital for the Swedish financial company, Skandia, as a technique for quantifying the company's intangible assets (Peppard & Rylander, 2001; Kitts et al., 2001). They devised a performance measurement index in five main areas; financial, human, customer, process and renewal. They emphasize the role of people in organizations and the importance of releasing human potential (Andriessen, 2007). According to Skandia's model, the hidden factors of human and structural capital comprise intellectual capital when added together (Bontis, 2001). Many other studies have conferred upon the importance and content of intellectual capital (Lu et al., 2010). Intellectual capital has become critical to sustaining competitive advantage, organizational success, innovation, superior organizational performance, core differentiator operator, improve new product development performance, enhance shareholder value, create a framework that allows for describing all resources at the firm's disposal and how they interact to create value, organizational performance etc. (Ramezan, 2011; Montequín et al., 2006; Bontis, 1998; Kim & Kumar, 2009; Wall, 2005; Bozbura et al., 2007; Joia, 2007; Hsu & Fang, 2009; Tai & Chen, 2009; Lu et al., 2010; Bozbura & Beskese, 2007; Lee, 2010; Peppard & Rylander, 2001; Chen, 2009; Bozbura & Beskese, 2007). However, the concept of intellectual capital is still unknown to many because it is difficult to measure in explicit terms (Lytras & Pablos, 2009). In other words, there is no agreement on a common definition of IC (Peppard & Rylander, 2001; Kim et al., 2010; Beattie & Thomson, 2007; Montequín et al., 2006; Meca & Martinez, 2007; Beattie & Thomson, 2007).

Table 1
Some definitions for IC

Definition	Reference
Intellectual Capital is "those intangible assets of an organization that are not recorded in financial statements but which may constitute 80% of the market value of the organization".	Torres, 2006
Intellectual capital is "the group of knowledge assets that are attributed to the value creation of an organization".	Chu et al., 2006
Intellectual capital is "that asset based on knowledge and developed throughout flows among its different categories".	Rudez & Mihalic, 2007
Intellectual capital is the "assets relating to employee knowledge and expertise, customer confidence in the company and its products, brands, franchises, information systems, administrative procedures, patents, trademarks and the efficiency of company business processes".	Bozbura & Beskese, 2007
Intellectual capital has been seen as "the combination of &human capital, & organizational capital and &customer capital, or simply as competence×commitment".	Bukh et al., 2001
Intellectual capital is "the set of critical resources used by firms to facilitate productive activities and generate economic rents".	Peng et al., 2007
Intellectual capital can be described as "intellectual material that has been formalized, captured and leveraged to produce a higher-valued asset".	Martin, 2000
Intellectual capital is "a product of capacity which is the knowledge, skills, abilities, information and experience of people; willingness of people to apply capacity; and opportunity provided by the work system to activate stocks of intellectual capital".	Burr & Girardi, 2002
Intellectual capital is "knowledge-based equity of a company".	Bartholomew, 2008
Intellectual capital is "the pursuit of effective use of knowledge the finished product as opposed to information the raw material".	Bartholomew, 2008
Intellectual capital is "sum of all knowledge-based factors i.e., resources, capabilities, and competences that are critical to the creation of organizational value and a long-term, sustained, competitive advantage".	Lytras & Pablos, 2009
Intellectual capital is "the collection of intangible resources and their flows".	Rudez & Mihalic, 2007
Intellectual capital is "the combined intangible assets, which enable the company to function".	Gavious & Russ, 2009
Intellectual capital is "the assets relating to employee knowledge and expertise, customer confidence in the company and its products, brands, franchises, information systems, administrative procedures, patents, trademarks and the efficiency of company business processes".	Bartholomew, 2008
Intellectual capital is "the future earning potential from a combination of human capital brains, skills, insights, and the potential of an organization's people".	Burr & Girardi, 2002
Intellectual capital is "the possession of knowledge, applied experience, organizational technology, customer relationships and professional skills that provide the firm with a competitive edge in the market".	Rudez & Mihalic, 2007; Montequín et al., 2006; Kim, et al., 2010; Bontis, 2001; Andriessen, 2004
Intellectual capital is "a claim to future benefits that does not have a physical or financial embodiment".	Rudez & Mihalic, 2007
Intellectual capital is "the term attributed to intangible assets which create company value".	Beattie & Thomson, 2007
Intellectual capital is "the intellectual resources that have been formalized, captured, and leveraged to create assets of higher value".	Kim et al., 2010
Intellectual capital has prevailed as "a measure of core competency and competitive advantage which explains the gap between the market value and book value of an organization at a time of decreasing usefulness of current financial reporting".	Han & Han, 2004
Intellectual capital is the "sum of the hidden assets of the company not fully captured on the balance sheet and that it is the most important source for sustainable competitive advantages in companies".	Peng et al., 2007
Intellectual capital is "the sum of the knowledge of its members and the practical translation of this knowledge into brands, trademarks and processes".	Andriessen, 2004
Intellectual capital is "all non-monetary and non-physical resources that are fully or partly controlled by the organization and that contribute to the organization's value creation".	Peng et al., 2007
Intellectual capital "refers to valuable, intangible and inimitable resources for value creation of a firm".	Peng et al., 2007
Intellectual capital "means anything an enterprise can use to increase its competitive advantage in the market place, including knowledge, information, intellectual property rights and experience. In other words, IC is presented as intangible assets and it produces value to enterprises that can be reflected as final income in financial statements, but it cannot be expressed as an accounting title in financial statements".	Lu et al., 2010
Intellectual capital is "the packaged useful knowledge".	Andriessen, 2004
Intellectual capital is "intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth".	Tai & Chen, 2009; Bontis, 1998; Bukh et al., 2001; Yang & Lin, 2009; Bontis, 2001; Burr & Girardi, 2002
Intellectual capital is "the resource that comes from the knowledge, experience and transferable competencies of its staff, from the organization's ability to innovate and manage change, from its infrastructure, and from relationships between stakeholders and partners".	Lee, 2010
Intellectual capital is "the knowledge that can be converted into profits".	Andriessen, 2004
Intellectual capital is "the enhanced value of a firm attributable to assets, generally of an intangible nature, resulting from the companies organizational function, processes and information technology networks, the competency and efficiency of its employees and its relationship with its customers".	Gavious & Russ, 2009
Intellectual capital is "the knowledge that can be converted into profits".	Baker, 2008
Intellectual capital is "equal to a company's core competencies".	Andriessen, 2004
Intellectual capital "consists of assets created through intellectual activities ranging from acquiring new knowledge learning and inventions to creating valuable relationships".	Tai & Chen, 2009; Montequín et al., 2006
Intellectual capital is "the knowledge and knowing capability of a social collectivity, for example an organization, intellectual community, or professional practice".	Chen, 2009

Joia (2007) suggest that the multidimensional nature of intellectual capital, as defined by many members of the community, is often not well understood, which means definitions are not always

very clear and there are no boundaries of what people mean when they talk about intellectual capital (Joia, 2007). Intellectual capital has been defined from different perspectives, focusing on the analysis level (individual or organizational), the perception of the value of time (current value or future value), and objectivity (input or output) (Kim & Kumar, 2009). After reviewing existing literature on this topic, some definitions have been revealed that are represented in Table 1.

3. Components & Models

Several contributions have provided different frameworks for classifying the different components of intellectual capital (Ramezan, 2011). Despite the lack of a common definition for intellectual capital, many researchers accept that there are three major categories for intellectual capital: human capital, structural (or organizational) capital and relational (or customer) capital (Beattie & Thomson, 2007; Wall, 2005; Kim et al., 2010; Rudez & Mihalic, 2007; Chu et al., 2006; Tai & Chen, 2009; Torres, 2006). However, there are other categories include: process capital, innovation, research, and development capital (Tai & Chen, 2009; Meca & Martinez, 2007) end customer-relationship capital and non-end-customer-relationship capital (Rudez & Mihalic, 2007), Business capital (Ramezan, 2011), Social capital (Ramezan, 2011; Baker, 2008) strategy capital (Meca & Martinez, 2007), etc. Fig. 1 represents Skandia's value scheme.

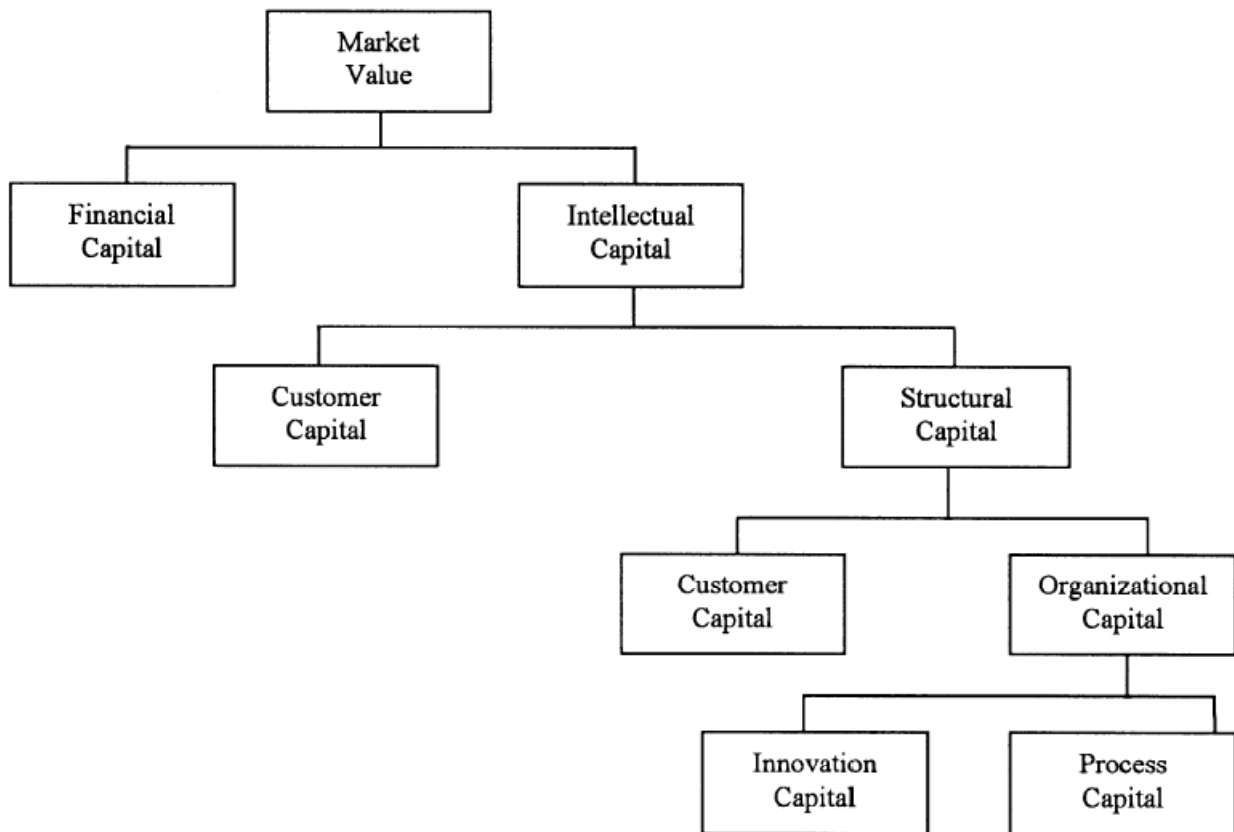


Fig. 1. Skandia's value scheme (Source: Bontis, 2001)

Such categorization in intellectual capital can help in making decisions about the actions that the firm must perform and about the implementation of programs that allow maintenance, leverage and building of those more valuable intangible assets (or intellectual capital). Hence, in order to explore the relationships between any specific kind of intellectual capital and competitive advantage, a clear identification of the main components of intellectual capital is required (Chen, 2009). There are some

definitions for three major components of intellectual capital. Table 2, 4 and 6 represent some of these definitions.

3.1 Human Capital

Human capital is the core asset of an organization (Yang & Lin, 2009) that was originally used by Nobel economist Gary Becker (1964) to refer to the stored value of knowledge and skills of members of the US workforce (Smart, 1999). As one industry leader said, this is the capital that leaves in the elevator at night (Baker, 2008). In fact, human capital is a matter of survival and success in all of the organizations (Meca & Martinez, 2007; Gavius & Russ, 2009; Luo et al., 2009; Doong et al., 2010; Yang & Lin, 2009). Therefore, keeping knowledge of workers and knowledge workers are important issues for companies to maintain their human capital. Some of the results of having higher human capital are: increase organizational performance (Becker, 1964; Lim et al., 2010; Doong et al., 2010; Smart, 1999; Bozbura et al., 2007; Zula & Chermack, 2007), strengthening core competence, increasing success of organizations (Zula & Chermack, 2007), sustaining organization competitive advantage (Yang & Lin, 2009; Kim et al., 2010; Zula & Chermack, 2007), significant positive effects on financial performance (Doong et al., 2010; Bozbura et al., 2007; Zula & Chermack, 2007; Gavius & Russ, 2009), strategic renewal (Ramezan, 2011; Kim et al., 2010, Bontis, 1998), source of creativity and innovation (Mouritsen et al., 2001; Ramezan, 2011; Kim et al., 2010, Bontis, 1998; Zula & Chermack, 2007).

Despite the importance of human capital for organizations, there is no common definition for it as well as indicators of human capital. Kim et al. (2010) suggest that human capital focuses on the economic value of what the employees can produce and represents the individual and collective competence of employees (Kim et al., 2010). Martin (2000) proposes that human capital resides in employees who are doing work that adds value for customers (Martin, 2000). Some definitions for human capital are presented in Table 2.

Many indicators for measuring human capital have been used in different organizations. Meca & Martinez (2007) propose that human capital elements vary significantly depending on the type of company; they may be more important for some firms and less important for others (Meca & Martinez, 2007). Among many definitions and papers, seven categories specified by the authors including Attitude & Motivation, Competence, Skill, Capabilities, Creativity & Innovativeness, Experience & Expertise, Individual personal characteristics, Knowledge and Efficiency

- Attitude & Motivation
- Competence, Skill, Capabilities
- Creativity & Innovativeness
- Experience & Expertise
- Individual personal characteristics
- Knowledge
- Efficiency

Next, we present some indicators that are extracted from previous studies.

Table 2
Some definitions for human capital

Resource	Definition
Martinez-Torres, 2006	Human capital is "the individual-level knowledge, such as professional skills, experience, and innovativeness that each employee possesses".
Rudez & Mihalic, 2007	Human capital is represented by the "intangible assets embodied by individuals".
Ramezan, 2011	Human capital makes reference to "the tacit or explicit knowledge which people possess, as well as their ability to generate it, which is useful for the mission of the organization and includes values and attitudes, aptitudes and know-how".
Chu et al., 2006	The term human capital refers to the "knowledge, seniority, mobility rate, skills, and experiences of the entire organization's staff and management".
Ramezan, 2011	Human capital includes "values and attitudes, aptitudes and know-how".
Bozbura & Beskese, 2007	Human capital is "the individual-level knowledge that each employee possesses".
Baker, 2008	Human capital "is owned by the knowledge worker".
Joia, 2007	Human capital is "those components refer to the skills and competencies of people in the organizations".
Ricceri, 2008	Human capital is "the knowledge that employees take with them when they leave the firm. Includes the knowledge, skills, experiences and abilities of people. Some of this knowledge is unique to the individual, some may be generic. Examples are innovation capacity, creativity, know-how and previous experience, teamwork capacity, employee flexibility, tolerance of ambiguity, motivation, satisfaction, learning capacity, loyalty, formal training and education".
Zula & Chermack, 2007	Human Capital is "the knowledge and skills that people acquire through education and training as being a form of capital, and this capital is a product of deliberate investment that yields returns".
Ramezan, 2011	Human capital presents "the individual tacit knowledge embedded in the mind of the employees".
Ramezan, 2011	Human capital can be defined as "a combination of employee's competence, attitude and creativity".
Smart, 1999	Human capital is the "propensity of a person or group to perform behaviors that are valued by an organization".
Bontis, 2001	Human Capital is defined as "the combined knowledge, skill, innovativeness and ability of the company's individual employees to meet the task at hand. It also includes the company's values, culture and philosophy. Human capital cannot be owned by the company".
Lim et al., 2010	Human capital refers to "the stock of usable knowledge, skills, capabilities, productivity of an organization and competencies for individuals and for groups that sustain an organization's wealth".
Lim et al., 2010	Human capital is "the combined knowledge, wisdom, expertise, skill, intuition, innovativeness, and ability of the individuals to meet the tasks and goals at hand, which include values, culture, and philosophy".
Lim et al., 2010	Human capital is the "individual's or firm's collective capability to extract the best solutions from the knowledge of its people, and represents the creativity and innovativeness that exist in each employee's mind to provide solutions to customers".
Massie 2001	Human capital is often defined as "the productive capacity imbedded in an individual".
Chen, 2009	Human capital represents the individual knowledge stock of an organization as represented by its employees
Montequín et al., 2006	Human capital describes "the value of the know-how and competences of an organization's employees".

3.2 Attitude & Motivation

This category has been addressed by many ((Kim et al.,2010;Beattie & Thomson, 2007; Martin, 2000; Rudez & Mihalic, 2007; Ramezan, 2011; Kim and Kumar, 2009; Cabrilo et al., 2009; Lim et al., 2010; Han & Han, 2004) and different factors are discussed by various researchers.

Factor	Researcher(s)
Ability to attract talented people	(Lim et al.,2010)
Absence / Leaving rate	(Beattie & Thomson, 2007;Guthrie & Petty,2000;Tai & Chen,2009;Lim et al.,2010)
Agreements with employees	(Meca & Martinez, 2007)
Career opportunities	(Meca & Martinez, 2007)
Commitment	(Beattie & Thomson, 2007;Lim et al.,2010;Kim and Kumar,2009)
Employee relations	(Beattie & Thomson, 2007;Guthrie & Petty,2000; Peng et al.,2007)
Employee safety	(Beattie & Thomson, 2007)
Employee compensation (welfare, wages & salaries, Insurance, Pensions)	(Lim et al.,2010 ;Beattie & Thomson, 2007; Meca & Martinez, 2007)
Empowerment	(Lim et al.,2010)
Equity issues (race, gender, religion and disability issues)	(Beattie & Thomson, 2007)
Identification	(Beattie & Thomson, 2007)
Job rotation opportunities	(Meca & Martinez, 2007)
Leadership index	(Han & Han,2004;Lim et al.,2010 ;Bozbura & Beskese,2007;Kim and Kumar,2009;Cabrilo et al.,2009; Peng et al.,2007)
Perceptions	(Beattie & Thomson, 2007)
Recruitment Policy	(Beattie & Thomson, 2007;Meca & Martinez, 2007)
Remuneration systems	(Meca & Martinez, 2007)
Reputation of company employees with head-hunters	(Lim et al.,2010)
Retention of key personnel	(Lim et al.,2010)
Satisfaction	(Wall,2005;Lim et al.,2010;Beattie & Thomson, 2007;Guthrie & Petty,2000;Kim and Kumar,2009)
Staff capacity maximization	(Lim et al.,2010)
Strategic alignment.	(Cabrilo et al.,2009)
Turnover ratios / staff stability	(Martin,2000;Wall,2005;Beattie & Thomson, 2007;Lim et al.,2010 ;Lu et al.,2010; Montequín et al.,2006)

3.3 Competence, Skill, Capabilities

This item has been investigated by several researchers (Beattie & Thomson, 2007; Montequín et al., 2006; Chen, 2009, Guthrie & Petty, 2000; Peng et al., 2007; Bozbyra & Beskese, 2007; Rudez & Mihalic, 2007; Kim & Kumar, 2009; Meca & Martinez, 2007; Ramezan, 2011; Peng et al., 2007; Kim et al., 2010).

Factor	Researchers
Aptitude of staff	Wall, 2005; Montequín et al., 2006
Communicative abilities	Beattie & Thomson, 2007
Dependence on key employees	Meca & Martinez, 2007
Development	Beattie & Thomson, 2007; Wall, 2005
Flexibility / Changeability	Beattie & Thomson, 2007; Peng et al., 2007
Human resources / Human assets	Beattie & Thomson, 2007
Learning capacity	Lim et al., 2010
Management credibility	Lim et al., 2010
Managerial talent of administrative staff	Peng et al., 2007
New comers	Lim et al., 2010
Number of senior positions filled by junior staff	Wall, 2005; Lim et al., 2010
Percentage of persons receiving variable earned income	Lim et al., 2010
Proactive and reactive abilities	Lim et al., 2010
Reputation	Peng et al., 2007
Social skills	Cabrilo et al., 2009; Beattie & Thomson, 2007
Staff profile	Beattie & Thomson, 2007
Staff with professional qualifications	Wall, 2005; Guthrie & Petty, 2000; Lim et al., 2010; Beattie & Thomson, 2007
Taking responsibility	Beattie & Thomson, 2007
tenure	Martin, 2000
time to fill an open position;	Guthrie & Petty, 2000
Work-related competencies	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Lim et al., 2010

3.4 Creativity & Innovativeness

Creativity & Innovativeness is another item influencing human capital and there are different factors associated with this factor as follows,

Factor	Researchers
Employees who are able to translate customer needs into products	Lim et al., 2010
Entrepreneurial spirit	Guthrie & Petty, 2000; Lim et al., 2010; Beattie & Thomson, 2007
Intellectual agility	Kim et al., 2010
New ideas generated by members of staff	Wall, 2005; Lim et al., 2010
Organizational patents, trademarks	Chen, 2009
Paper/ Patent per employee	Kim & Kumar, 2009

3.5. Efficiency

According to Cabrilo et al. (2009), different efficiency factors are discussed as follows,

Factor	Researchers	Factor	Researchers
Full-time or permanent employees who spend less than 50% of work hours at a corporate facility	Lim et al., 2010	Production/Income per employee	Meca & Martinez, 2007
Hours spent in debriefing & Orienting	Lim et al., 2010	Productivity	Beattie & Thomson, 2007
Improvement systems	Kim et al., 2010	Quality performance ratios	Lim et al., 2010
Measures of cycle time for key HR processes;	Guthrie & Petty, 2000	Ratio of wages or salary to total cost	Lim et al., 2010
Number of managers	Lim et al., 2010	Revenue per patent	Lim et al., 2010
Number or percentage of full-time, contract or temporary staff	Lu et al., 2010; Meca & Martinez, 2007; Beattie & Thomson, 2007; Lim et al., 2010	Staff capacity utilization	Lim et al., 2010
Organizational infrastructure	Chen, 2009	Stakeholder satisfaction indicators	Lim et al., 2010
Percentage of correct entries on HR information systems.	Guthrie & Petty, 2000	Standards contribution per man	Kim and Kumar, 2009
Percentage of employee development plans completed;	Guthrie & Petty, 2000	Star employees their performance equals two times the performance of their colleagues	Lim et al., 2010
Percentage of persons who are subject to a system of earned income according to objectives	Lim et al., 2010	Superstar employees their performance equals four times the performance of their colleagues	Lim et al., 2010
Performance	Kim et al., 2010; Guthrie & Petty, 2000	total HR investments/revenue;	Guthrie & Petty, 2000
Processing time for administrative tasks	Lim et al., 2010	Value added per employee	Wall, 2005, Lim et al., 2010; Tai & Chen, 2009; Beattie & Thomson, 2007; Meca & Martinez, 2007

3.6. Experience & Expertise

Experience and expertise are another important components of human capital (Cabrilo et al., 2009; Bozbura & Beskese, 2007; Martin, 2000; Lim et al., 2010; Meca & Martinez, 2007; Lu et al., 2010; Wall, 2005; Asonitis et al., 2010; Kim & Kumar, 2009; Beattie & Thomson, 2007; Chen, 2009).

Factor	Researchers
Average duration of employment	Lim et al., 2010
Effectiveness of learning transfer in key areas	Lim et al., 2010
Empowered teams	Beattie & Thomson, 2007; Asonitis et al., 2010; Lim et al., 2010
Expert networks	Beattie & Thomson, 2007
Management	Beattie & Thomson, 2007
Replacement costs of key personnel	Lim et al., 2010
Rookie ratio percent of employees with less than 2 years of experience	Lim et al., 2010
Reflect experiences previous	Beattie & Thomson, 2007

3.7. Individual personal characteristics

Individual personal characteristics in the other human capital addressed by many researchers and the factors are addressed by the following,

Factor	Researchers
Average age of staff	Lim et al., 2010; Beattie & Thomson, 2007; Meca & Martinez, 2007
Company diversification index	Lim et al., 2010
Men/women diversity // Ratio of men and women in management	Lim et al., 2010
Risk-taking and problem solving capabilities	Bozbura & Beskese, 2007
Sensitivity	Beattie & Thomson, 2007
Talent	Lim et al., 2010
Tolerance for ambiguity	Beattie & Thomson, 2007

3.8. Knowledge

Knowledge is the component of human capital (Beattie & Thomson, 2007; Chen, 2009) with the following factors,

Factor	Researchers
Background variety index individual and group level	Lim et al., 2010
Company managers with advanced degrees: business, science and engineering, liberal arts	Lim et al., 2010
Creating results by using knowledge; Education	Guthrie & Petty, 2000 Bozbura & Beskese, 2007; Guthrie & Petty, 2000; Lim et al., 2010; Beattie & Thomson, 2007; Asonitis et al., 2010; Meca & Martinez, 2007; Kim & Kumar, 2009
Individual-level knowledge	Bozbura & Beskese, 2007
IT literacy	Han & Han, 2004; Lim et al., 2010; Beattie & Thomson, 2007
Know-how employees	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Lim et al., 2010
Knowledge sharing.	Cabrilo et al., 2009; Guthrie & Petty, 2000
Number of certified employees	Lim et al., 2010
Organizational learning	Lim et al., 2010
Structural knowledge	Beattie & Thomson, 2007
Training	Beattie & Thomson, 2007; Lim et al., 2010; Guthrie & Petty, 2000; Tai & Chen, 2009; Kim et al., 2010; Wall, 2005
Work-related knowledge	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Lim et al., 2010

3.9 Relational Capital

Initially relational capital was under structural capital in the original model of Edvinsson and Malone (1997). However, Bozbura (2004) argued that relational capital should be separated from structural capital to conduct further discussion (Chen, 2009). In some researches, relational capital is represented as customer capital (Tai & Chen, 2009; Han & Han, 2004; Ramezan, 2011; Martin, 2000; Bontis, 1998; Kim et al., 2010; Wall, 2005). According to Chen et al. (2004), customer capital is the main determinant in the conversion of intellectual capital into market value, acting as a bridge and catalyst on the operations of intellectual capital. Compared with human and organizational capital, customer capital has a more direct effect on a company's value and organizational performance (Bontis, 1998). Also, customer capital can be the foundation for capturing insight into the future need for customer services. Organizations create customer capital through the relationships that are developed between their internal agents (i.e. management and employees) and their customers (Chang & Tseng, 2005; Duffy, 2000; Kim et al., 2010). There are many definitions for relational capital. Some of relational capital definitions are presented in Table 4.

Table 4
Relational (Customer) Capital Definitions

No	Researchers	Definition
1	Martinez-Torres, 2006; Bozbura & Beskese, 2007; Lee, 2010	Relational capital is "the sum of all assets that arrange and manage the firm's relations with the environment. The relational capital contains the relations with customers, suppliers, shareholders, the rival, community, the official institutions, and society".
2	Chen, 2009	Relational capital is "the summation of relationships, interactions, and intimacy of an organization with internal and external stakeholders; that is to say, relational capital which embraces all the relations the firm has established with its stakeholder groups such as customers, suppliers, the community, the government, etc".
3	Chang & Tseng, 2005; Engstrom et al., 2003; Kim et al., 2010	Customer capital is "the value that contributes to current and future revenues, resulting from an organization's relationship with its customers".
4	Bontis et al., 2000; Kim et al., 2010	Customer capital is "the knowledge embedded in the marketing channels and customer relationships that an organization develops through the course of conducting business".
5	Rudez & Mihalic, 2007	Customer capital "is constituted by customer satisfaction and loyalty, image and brand, and direct distribution channels. Customer capital can be broadened to relationship capital, which also includes relationships with other subjects such as business partners, tourism promotion organizations, government, local community, competitors, creditors, special interest groups, the media and the public".
6	Chu et al., 2006	The term relational capital "refers to the organization's establishment, maintenance, and development of public relations matters, including the degree of customer, supplier, and strategic partner satisfaction, as well as the merger of value and customer loyalty".
7	Ramezan, 2011	Relational capital "gathers the value of the relationships that the firm maintains with external agents business activity close by or with other more distant social agents".
8	Joia, 2007	Relationship capital components "refer to relationships with customers or other stakeholders".
9	Beattie & Thomson, 2007	Relational capital is "all resources linked to the external relationships of the firm, with customers, suppliers or R&D partners. Comprises that part of human and structural capital involved with the company's relations with stakeholders investors, creditors, customers, suppliers, etc. plus the perceptions that they hold about the company".

Among many definitions and papers, seven categories specified by the authors including customers, stakeholders, corporate identity, internal issues, market presence and business contracts and suppliers. Table 5 represents relational capital indicators for each category.

Table 5
Indicators of each category for relational (customer) capital

Category	Factor	Resource
Customer	Customer loyalty	Tai & Chen, 2009; Beattie & Thomson, 2007; Bozbura & Beskese, 2007; Martin, 2000; Guthrie & Petty, 2000; Singh & Kansal, 2011; Bozbura et al., 2007; Cabrilo et al., 2009; Chen, 2009; Ortiz, 2009; Kim et al., 2010
	customer relationship	Ramezan, 2011; Bontis, 1998; Asonitis & Kostagiolas, 2010; Chen, 2009; Ortiz, 2009
	Customer complaint	Ramezan, 2011; Cabrilo et al., 2009; Wall, 2005
	Customer database	Ramezan, 2011; Ortiz, 2009; Beattie & Thomson, 2007
	Customer retention rate	Han & Han, 2004; Ramezan, 2011; Kim and Kumar, 2009; Kim et al., 2010
	Customer satisfaction	Tai & Chen, 2009; Han & Han, 2004; Beattie & Thomson, 2007; Ramezan, 2011; Cabrilo et al., 2009; Kim & Kumar, 2009; Kim et al., 2010; Wall, 2005
	Customer service capability	Ramezan, 2011
	customer's needs Identifying	Beattie & Thomson, 2007; Ramezan, 2011
	Customers	,Tai & Chen, 2009; Han & Han, 2004; Beattie & Thomson, 2007; Bozbura & Beskese, 2007; Guthrie & Petty, 2000; Singh & Kansal, 2011; Bozbura et al., 2007; Wall, 2005
	New strategic customers	Beattie & Thomson, 2007
	Unit sales to customer Average revenue per unit	Ramezan, 2011, Kim & Kumar, 2009; Cabrilo et al., 2009; Han & Han, 2004
	Patients	Peng et al., 2007
	Stakeholders	Knowledge/acquaintance with community
Knowledge/acquaintance with government		Beattie & Thomson, 2007; Cabrilo et al., 2009; Peng et al., 2007; Bozbura et al., 2007
Official institutions		Bozbura & Beskese, 2007
Society Environmental activities international scientists		,Bozbura & Beskese, 2007; Beattie & Thomson, 2007; Bozbura et al., 2007; Lee, 2010; Peng et al., 2007; Asonitis & Kostagiolas, 2010 Lee, 2010
Corporation Identity	Brands	,Tai & Chen, 2009; Beattie & Thomson, 2007; Ramezan, 2011; Guthrie & Petty, 2000; Singh & Kansal, 2011; Watson & Stanworth, 2006; Kim & Kumar, 2009; Asonitis & Kostagiolas, 2010; Kim et al., 2010
	Company names	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Singh & Kansal, 2011; Ortiz, 2009
	conference activities	Lee, 2010; Peng et al., 2007
	Customer names & reputation	Beattie & Thomson, 2007
	Image	Beattie & Thomson, 2007; Cabrilo et al., 2009; Asonitis & Kostagiolas, 2010; Ortiz, 2009; Kim et al., 2010; Wall, 2005
	Media Advertising.	Peng et al., 2007; Ortiz, 2009; Wall, 2005
	quality standards	Beattie & Thomson, 2007; Ortiz, 2009
	Transparency of organization	Wall, 2005
Internal Issues	Corporate culture	Ortiz, 2009
	Top management team	Peng et al., 2007
	Shareholders Stakeholders	Bozbura & Beskese, 2007; Beattie & Thomson, 2007; Bozbura et al., 2007
Market Presence and Business Contracts	Basic marketing capability	Han & Han, 2004; Beattie & Thomson, 2007
	Business collaborations	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Singh & Kansal, 2011; Ortiz, 2009
	Collaboration	Beattie & Thomson, 2007; Lee, 2010; Ortiz, 2009
	Commercial power	Beattie & Thomson, 2007; Kim and Kumar, 2009
	Connectivity	Beattie & Thomson, 2007; Martin, 2000; Ortiz, 2009
	Distribution channels	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Singh & Kansal, 2011; Ortiz, 2009; Kim et al., 2010
	Favorable contracts	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Singh & Kansal, 2011
	Financial contracts	Beattie & Thomson, 2007
	Franchising agreements	,Beattie & Thomson, 2007; Guthrie & Petty, 2000; Singh & Kansal, 2011; Ortiz, 2009
	Licensing agreements	Beattie & Thomson, 2007; Guthrie & Petty, 2000; Singh & Kansal, 2011; Kim and Kumar, 2009; Ortiz, 2009
	Market	Bozbura & Beskese, 2007; Bozbura et al., 2007; Bontis, 1998
	Market intensity	Beattie & Thomson, 2007
	Market orientation	Kim et al., 2010
	Market potential	Ramezan, 2011
	Market Share	Tai & Chen, 2009; Beattie & Thomson, 2007; Ramezan, 2011; Cabrilo et al., 2009; Kim et al., 2010
	Networking	Beattie & Thomson, 2007; Ortiz, 2009
	sales channel	Ramezan, 2011
tech licenseNum. of	Kim & Kumar, 2009	
CompetitorsCompetitive intelligence	Beattie & Thomson, 2007; Peng et al., 2007	
Suppliers	Research collaborations	Beattie & Thomson, 2007
	Knowledge/acquaintance with suppliers	Beattie & Thomson, 2007
	Links with suppliers	Beattie & Thomson, 2007; Bozbura & Beskese, 2007; Bozbura et al., 2007; Watson & Stanworth, 2006; Cabrilo et al., 2009; Peng et al., 2007; Asonitis & Kostagiolas, 2010; Chen, 2009; Ortiz, 2009
	Negotiating capacity with financial entities	Beattie & Thomson, 2007
	Outsourcing partners	Peng et al., 2007

Relational capital has some components and indicators that vary in researches. It should be considered that these components and indicators are different in companies. This capital contains the

relations with customers, shareholders, suppliers, rivals, the state, governmental institutions and society (Bozbura et al.,2007;Lee, 2010; Bozbura & Beskese,2007).Meritum Project (2002) proposed that relational capital is defined by an organization's brand value, a strong network with customer, customer satisfaction, and royalty revenue. Interested external parties have a significant effect on the value of relational capital. Public R&D organizations, for example, take advantage of interested external parties by their involvement in joint projects with universities and technology-intensive companies. Moreover, an organization's reputation increases the trust of customers or investors in the reliability of some technologies (Guerrero,2003). This kind of capital is related to the value that all the external relationships have for a company. It is concerned with establishment of strong ties between the organization and its customers (Brooks and Nafukho, 2006). The quality of the relationships and the ability to create new customers are key factors for the success of a company. The relations held with other agents such as the suppliers and the different alliances of the company are also a very important knowledge source. Relational capital includes indicators for measuring customer information, suppliers etc(Singh & Kansal,2011). Ramezan(2011) proposed that relational capital gathers the value of the relationships that the firm maintains with external agents (business activity close by or with other more distant social agents(Ramezan,2011;Beattie & Thomson, 2007).

Customer satisfaction and loyalty, handling customer, customer orientation, market share, and distribution channels may be indicators of customer capital (Bontis, 1998; Bontis et al., 2000; Engstrom et al., 2003). It is also constituted by customer satisfaction and loyalty, image and brand, and direct distribution channels (Kim et al.,2010).

Relational (Customer) capital includes both current value and potential future value of the organizational relationships with customers. Therefore, customer capital is in the tacit knowledge of marketing channels and customer relationships. Hence, it encompasses components such as brands, market share, customer information, relationships with customers, customers access points and business contracts (Bonits,2000).

3.10 Structural Capital

Structural (organizational) capital is the last common component of intellectual capital. Structural capital has been described as the backbone of the organization (Burr & Girardi, 2002). It is knowledge that does not go home at night; it belongs to the organization as a whole. It can be reproduced and shared technologies, inventions, data, publications, and strategy and culture, structures and systems, organizational routines and procedures (Bukh et al., 2001). Structural capital plays an integral role in knowledge creation and management (Chang & Birkett, 2004). Hsu & Fang (2009) defines structural capital as including process capital and innovation capital. Martinez-Torres (2006) defines structural capital as the property of the organization, such as processes, information in a database, etc. Chang & Birkett (2004) suggests that it refers to the combinations of formal and informal structures that support the use of human capital in an organization. Structural capital therefore conditions and contains how human capital is deployed, and codifies the residues of past uses of human capital as organizational knowledge. Structural capital represents the structures and cultures developed to support the use and enhancement of human and relational capital (Chang & Birkett, 2004). Chang & Birkett (2004) suggests that structural capital refers to the general system and procedures of the organization for problem-solving and innovation. It includes assessment of the stored knowledge value, the cycle of liquid capital, as well as accounting of administration expenses. Structural capital is defined as the structural ability of a firm to translate human capital innovation

and energy into company property and to capitalize on that innovation to create wealth. Structural capital generally describes the general system and procedure for problem-solving and produces values in an organization, including the accounting-based value and accrued capital revolving rate (Chu et al., 2006). Embedded in organizations, structural capital was the supportive infrastructure of human capital (Chen, 2009). An enterprise with strong structural capital will create favorable conditions to utilize human capital and allow human capital to realize its fullest potential, and then to boost its innovation capital and customer capital. In detail, structural capital can be classified into company culture, organizational structure, organizational learning, operational process, and information system (Ramezan, 2011). Holton and Yamkovenko (2008) suggests that structural capital is referred to as a repository of knowledge that is accessible through various sources, which allows for knowledge sharing and knowledge creation among organizational members (Holton & Yamkovenko, 2008). Structural capital is the support mechanism that enables employees to optimize their job performance and overall organizational performance (Liu, 2010).

After studying lots of papers, some definitions for structural capital were obtained. Table 6 represents these definitions.

Table 6
Structural (organizational) capital definitions

No	Researchers	Definition
1	Martinez-Torres , 2006	Organizational capital is" the sum of all assets pertaining to the firm, which make the creative ability of the organization possible. The vision of the firm , management philosophy , organization culture , strategies , processes , working systems , and information technology can be mentioned among these assets".
2	Rudez & Mihalic , 2007	Structural capital "is constituted by management philosophy , culture , business processes and information technology in the hotel industry".
3	Ramezan , 2011	Organizational capital is "the combination of explicit and implicit , formal and informal knowledge which in an effective and efficient way to structure and develop the organizational activity of the firm , that includes culture implicit and informal knowledge , structure explicit and formal knowledge and organizational learning implicit and explicit , formal and informal renewal knowledge processes ".
4	Chu et al. , 2006	The term structural capital refers to" the general system and procedures of the organization for problem-solving and innovation. It includes assessment of the stored knowledge value , the cycle of liquid capital , as well as accounting of administration expenses".
5	Ramezan , 2011	Structural capital "contains both organizational and technological elements that pursue integration and coordination within the firm".
6	Bozbura & Beskese , 2007	Organizational capital is "the sum of all assets that make the creative ability of the organization possible".
7	Joia , 2007	Organizational capital components "refers to organisational culture , routines and practices , or intellectual property".
8	Beattie & Thomson , 2007	Organizational capital is "the knowledge that stays within the firm at the end of the working day. Comprises the organizational routines , procedures , systems , cultures , databases , etc. Some may be legally protected and become Intellectual Property Rights , legally owned by the firm under separate title".

Authors identified five categories for structural capital includes:

- Culture
- Knowledge based infrastructure
- Intellectual property
- Processes, Working Systems & Routines
- Organization`s path

Indicators for these categories are represented in Table 7.

Table 5
Indicators of each category for relational (customer) capital

Category	Factor	Resources
Culture	Achieving mechanism culture	Beattie & Thomson, 2007
	Corporate/Organizational culture	Beattie & Thomson, 2007; Cabrito et al., 2009; Kim & Kunter, 2009; Peng et al., 2007; Quthrie & Petty, 2000; Singh & Kansal, 2011; Ramezan, 2011
	Cultural diversity	Beattie and Thomson, 2007
Knowledge-based infrastructure	Communication systems	Beattie & Thomson, 2007; Peng et al., 2007; Kim et al., 2010; Cabrito et al., 2009
	Databases	Beattie & Thomson, 2007; Bozbura & Beskese, 2007; Cabrita et al., 2009
	Documentation services	Beattie & Thomson, 2007
	Infrastructure	Beattie & Thomson, 2007; Quthrie and Petty, 2000; Martin, 2000, Chen, 2009
	Knowledge centre	Beattie & Thomson, 2007; Cabrito et al., 2009; Peng et al., 2007
	Specialized software/IT	Beattie & Thomson, 2007; Rudez & Mihalic, 2007; Cabrito et al., 2009
	Systems information/network	Beattie & Thomson, 2007; Ramezan, 2011; Tai & Chen, 2009; Singh & Kansal, 2011; Guthrie & Petty, 2000; Peng et al., 2007; Kim & Kunter, 2009; Wall, 2005
Intellectual Property	Organizational learning	Beattie & Thomson, 2007; Ramezan, 2011; Peng et al., 2007; Kim & Kunter, 2009
	Brands	Beattie & Thomson, 2007; Cabrito et al., 2009; Tai & Chen, 2009
	Copyrights	Beattie & Thomson, 2007; Singh & Kansal, 2011; Quthrie & Petty, 2000
	Innovation	Beattie & Thomson, 2007; Peng et al., 2007; Kim & Kunter, 2009; Wall 2005; Cabrito et al., 2009
	Intellectual property	Beattie & Thomson, 2007; Quthrie & Petty, 2000
	Intellectual resources	Beattie & Thomson, 2007
	Patents	Beattie & Thomson, 2007; Chen, 2009; Kim & Kunter, 2009; Peng et al., 2007; Quthrie & Petty, 2007; Singh & Kansal, 2011
	Research projects	Beattie & Thomson 2007, cabrito et al 2011
Processes, Working Systems & Routines	Trademarks	Beattie & Thomson, 2007; Cabrito et al., 2009; Chen, 2009; Quthrie & Petty, 2000; Singh & Kansal, 2011; Tai & Chen, 2009
	Administrative processes	Beattie & Thomson, 2007
	Organizational flexibility	Beattie & Thomson, 2007; Peng et al., 2007
	Competitive and market channels & Distribution channels	Beattie & Thomson, 2007
	Customer support	Beattie & Thomson, 2007
	Financial relations	Beattie & Thomson, 2007; Peng et al., 2007; Quthrie & Petty, 2000; Singh & Kansal, 2011
	Laboratories	Tai and Chen, 2009; Kim & Kunter, 2009
	Management processes	Beattie & Thomson, 2007; Peng et al., 2007
	Operation process	Beattie & Thomson, 2007; Singh & Kansal, 2011; Quthrie & Petty, 2000
	Organizational routines	Beattie & Thomson, 2007; Ramezan, 2011; Peng et al., 2007
	Procedures	Beattie & Thomson, 2007; Kim et al., 2010; Martin, 2000; Peng et al., 2007
	Process capability	Beattie & Thomson, 2007; Rudez & Mihalic, 2007
	Index of productivity	Beattie & Thomson, 2007; Wall, 2005; Kim & Kunter, 2009
	Quality improvements	Beattie & Thomson, 2007
	Quality management	Beattie & Thomson, 2007
	Management system	Kim & kunter, 2009; Bozbura & Beskes, 2007
	Organization's path	Organizational structure
Strategy		Beattie & Thomson, 2007
Management philosophy		Beattie & Thomson, 2007; Singh & Kansal, 2011; Quthrie & Petty, 2000; Rudez & Mihalic, 2007
Mission/vision		Kim & Kunter, 2009; Peng et al., 2007; Bozbura & Beskes, 2007

4. Conclusions

As Chu et al. (2006) mentioned, the components of intellectual capital indicate firm future value and the ability to generate financial results. In other words, today, intangible assets of an organization play a key role in creating wealth for companies. Intangible assets and especially intellectual capital is an undeniable part of organization market value. Maybe it could be said that intangible asset and intellectual capital have a great effect on the market value of every organization. However, up to now there is no single best solution because each method has its pros and cons (Lu et al., 2010, Wall, Kirk & Martin, 2004). Using definitions from previous studies, some categories were identified for three common components. Human capital categories are:

- Attitude & Motivation
- Competence, Skill, Capabilities
- Creativity & Innovativeness
- Experience & Expertise
- Individual personal characteristics

- Knowledge
- Efficiency

Relational Capital categories are:

- Customers
- Stakeholders
- Corporate identity
- Internal issues
- Market Presence and Business Contracts
- Suppliers

Structural capital categories are:

- Culture
- Knowledge based infrastructure
- Intellectual property
- Processes, Working Systems & Routines
- Organization`s path

Every organization should select its appropriate intellectual capital definition and its indicators to measure it. Right selection of indicators is a critical issue for organization to know about their intellectual capital index. For the goal of this paper, lots of papers have been studied by the authors. It is agreed that there is no common definition for intellectual capital. Many indicators were recognized during the study, but they`re not appropriate for all of organizations. Therefore, the most important part of every study to measure intellectual capital is picking the right indicators for that organization.

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