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Designing a model for measuring and analyzing the relational capital using factor analysis: Case study, Ansar bank

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Abstract

Purpose – The purpose of this paper is to present a model for measuring relational capital in banks by using measurement indicators defined in previous studies and according to the conditions of the banking industry and in particular the Ansar bank in Iran.

Design/methodology/approach – The study identifies measurement indicators of relational capital from the related resources and articles and uses content analysis and factor analysis methods. It also measures the selected indicators through a questionnaire analyzing them using the SPSS software to create a model to measure relational capital in the bank.

Findings – By using the measurement model created in this research, relational capital in Ansar bank is determined to be comprised of eight principal components. The total score of these components is the starting point of promoting the relational capital in the banking industry.

Research limitations/implications – This study may not have thoroughly covered the peer-reviewed articles on intellectual capital, but it can be assumed with high confidence that it has made a serious attempt at studying the most important papers on the subject as of date. Moreover, the model presented in this study is valid only when applied in comparing banks. It should further be noted that time limitation, non-availability of relevant experts as well as the required data may have affected the accuracy and reliability of the results. However, the final model has been utilized to try to optimally minimize each limitation according to the existing resources, and through their proper management.

Practical implications – This study provides a new approach that can significantly help bank managers in comparing their banks in the field of relational capital and reacting to their weaknesses and performance advantages of relational capital over its rivals.

Originality/value – In addition to creating a new framework for relational capital indicators, this study offers a model for measuring relational capital in the banks.

Keywords Factor analysis, Intellectual capital, Banks, Relational capital

Paper type Research paper

1. Introduction

In addition to the importance of physical and financial assets, Marr (2008) indicates elements called intellectual capital such as employee skills, good knowledge, good relations with customers and suppliers, having market and client data and culture of innovation existing as a key differentiator between successful, mediocre and failing enterprises. Also above-average returns in the long term are not achieved by physical investing in factories or offices, but by investing and managing in intellectual capital. IC also allows organizations to manage their tangible resources and in better way exploit them.

The study carried out by Bramhandkar *et al.* (2007) illustrated that companies which grant more attention to the intellectual capital, display better performance, higher

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return on investment and less volatility in stock prices. Stewart (2007) also showed that the information age and knowledge-based economy is a fundamental revolution, whereby information is replaced by the working capital and the intellectual property is replaced by physical assets.

Currently, organizations have two types of asset, namely tangible and intangible. In traditional accounting systems, intangible assets are not recorded in the financial statements but have a significant role in determining the market value of companies. According to a study conducted by Inkinen (2015), knowing the value of intangible assets in order to measure them appropriately has a significant impact on the company's performance and the way of managing the said assets.

Due to the widening gap between the book value and the market value of organizations, it is necessary that the methods of measurement and analysis of intellectual capital are extended, and localized for practical use (Marr, 2008), and use other factors such as the real organization value along with the intellectual value and the inability of traditional accounting systems to correctly interpret this gap.

Also with the emergence of the new economy, organizations must have a sustainable competitive advantage to maintain profitability above average, to improve their position in the market among competitors. According to the resource-based view, a sustainable competitive advantage can be achieved through the creation and maintenance of strategic resources in an organization.

Since the 1990s, knowledge has been one of the most strategic resources of any company, and within the framework of a knowledge-based view, knowledge assets and intellectual capital are the main drivers in creating competitive advantages (Sydler *et al.*, 2014).

After the conclusion of the Iran nuclear deal and lifting of sanctions, the emergence of foreign banks and financial institutions is rapidly gaining pace in the country, and as result, domestic banks must be managed on an international scale to maintain their competitive edge and rate of success. Additionally, given the fact that most prestigious banks in Asia, Europe and America measure and manage their intellectual capital, measuring the intellectual capital is essential in competing with them.

The purpose of this paper is to present a model for measuring relational capital in banks by using measurement indicators defined in previous studies and according to the conditions of the banking industry in Iran.

Since one of the considerations in this study has been to focus more precisely on the measurement of intellectual capital, the authors have accordingly extended most of our concentration on the relational capital element as one of the elements responsible for value creation in the organization. The benefits of measuring the relational capital are the constitution of awareness with respect to the value of the capital in the market as it relates to the overall value of the bank, and management planning and organizational strategies to improve relational capital. The authors have put forth a main research question and three sub-questions in this paper as outlined below:

RQ1. Why and how to measure relational capital of a bank?

RQ1a. What are the relational capital measurement indicators introduced in previous studies?

RQ1b. What are the relational capital indicators related to the banking industry?

RQ1c. What is the statistical method for measuring relational capital in the banking industry in Iran?

The paper is organized as follows: first, the research method employed closer to the research problem is described in the next section. Then, the results are presented and discussed, and finally the conclusions and implications of the study are laid out in the last section. Moreover, future research directions are highlighted as well.

2. Literature review

By examining a large number of organizations, Miller *et al.*, (1999) concluded that through the creation of relational capital indicators, organizations can be rigorously compared to one another (Raza, 2013). Duffy (2000) defined the measurement of the relational capital as the role of the customer in the current and future income of the organization, and stated the need of the new economic environment and the change from the product – based economy to the Customer-based one. Ordóñez de Pablos (2002) examined the ways in which leading companies measure their social capital and relational capital in a knowledge-based economy, and offered a conceptual framework for analyzing social capital and relational capital by reviewing and analyzing the reports of the leading companies in India and Europe. In several studies, the relationship between the relational capital and its indicators and the method of performance was evaluated by using case studies. Results showed a significant relationship between relational-social capital and its elements within the organization. In fact, it was shown in one study that the relational capital explains 3.28 percent of the variance in company performance (Sulait, 2010; Raza, 2013; Chen *et al.*, 2004). Sydler *et al.* (2014) provided a method for measuring the intellectual capital and its impact on company performance via quantitative assessment, and was able to show that intellectual capital explains long-term differences in the profitability of organizations.

Many researchers have used a variety of labels for the relational capital which clearly indicates the nature of external, customer and community based relational capital, including: external structure (Sveiby, 1997), customer framework (Edvinsson and Malone, 1997), customer capital (Edvinsson and Malone, 1997; Bontis, 2001), social capital, intrasocial and intersocial capitals (McElroy, 2002), business capital (Intellectus, 2003), external capital, business relational capital (Guthrie *et al.*, 2004) and external social capital (Subramaniam and Youndt, 2005).

All the different definitions for the relational capital provided by different researchers can be seen in the Table I. Initially the emphasis is on the relationships with customers and suppliers (Edvinsson and Malone, 1997; Stewart, 1998; Bontis *et al.*, 2000) .However, gradually concepts such as commercial power, environmental activities, relationships with internal and external stakeholders as well as the relationship between the community and business agents were also reflected on the relational capital (Martínez-Torres, 2006; Chen, 2009; Ramezan, 2011). In this study, pursuant to the definition of Bontis *et al.* (2000), the relational capital is considered to be the knowledge embedded in the relation to stakeholders and its relevant value. One key point in this research which should be considered in the definition of the way managers think. Actually, the attitude of managers about relational capital and its value and improvement has a huge impact on the importance of its management.

3. Study design and methodology

3.1 Literature reviews process

To review the relational capital indicators from previous studies and literature review, the author adopted the principles of a systematic in this study recommended by Jesson *et al.* (2011), and used by Ferenhof *et al.* (2015) which comprises the following stages:

Definition		Author (year)
Included in the structural capital, customer capital provides the relationships developed with key customers		Edvinsson and Malone (1997)
Focussed on customer capital: relationships with customers and suppliers		Stewart (1998)
The knowledge embedded in the marketing channels and customer relationships that an organization develops through the course of conducting business		Bontis *et al.* (2000)
Relational capital as the value of an organization's external relationships with the organizations and people with whom it does business.		Brinker (2007) Tumwine *et al.* (2012)
Relational capital as knowledge embedded in the relationships with external entities or individuals that can influence the organization's life		do Rosário Cabrita and Vaz (2005)
Splits relational capital into two capitals: relational business capital (which includes the analysis of organizational relationships with customers, suppliers, partners, and competitors, as well as other business-related activities in the same), and relational-social capital (referring mainly to the value of the firm's relations with society in general terms)	Can be defined as the combination of knowledge which is incorporated in the organization and employees, as a consequence of the value derived from the relationships which they maintain with market agents and with society in general	Intellectus (2003)
The value that contributes to current and future revenues, resulting from an organization's relationship with its customers		Chang and Tseng (2005)
The relationships that an organization has with its clients/customers and the environment	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	Martínez-Torres (2006)
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		Chu *et al.* (2006)
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		Rudež and Mihalič (2007)
Refer to relationships with customers or other stakeholders		Joia (2007)

(*continued*)

Table I.
Definitions of relational capital

Definition	Author (year)
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	Beattie and Thomson (2007)
Identified relational capital as an intangible asset that is based on developing, nurturing and maintaining high-quality relationships with any organization, individuals or groups that influence business position in the market	Welbourne and Pardo-del-Val (2009) and Tumwine *et al.* (2012)
There are included those intangible assets that the company obtains when it supports relations with agents of its environment like clients, suppliers or allies	Alama Salazar (2009)
The knowledge embedded in relationships with customers, suppliers, industry associations or any other stakeholder that influence the organization's life	Cabrita and Bontis (2008)
Represents the knowledge embedded in the relationships with the outsider environment	Chang *et al.* (2008)
Refers to customer capital that represents the potential an organization has due to ex-firm intangibles	Wu *et al.* (2008)
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.	Chen (2009)
Includes all value of stakeholders, customers, and supplier relations	Hsu and Fang (2009)
Relational capital makes reference to the value to the organization of the relationships which it maintains with the main agents connected with its basic business processes – customers, suppliers, allies, etc., as well as the value to the organization of the relationships which it maintains with other social agents and its surroundings	Martín-de-Castro *et al.*(2011)
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)

Table I.

mapping the field through a scoping review; comprehensive search; quality assessment, data extraction; synthesis and write up.

First, the research questions, and the inclusion and exclusion criteria including the keywords were defined. The purpose of the literature review was to determine the current status and review of work done in the field of intellectual capital, particularly in

the relational capital. The research questions were formulated above in *RQ1*, *RQ1a*, *RQ1b*, and *RQ1c*.

Inclusion and exclusion criteria were specified to help answer the research questions. The inclusion criteria were: publications in the period 1999-2015, peer-reviewed articles, English and Persian language, Scopus, Science Direct, Emerald and Civilica databases. Papers published prior to 1999 as well as books and gray literature such as reports and non-academic researches, and also languages other than the ones listed in addition to the other databases other than the ones mentioned, represent the exclusion criteria. Furthermore, an excel data sheet was produced comprised of key aspects related to the research aim.

In this case, these included: name of the (s), year of publication, the name of introduced indicator and the number of repetitions.

Second, once all relevant issues had been specified, the author accessed the databases and looked for more suitable articles. The initial search used the keyword combinations "relational capital" and "intellectual capital" or "measurement" or "reporting" or "indicator". It resulted in about 250 articles.

Third, all of the abstracts were read only based on their relevance to the next sections. Eventually, this process led to the final selection of about one hundred eighteen articles, which fulfilled the set criteria thus representing the basis of analysis. Fourth, all articles were evaluated during the study and the related data and topics were entered in the report. Fifth, the discussion, and analysis of the dimensions, relational capital indicators, and intellectual capital measurement models were conducted and most of the conceptual model and relational capital measuring model were reviewed and compiled in literature review process.

3.2 Questionnaire design

Questionnaires developed earlier by Bontis (1998), Kamukama (2013) and many others introduced the indicators used in previous studies to design a new questionnaire for the banking industry context which is given in the Appendix. Intellectual capital was sub-divided into three elements, namely the human capital, the structural capital and the relational capital. In this research, the authors have only focussed on the relational capital, and the fifty items which were designed to measure it according to the principles. All items were measured on a five-point Likert-type scale, in line with measurements used in previous studies. This scale anchored on a five point, ranging from 1 – strongly disagree to 5 – strongly agree. Further tests covered the reliability of the instrument and Cronbach's α values for relational capital items were all above 0.92, suggesting adequate internal validity. Anastasi (1985) and Numally (1978) state that reliability coefficients of 0.70 or more signify high validity of instruments (Kamukama, 2013).

Data from 276 out of all 627 bank branches in 31 provinces representing 44 percent response rate were received and as shown in Table II, 223 out of 276 questionnaires or 80 percent of them filled correctly.

	n	%
Cases		
Valid	223	80.8
Excluded[a]	53	19.2
Total	276	100.0

Note: [a]Listwise deletion based on all variables in the procedure

Table II. Case processing summary

3.3 Relational capital indicators

Definitions of research subject are the prerequisite to any research that applies content analysis (Gray *et al.*, 1995). Intellectual capital components are measured through indicators, and as there is no official guideline to measure intellectual capital, these indicators are not standardized. However there are "basic" areas covered in most reports. Thus, it is necessary to have a map of the organizational knowledge-based resources as the first step toward its management (Ordóñez de Pablos, 2005, intellectual capital statements: what pioneering firms from Asia and Europe are doing now).

In total 144 indicators for the RC were gathered from past studies and reports in the field of IC, and 50 indicators were identified to reflect the map of the relational capital of the Ansar bank as you can see in Table III. However, many other different types of indicators also exist including: numerical (e.g. number of alliances with business schools), percentages (e.g. percentage of updated documents on the intranet), and monetary units (e.g. investment on $R+D+I$ projects) (Ordóñez de Pablos, 2005, intellectual capital statements: what pioneering firms from Asia and Europe are doing now), the authors converts them into qualitative indicators for normalizing all units of measurement.

4. Presentation and discussion of findings

4.1 Exploratory factor analysis and principal component analysis

The researcher ran a principal component analysis (a form of factor analysis and variable reduction procedure) to identify patterns in data and to reduce the variables in a more manageable level.

The authors believe that there is redundancy among variables. In this case, redundancy means that some of the variables correlate with each other, often because they are measuring the same construct. Because of this redundancy, it is believed that it should be possible to reduce the observed variables into a smaller number of principal components that will account for most of the variance in the observed variables (O'Rourke and Hatcher, 2013).

Principal component analysis was deemed appropriate because of its ability to establish linear components in the data set, besides being psychometrically sound and conceptually less complex (Field, 2009). Though there are three orthogonal rotation methods, such as varimax, quartimax and equamax, the researcher found varimax rotation appropriate because of its ability to maximize the dispersion of loadings within factors; as a result, it loads a smaller number of variables onto each factor (Field, 2009). On the basis of the criterion of Kaiser (1960), the researcher retained all factors with eigenvalues greater than 1. The criterion was based on the idea that the eigenvalues represent the amount of variation explained by a factor and that an eigenvalue of 1 represents a substantial amount of variation. The researcher, therefore, deemed it fit to base on the criterion of Kaiser (1960) to determine the number of factors to retain.

4.2 Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy

This measure examine the suitability of data for factor analysis. KMO adequacy sample indicates the variance in the variables that may be caused by the hidden factors. As seen in Table IV high values (close to 1) indicate that factor analysis is appropriate for the desired data. Another test is Bartlett's test of sphericity tests the hypothesis that your correlation matrix is an identity matrix, which would indicate that your variables are unrelated and therefore unsuitable for structure detection. Small values (less than 0.05) of the significance level in Table II indicate that a factor analysis may be useful with our data (Kärnä *et al.*, 2003).

	Relational capital indicators
1	Turnover by segments and products
2	Financial relationships; relationships with shareholders, bankers, fund suppliers, investors and institutions
3	Brand value
4	Customer satisfaction index
5	Customer loyalty index
6	Business collaborations
7	Licensing agreements
8	Franchising agreements
9	Penetration in the internet
10	Communities of practice, professional associations
11	Subsidiaries
12	Financial leverage
13	Environmental activities
14	Market intensity
15	Social matters
16	Growth rate
17	Marketing expense
18	Unsolicited applications
19	Customer-focussed teams and innovative groups
20	Cooperation agreements with universities and business schools
21	Longevity of customer relationship
22	Ambassadors
23	Entry of new customers
24	Repeat customers
25	Customers per employee
26	No. of favorable recommendations from analysts
27	No. of contacts with investors and analysts
28	No. of solved consultations from shareholder's information office
29	Number of customer complaints
30	New products/services developed in cooperation with customers(customer panels)
31	The integral index of the website quality
32	Activity level of social networking
33	Number of published articles, pamphlets, and brochures
34	Number of presentations, conferences and training days held where customer participate
35	Exposure to the media
36	Sponsorship agreements
37	% of market share
38	Construction of sales channel
39	Research collaborations; Total costs of research and development or these as a proportion of turnover
40	Construction and utilization of the customer database
41	Reduce time to resolve problem
42	Market share improving
43	Value-added service
44	Feedback from customers
45	Confident of future with customer
46	Launch what customers don't want
47	Capitalize on customers wants
48	Environment consciousness
49	The competitiveness against rivals
50	Interoperate dispersal of customer feedback

Table III.
RC indicators adopted for research model

4.3 Initial extraction of the components and rotation to a final solution

The rotated component matrix with principal component analysis extraction method with varimax rotation that extracted 13 components from 50 variables can be seen below. The authors consider factors that are independent of each other and selected varimax rotation. In reality, the number of components extracted in a principal component analysis is equal to the number of observed variables being analyzed. In most instances, however, only the first few components account for meaningful amounts of variance; and only these first few components are retained, interpreted, and used in subsequent analyses (O'Rourke and Hatcher, 2013).

Therefore the authors assume that the remaining 37 from 50 components get only trivial amounts of variance. Here the authors assume factor loadings over 0.33 are significant and factor loadings smaller than 0.33 is matrix suppressed. In the following matrix, factor loadings that make a construct are determined within a rectangular. For example, variables 25, 4, 2, 24, 16, 39 and 47 relatively high factor loadings on the first component and except variable 16 and 47 conceptually depend on together.

In Figure 1, some variables are highly correlated to other factors other than the highest load factor. For example, variable 16 initially has the highest loading on the first component, and then the fourth component. But the concept of variable 16 is more correlated with the fourth component. Given that in this matrix, 13 factors extracted by the SPSS software, but all of the components have not significant conditions to maintain and analysis.

In this section the authors consider factors independent of each other and varimax rotation were selected.

4.4 Interpreting the rotated solution and naming the components

Interpreting a rotated solution means determining just what is measured by each retained component. In short, this involves identifying the variables with high loadings on a given component and determining what these variables share in common. Usually, a brief name as shown in Table V is assigned to each retained component to describe its content (O'Rourke and Hatcher, 2013).

In reality, the number of components extracted in a principal component analysis is equal to the number of observed variables being analyzed (Hatcher and Stepanski, 1994).

This means that in this research the authors have 50 components, not eight. However, in most analyses, only the first few components account for meaningful amounts of variance, so only these first few components are retained, interpreted, and used in subsequent analyses. In our study, through using criteria, the eigenvalue-one criterion, the Scree test, proportion of variance accounted for and the interpretability criteria, only the first eight components would account for a meaningful amount of variance; therefore only these would be retained for interpretation. It can be assumed that the remaining 42 components accounted for only trivial amounts of variance.

The first component extracted, perceived value by stakeholders accounts for a maximal amount of total variance in the observed variables. Under typical conditions,

Table IV. KMO and Bartlett's test

Kaiser-Mayer-Olkin measure of sampling adequacy		0.872
Bartlett's test of sphericity	Approx. χ^2	4,468.044
	df	1,225
	Sig.	0.000

Rotated Component Matrix[a]

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Var25	0.746												
Var4	0.719												
Var24	0.594												
Var2	0.576												
Var39	0.508	0.367											
Var3	0.502			0.455									
Var1	0.495			0.442									
Var16	0.494						0.422						
Var14	0.471												
Var47	0.436												
Var42		0.697											
Var50		0.671											
Var49	0.411	0.633											
Var33		0.593				0.473							
Var44	0.389	0.537											
Var46		0.533											
Var45		0.507								0.347			
Var48	0.385	0.496											
Var43		0.431				0.344				0.404			
Var32		0.411										0.350	
Var20			−0.718										
Var22			0.703										
Var28			0.676										
Var15			0.663										
Var26			0.567										
Var30			0.539				0.461						
Var5			0.486								0.447		
Var11			0.411										
Var19				0.669									
Var35				0.549		0.346							
Var17				0.507									
Var7					0.725								
Var8					0.696								
Var6				0.343	0.461								
Var38					0.377							0.338	
Var9						0.828							
Var34							0.556						
Var40	0.347						0.352						
Var21								0.639					
Var13								0.446	0.371				
Var10			0.346					−0.364					
Var23								0.341					
Var29													
Var12									0.770				
Var31										0.750			
Var18											0.666		
Var41			0.349									0.709	
Var37												0.355	
Var27													0.770
Var36													−0.350

Notes: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. [a]Rotation converged in 39 iterations

Figure 1.
Rotated component matrix[a]

this means that perceived value by stakeholders will be correlated with at least some of the observed variables. It may be correlated with many. The second component extracted, customer demand response system will have two important characteristics. First, this component will account for a maximal amount of variance in the data set that was not accounted for by the first component. Again under typical conditions, this means that the second component will be correlated with some of the observed variables that did not display strong correlations with perceived value by stakeholders. The other characteristic of the second component is that it will be uncorrelated with the first component. Literally, if you were to compute the correlation between components 1 and 2, that correlation would be 0. The remaining components that are extracted in the analysis display the same two characteristics.

Each component accounts for a maximal amount of variance in the observed variables that was not accounted for by the preceding components, and is uncorrelated

Naming component	Variables that load on the component
First component – perceived value by stakeholders	1. Financial relationships; relationships with shareholders, bankers, fund suppliers, investors and institutions
	2. Brand value
	4. Customer loyalty
	14. Customer satisfaction
	24. Longevity of customer relationship
	25. Ambassadors
	39. Confident of future with customer
	47. % of market share
Second component – customer demand response system	32. New products/services developed in cooperation with customers(customer panels)
	42. Construction and utilization of the customer database
	44. Reduce time to resolve problem
	45. Value-added service
	46. Feedback from customers
	48. Launch what customers don't want
	49. The competitiveness against rivals
	50. Capitalize on customers wants
Third component – research and development collaborations	5. Business collaborations
	11. Communities of practice, professional associations
	15. Market intensity
	20. Licensing agreements
	22. Customer-focussed teams and innovative groups
	26. Entry of new customers
	28. Favorable recommendations from analysts
	30. Solved consultations from shareholder's information office
	41. Research collaborations
Forth component – environmental protection systems and social activities	3. Environment consciousness
	6. Interoperate dispersal of customer feedback
	17. Social matters
	19. Environmental activities
	37. Exposure to the media
Fifth component – Brand improvement	7. Repeat customers
	8. Franchising agreements
	38. Sponsorship agreements
Sixth component – internet-based services and marketing	9. Penetration in the internet
	33. The integral index of the website quality
	35. Published articles, pamphlets, and brochures
Seventh component – Banking service distribution	16. Turnover by segments and products/services
	34. Activity level of social networking
	40. Construction of sales channel
Eighth component – financial management and capabilities	10. Marketing expense
	13. Financial leverage
	21. Unsolicited applications
	23. Cooperation agreements with universities and business schools
	29. Contacts with investors and analysts

Table V.
Naming the extracted and significant for analysis components

with all of the preceding components. A principal component analysis proceeds in this fashion, with each new component accounting for progressively smaller and smaller amounts of variance (this is why only the first few components are usually retained and interpreted). The analysis shows that these eight components will display varying

degrees of correlation with the observed variables, but are completely uncorrelated with one another.

So, the authors use principal component analysis as a powerful tool for reducing 50 observed variables into eight artificial variables that account for most of the variance in the data set and to identify new meaningful underlying variables. It is particularly useful when the managers need a data reduction procedure that makes no assumptions concerning an underlying causal structure, that is responsible for covariation in the data.

4.5 Calculation of component scores

A principal component is a linear combination of observed variables that are optimally weighted. Below is the general form of the formula to compute scores on the first component extracted (created) in a principal component analysis (O'Rourke and Hatcher, 2013):

$$C_1 = b_{11}(X_1) + b_{12}(X_2) + \cdots + b_{1p}(X_p)$$

where C_1 is the participant's score on principal component 1 (the first component extracted); b_{1p} the coefficient (or weight) for observed variable p, as used in creating principal component 1; X_p the participant's score on observed variable p.

Eventually, to obtain a measurement the authors assign scores to each subject to indicate where that subject stands on the retained components. Actually, the authors want to assign one score to each subject to indicate that subject's standing on the perceived value by stakeholders, and a different score indicate that subject's standing on the customer demand response system component and so on.

After obtaining the component scores, the authors may sum them up with an equal weight that was obtained the number 1533/13 as shown in Table VI (Chu and Choi, 2000).

This number implies two things: first, the authors obtain a measurement for relational capital from extracted components. Second, this number can only be an effective scale in comparing relational capital between the two banks or more.

Since the authors do not have neither information about the situation of other banks nor any measurements on IC and its elements, human capital and structural capital.

So this scale, can starts a quantitative method for measuring relational capital in the banking industry and other industries.

4.6 Importance-performance analysis (IPA) of relational capital of Ansar bank

According to the IPA that was formulated by Martilla and James (1977), the importance of variables of relational capital vs the performance was questioned by experts in the field of intellectual capital and bank managers in the Ansar bank.

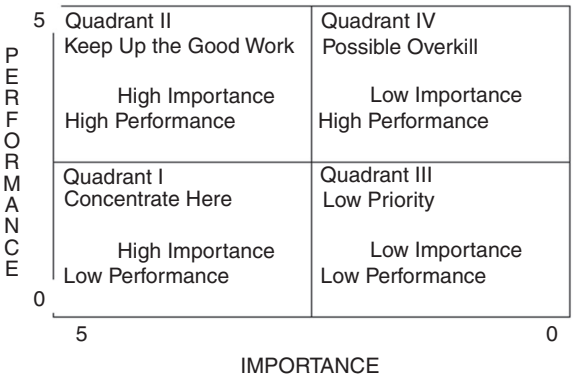
The interpretation of the IPA is graphically presented on a grid divided into four quadrants. Figure 2 illustrates the IPA grid. The *Y*-axis reports the expert's perceived importance of selected indicators, and the *X*-axis shows the bank's performance in relation to these indicators. The four identifiable quadrants are: Concentrate Here, Keep Up the Good Work, Low Priority and Possible Overkill.

In the Concentrate Here quadrant, indicators are perceived to be very important to experts, but performance levels are seen as fairly low. This sends a direct message that improvement efforts should be concentrated here.

In the Keep Up the Good Work quadrant, indicators are perceived to be very important to indicators while at the same time, the organization seems to have high levels of performance in relation to these indicators.

Component score	The equation for calculating scores of the extracted components
529/99	C1 = 0.746 × Var25 + 0.719 × Var4 + 0.594 × Var24 + 0.576 × Var2 + 0.508 × Var39 + 0.495 × Var1 + 0.471 × Var14 + 0.436 × Var47
943/83	C2 = 0.697 × Var42 + 0.671 × Var50 + 0.633 × Var49 + 0.537 × Var44 + 0.533 × Var46 × 0.507 × Var45 + 0.496 × Var48 + 0.431 × Var43 + 0.411 × Var32
291/05	C3 = 0.703 × Var22 + 0.718 × Var20 + 0.663 × Var15 + 0.676 × Var28 + 0.567 × Var26 + 0.539 × Var30 + 0.411 × Var11 + 0.486 × Var5
160/05	C4 = 0.669 × Var19 + 0.507 × Var17 + 0.502 × Var3 + 0.343 × Var6
165/81	C5 = 0.725 × Var7 + 0.696 × Var8 + 0.377 × Var38
354/61	C6 = 0.828 × Var9 + 0.593 × Var33 + 0.346 × Var35
−173/24	C7 = 0.494 × Var16 + 0.352 × Var40 + 0.461 × Var30 + 0.556 × Var34
25/84	C8 = 0.639 × Var21 + 0.446 × Var13-0.364 × Var10 + 0.341 × Var23
Total scores of components for bank branches	
1533/13	$\sum_{i=1}^{223}\sum_{j=1}^{8} C_{ij}$

Table VI.
Calculation of component scores



Source: Chu and Choi (2000)

Figure 2.
Importance-performance analysis grid

In the Low Priority quadrant, indicators have low importance and low performance. Although performance levels may be low in this cell, managers should not be overly concerned since the indicators in this cell are not perceived to be very important. Limited resources should be expended on this "low priority" cell.

Lastly, the Possible Overkill quadrant contains indicators of low importance, but of relatively high performance. Experts are satisfied with the performance of the organizations, but managers should consider present efforts on the indicators of this cell as being over utilized.

In this study, indicator means of the perceived importance and performance of each indicator were calculated and plotted into a graphical grid. Cross-hairs (vertical and horizontal lines), using the mean values of the Importance and Performance of each indicator, were calculated to separate the derived factors into four identifiable quadrants (see Figure 2). The two-dimensional grid displayed the performance of indicators on the vertical axis from high (top) to low (bottom) and the importance of indicators on the horizontal axis from high (left) to low (right).

As you can see in the Concentrate Here quadrant in Figure 3, variables 36, 30, 23 and 5, respectively, which represents the number of lectures and conferences attended by customers, useful advice from stakeholders, cooperation with universities and business schools and business cooperation with despite the importance of high-yield has been low. And thus, should be treated as priority improvement projects in the bank. These indicators performance where achievement is so far below what it ought to be, given its importance to the experts, the bank is probably being lost directly as a result. (Slack, 1994) The short-term objective must; therefore, be to raise the performance of any indicators lying in this quadrant by cooperation agreements with institutions of higher education that reflects the company's access to specialists and thus to the latest research. For instance, the company may invite students to write their assignments on a company issue, or may agree to sponsor work performed by a PhD. Cooperation supports the corporate image within the educational institution, and the company may be seen as proactively engaged in recruiting new employees. This is related typically to management challenges as knowledge sharing and collaboration and recruiting employees (Chu and Choi, 2000). Another strategies to improve the indicators in this quadrant are sharing information with stakeholders, particularly shareholders, business cooperation such as joint-ventures, mergers, acquisitions and outsourcing and so on.

Variables 2, 14, 4, 1, 46, 38, 26, 8, 32, 42, 50 and 31 which represents brand value, customer satisfaction, customer loyalty, financial relationships, customer feedback, sponsorship agreements, new customers, franchising agreements, customer panels, construction and utilization of the customer database, capitalize on customer's needs and number of customer complaints, respectively, were identified in the Keep Up the Good Work quadrant. Many variables in this quadrant related to the customer relationship, which indicates that the target bank had acceptable performance in this area, at least in the short-to-medium term. In the long term, however, the bank needs strategic planning

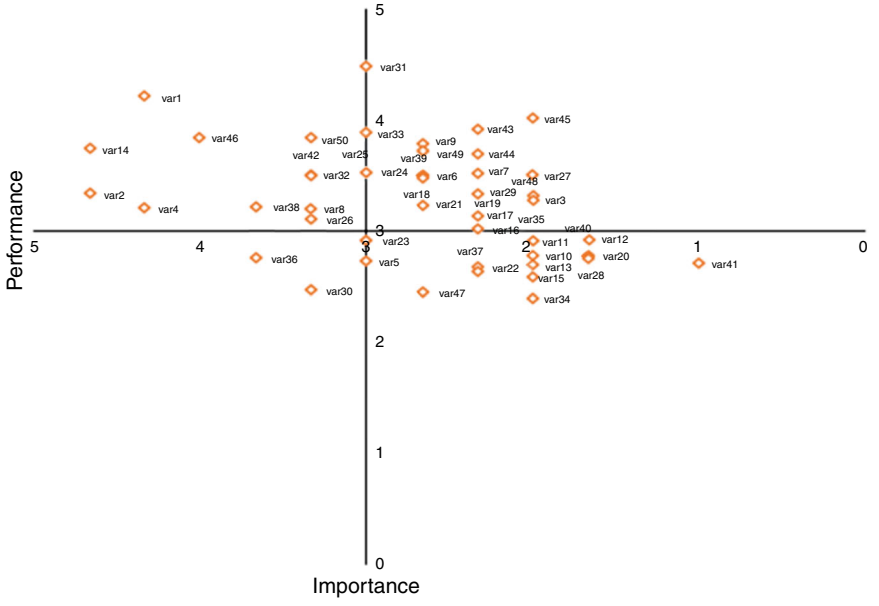


Figure 3.
Importance – performance matrix of relational capital of Ansar bank

such as services of good quality and value and any activities that could raise company name and favorable contract for greater competitiveness against its rivals.

The Low Priority quadrant identifies those items where bank is performing adequately but experts perceive them as less important when compared with other indicators.

Variables 5,47, 22, 23, 37, 34, 15, 28, 30, 13, 10, 11, 40, 12, 20 and 41 which indicates market share, customer-focussed teams and innovation groups, exposure to the media, social networking, market intensity, recommendations from analysts, financial leverage, marketing expenses, professional associations, structure and location of branches, number of subsidiaries, licensing agreements and research collaborations, respectively. Performance in these indicators is poor but it matters, and certainly they need improving, but probably not as a first priority.

Variables in the Possible Overkill quadrant are 3, 6, 7, 9, 16, 17, 18, 19, 21, 24, 25, 27, 29, 31, 32, 33, 35, 39, 43, 44, 45, 48, 49 which represents knowledge of environmental activities, disseminating data on customer feedback, repeated customers, the level of activity and internet services, turnover of branches, community actions, growth in sales, environmental activities, unsolicited applications, ambassadors, longevity of relationships, customer per employee ratio, relationship with investors and analysts, customer complaints, customer panels, website quality, published articles, costumer trust, reducing time of solving problem, improving market share, value-added service, what customers do not want, organization's competitiveness against rivals.

Those indicators within this area have a better performance achievement than what is seemingly warranted. Maybe this means that too many needed resources are used to achieve this level. It is only sensible; therefore, to check if any resources used to achieve such a performance could be diverted to a needier indicator. Another analysis that can be offered is that, as you can see in Figure 3, many variables in terms of performance have been drawn to this quadrant, which may indicate an error in the assessment of performance by managers. For example, the variables, unsolicited applications and cooperation with the business school at almost the same in terms of concept and both have been evaluated with high importance but they are in opposite quadrant in terms of performance, so this contradiction, undermines to some extent careful evaluation of managers of the bank. Such as previous example, the longevity of customer relationships reflects a customer's loyalty to the company. On the one hand a high average longevity can be a good sign, as it may indicate close customer relations, on the other the figure should not be too high, as this may indicate a lack of ability to acquire new customers. But in this quadrant both these indicators have a high performance.

5. Conclusion

Disclosure of the relational capital a company has acquired should be a top priority for management teams (Bukh *et al.*, 2006; Rawson, 2012). Reporting intellectual capital not only creates internal benefits with regard to intangible resource management but also external benefits. A number of features stand out among these advantages, such as profit generation, strategic positioning, and acquisition of innovations from other companies, customer loyalty, cost reductions and productivity improvement (Ordóñez de Pablos, 2004).

One way for companies to report relational capital is through defining and measuring key indicators based on purpose and strategies of the company. Getting

these measurements assists managers and external analysts in determining the value of relational capital that a company has built and its position among competitors.

5.1 Research findings

The aim of the paper is to design a quantitative model for measuring relational capital in bank and expand the approaches that exist on this topic.

The study has addressed empirical matters that have not been addressed in the literature, more particularly in the banking industry. By using content analysis of 59 papers, 144 indicators have been extracted to measure relational capital. Then through using expert opinions and conducting interview with research and development departments of banks, a model with 50 indicators for measuring relational capital of the bank and examining the designed questionnaire using factor analysis was obtained.

In this paper, the authors have attempted to build a quantitative method for measuring relational capital in banks. Understanding how to measure relational capital has a dramatic effect on the manner of managing it. A company that identify and measures its relational capital indicators, has a much lower threat of competitors stealing its strengths in the relationship with stakeholders. The review of literature and empirical evidence confirm the strategic importance of intellectual assets to relational capital to build long-term competitive advantage, better performance and higher return on investment. The authors performed a case study analysis with Iranian bank and the authors focussed exclusively on the identifying and measuring relational capital. In particular, the authors focussed on intellectual capital indicators presented by authors and firms during the period 1990-2015. Our empirical study has identified eight principal components to measure relational capital in the Ansar bank: customer perceived value; customer demand response system; research and development collaborations; environmental protection and social activities; brand improvement; internet-based services and marketing; banking service distribution; and financial management and capabilities.

The total score of these components is the start point to compare relational capital situations in banks and promoting the relational capital in the banking industry.

5.2 Limitations

In this study a questionnaire tool has been used. Although, it would have been better to use observation and/or conduct an interview for some indicators or for assessment of performance of the bank. The questionnaire is a tool by which the understandings and attitude of any person is investigated; whereas, the reality might be different with respondent‘s answers.

Some other important limitations to this research include the reluctance of some of the respondents in completing the questionnaires, lack of attention by some them in answering the questions, and the possibility of bias in answering the questions by some of the respondents.

As well as the model presented in this study will only work if the comparison is made between banks. Furthermore, limited time, lack of access to all the experts and required data may affect the accuracy and reliability of the results and the final model.

5.3 Implications

The authors should point out how important the companies consider the intangible resources in the present business environment to be. Companies know that their competitive advantage lies in the intangible resources, especially in knowledge-based resources. However, this knowledge has to be renewed to be able to maintain this competitive advantage. Therefore, the company should develop a knowledge and learning management strategy, that is in line with the organizational strategy. Second, companies are aware of the importance of managing their knowledge and renewing their current knowledge base by means of knowledge management strategies aligned with the organizational strategy. Companies also know that knowledge-based resources should be quantified. Building and publishing "Intellectual Capital Reports" is a step ahead in measuring intellectual capital. These are corporate reports that present a true image of the intellectual capital base of the company and the organizational strategies of knowledge management. They will help in completing the information received through traditional annual corporate reports. Finally, the authors have to point out the growing need for generally accepted norms that help intellectual capital reporting and that can be compared to each other (Ordóñez de Pablos, 2004).

This means raising awareness about the status of relational capital or a boost in firm's customer relational capital leads to an increase in performance of the firm and there is many of studies prove the relationship between intellectual capital and its components with firm performance (Tseng *et al.*, 2013; Albertini, 2016). The firm which invests capital to strengthen its relationships with customers and stronger and organized distribution channels increases its performance (Raza, 2013).

This study promotes the efforts of managers to improve their awareness of relational capital against rivals which can be done through appropriate management of relational capital components. Thus, management should intensify initiatives to encourage greater understanding and acceptance of relational capital components that boosts performance in banking industry sector.

The study has important contributions for researchers and practitioners such as contributing to the academic literature through collection of different indicators and definitions of relational capital provided in previous researches for accurate understanding of the concept of relational capital and provide a comprehensive and reliable framework for measuring it.

By using previous studies and a quantitative approach, our research shows that relational capital in the banking industry can be measured. From a managerial perspective, our results showed that the relational capital of the bank is composed of eight components that managers can make strategic plans with respect to them. Moreover, the results also provide insights into several tools for such an IPA matrix for determining the status of the intellectual assets and define improvement strategies by using this.

In summary, the paper has taken a step forward to a better understating of the ways in which the management and measurement of relational capital can contribute to the enhancement of sustained competitive advantage taking into consideration the idiosyncrasy of Iranian banks and organizational cultures.

6. Recommendations

This paper has attempted to cover expressed definitions of relational capital and provide a model for its measurement, and also implement a designed model for banks.

There are, however, many models presented to measure intellectual capital and its components, but implementation and testing them in real organizations to gain more information is very important. Further research should be carried out to establish how relational capital can be measured over time and how the results from the measurement can improve on managerial decision making for companies.

Would these measures truly impact manager's decisions in adopting strategies about intellectual assets? Would measuring these assets in this manner really be helpful? What other easily understood methods could potentially assist the managers to measure the relational capital? Finding answers to these questions is recommended in future research and, of course, our next research step is the validation of presented model using confirmatory factor analysis and neural network approach, conducting this survey among several banks or other service sectors and subsequently analyzing the results and managerial implications on the agenda of the authors. Also, researchers can also examine whether our results can be generalized to developed countries in the same industry or a different one. Moreover, a longitudinal research is needed to examine the dynamic effect of indicators over time.

In future research it may be better to analyze the role of relational capital in the configuration of IC and strategic role of it. Also not calculated only elements of relational capital separately from each other, but the relationships and the impact of these elements should be considered and a step forward to validation of the presented model in this paper using confirmatory factor analysis.

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Appendix. Relational capital questionnaire

For the kind attention of Ansar bank branch manager/deputy, this questionnaire is merely a tool for measuring relational capital is related to a master thesis. I hope to complete the questionnaire and support this research. Please make sure to answer each question and tick the correct response (1 = strongly disagree; 2 = disagree; 3 = not sure; 4 = sure and 5 = strong agree) based on how you feel about the statement (Table AI).

(The Appendix follows overleaf.)

	Statement	1	2	3	4	5
1	Our organization always tries to maintain the relationship with shareholders, funders, and investors in the best condition					
2	*We have a strong corporate brand compared to competitors					
3	Our organization has knowledge of environmental activities at all levels					
4	*Our customers are loyal to our company, more so than to any other in the industry					
5	Our collaboration with other businesses (business cooperation) is very weak. NOTE: here the definition of the collaboration refers to activities such as joint venture, merger or purchase with different industries					
6	*Data on customer feedback is disseminated throughout the organization					
7	*There is a high amount of percentage of sales to repeat customers					
8	So many franchising agreements have been signed in our organization. NOTE: a legal contract in which a well-established business consents to provide its brand, operational model and required support to another party for them to set up and run a similar business in exchange for a fee and some shares of the income generated					
9	The level of activity and internet services of our organization is of higher quality than competitors					
10	A very small amount of the total expenses devoted to marketing expenses					
11	Our organization does not pay attention to participation in professional and specialized associations					
12	The number of our organization subsidiaries is much higher than competitors					
13	The financial leverage of our organization at the highest level in the industry					
14	*A poll of our customers would indicate that they are generally satisfied with our organization					
15	The growth range of products and services that our organization provides to its stakeholders is very slow					
16	Turnover of branches at the level of superior banks in the banking industry					
17	*Our factory devotes an important part of its budget to funding community and green actions					
18	Growth in sales in our organization in recent years has increased significantly					
19	Many activities in our organization are compatible with the environment and protect it					
20	Very little licensing agreements with other organizations is taking place in our organization					
21	Unsolicited applications by individuals for work in our organization is very high					
22	The activity of innovative and customer-focussed teams in our organization is very trivial and has insignificant output					
23	Our cooperation agreements with universities and business schools are widespread and growing					
24	*The longevity of the relationships we have with our customers is admired by others in the industry					
25	Our current customers consistently recommend our organization to others					
26	New customer acquisition in our organization is very low					
27	Customers per employee ratio in our organization is very high					
28	There have been few favorable recommendations and consultations from analysts regarding our organization					
29	Our organization has a valuable and profitable relationship with investors and analysts					
30	Advice from organization's shareholders would solve the problems of the organization was very low					
31	*Customers complaints are handled on time					
32	Many developments of new products/services of our organization have been carried out in collaboration with customers (customer panels)					

Table AI.
Relational capital questionnaire

(*continued*)

	Statement	1	2	3	4	5
33	The quality of our organization's website tailored to the needs of our customers and continuously improving					
34	The level of activity on social networks by our organization is very low					
35	Our organization always has published articles and brochures to show the progress of the organization and to inform stakeholders					
36	The quality of lectures, conferences and training days held that our customers have participated are very high					
37	Exposure products and services of our organization in the media are constantly done at the highest level					
38	Many sponsorship agreements in our organization will be signed					
39	*We feel confident that our customers will continue to do business with us					
40	Structure and location of branches in the country according to scientific principles and is in accordance with demand					
41	Research collaboration (total costs on research and development as compared to the turnover) of our organization and supporting of them is very low					
42	Our organization built a database for the maintenance and updating customer information and constantly uses it to improve the relationship with the customer					
43	*We have greatly reduced the time it takes to resolve a customer's problem					
44	*Our market share has been continually improving over the past few years					
45	*Our organization thrives on maintaining the most positive value-added service of any firm in the industry					
46	*We get as much feedback out of our customers as we possibly can under the circumstances					
47	*Our market share is the highest in the industry					
48	*We often launch something new only to find out that our customers do not want it					
49	*When it comes to new business, our customers have increasingly selected us vs our competitor's customers over the past few years					
50	*We capitalize on our customers' wants and needs by continually striving to make them satisfied					

Note: Statements that are marked with an * have been taken literally from the sources (Mention and Bontis, 2013; Kamukama, 2013)

Table AI.

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