

Full Length Research

Determining Principle Components of Human Capital Management using Principle Component Analysis: The Case of Foolad Technic International Engineering Company

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Different surveys have indicated the necessity of paying heed to Human Capital Management (HCM) and considered it as a competitive advantage for the organization and implied that one of the procedures to gain competitive advantage for the organization is to pay proper attention to human capital. On the same basis, this study aims to specify principle components of HCM. For this purpose, Foolad Technic International Engineering Company has been selected as the research's case and initially the level of HCM has been evaluated through using Bassi and McMurrer questionnaires. Then, applying One Sample T-test each of human capital management indices level has been checked. In the next step, principle components of human capital management has been designated utilizing Principle Components Analysis method and significant indicators in the formation of HCM principle components have been determined. The results of this study indicate that among all HCM measurements, knowledge accessibility has the highest level. Furthermore, parameters of workforce optimization and employees engagement have the most impact to signify the principle component of HCM.

Key words: Human Capital Management, principle components analysis, Leadership Practices, Employees Engagement, Knowledge Accessibility, Workforce Optimization and Learning Capacity

INTRODUCTION

In recent years importance of human capital and its impact on organizational evolution illustrates that human capital is particularly important for organizational development and completion increase and according to theories of efficiency assessment which are based on enterprise resources, as one of the most paramount resources human capital can be effective to create qualitative organization (Martin *et al.*, 2013). Human capital of each organization not only counts as a crucial resource of business but also it considers as the basis of

discrepancy creation between firms. Conducted researches show that staff skills, their knowledge and psychometric features and the quality of leadership are such factors that improve organizational performance (Habib *et al.*, 2010). Generally, it can be stated that people are the most valuable assets of the organization but rarely this fact is really accepted that knowledge is a capability to draw a route map for the firm.

Extensive numbers of surveys that have carried out about the concept of intellectual capital (IC) have defined three concepts of Human Capital, structural capital and relationship capital as the factors of IC (Edvinsson and Malone, 1997; Stewart, 1999). Among three mention factors, in current world of competition, human capital has been further emphasized and acknowledged as one

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of competitive factors between organizations. However, the importance of human capital in organizational development has been approved but still it has not been modified with a comprehensive definition. Husz (1998) has defined human capital as a function of time, experience, knowledge and capabilities of a generation which is used in manufacturing process. Overall, human capital does define as a combination of factors that related to employees and staff and it can include factors like knowledge, skill, technical skills, individual features (for instance: intelligence, energy, reliability), commitment, capabilities of learning (for instance: talent, being initiative and creativity), inclination to share the information between a team members and being focused on organizational goals.

If an organization can properly establish human capital then organization's management can be expectant to gain lots of profits and that would be a way to improve employees organizational commitment, employees participation in decision making and formation of team work climate. One the most important outcomes of human capital is organizational commitment which has some positive business consequences such as reduction of absenteeism and turning over, improvement of citizen behavior, increase of work effort and improvement of business performance (Shirouyehzad and Tavakoli, 2013). Different definitions of organizational commitment have been provided in research literature and lots of researchers carried out surveys related to this issue. Majority of these definitions of organizational commitment hint that inclination of organization's staff to continuously perform series of activities which are the resultsof previous organization's investments in human resources and by leaving organization, this investment would be lost (Becker, 1992).

Given the importance of HCM in organizations, in this study, the level of HMC would be considered and principle components of HCM would be studied and signified and determining paramount scales of HCM through determining principle components of it, they would be analyzed. In the following, principle components of HCM would be investigated and each of these components besides and the most significant components of each scale would be specified. To do this survey Foolad Technic International

Engineering Company is selected as the research's case.

LITERATURE REVIEW

In connection with measurement of human capital, many studies have been done that number of them are pointed.

Cabrales *et al.* (2011) considered the relationship between different procedures of human resources management and organizational learning capabilities and three main issues have been studied. Primarily, they checked the connection between organizational learning capabilities and procedures of human resources

management such as selection, development, evaluation and reward in next step, they investigated this issue that how human capital's value and uniqueness are related to organizational learning and human resource management. Survey's results show a direct connection between selection method and evaluation and both dimensions of human capital. Furthermore, methods of human resource development are connected with human capital values and selection techniques and evaluation methods are related to uniqueness of human capital. Therefore, human capital is a mediator section between methods of organizational learning and human resource management.

Another study conducted by Demartini and Paoloni (2011) evaluated human capital in knowledge intensive business services. This practical research combined surveys process and practice on the basis of an assumption that says indeed, perception of human resource systems cannot be changed without doing attempts with such aim. This research has been done based on three attitudes of skills, competencies and human capital behaviors and results imply that for better organizing of enterprise's project management there must be a technique to appraise human capital. In fact, the temporary nature of projects has faced to repetitive operation of production or service manufacturing. In practice, management of these two systems is totally different and hence, development of distinct technical skill is required.

Harris *et al.* (2012) deliberated the relationship between different aspects of human capital and sustain team connections and performance. This research, studied direct impacts and interactions of human capital and also impacts of jobs interference on individuals performance in 230 National Sport Associations and men's basketball teams and they understood there is a positive relation between player's and coach's human capital and team performance. Lastly, they found out that the relevance between human capital level and player's interference has no direct impact on performance.

Another research to mention was carried out by Tavakoli and Shirouyehzad (2013) that proposed an integrated approach of PCA/DEA to evaluate organizational units based on HMC. They initially considered HMC components as model inputs and organizational commitment as the model outputs. Afterward, due to use of statistical tests, components of HMC were correlated. Thereby, applying method of PCA principle components were calculated and then, organizational unit's performance was assessed.

Poldaru and Roots (2014) also proposed a PCA/DEA approach to measure the quality of life in Estonian Counties. This paper has surveyed the application of a PCA-DEA model to evaluate the quality of life (QOL) scores in Estonian counties and analyses the model's implications. The dataset was a balanced panel of 15 Estonian counties covering the period from 2000 to 2011. A PCA-DEA model has been considered as an alternative

method to estimate and predict QOL scores and rankings of Estonian counties. The method consists of a two-stage analysis that begins with a principal component analysis. In the second stage, the standard DEA is used. The results from the conventional DEA model and the PCA–DEA model are compared and discussed. A comparison of the methodologies demonstrates that a PCA–DEA model provides a powerful tool for performance ranking. The rankings of Estonian counties using QOL scores for different model specifications are presented. Finally, the QOL ranking of Estonian counties is revised using PCA–DEA.

Human capital

In recent years, the role of intangible organizational assets is much more discussed and organizations do attempt to pay more attention to such capitals and achieve better results. One of those intangible capitals is intellectual capital that has a direct effect on organizational performance (Roos and Roos, 1997). Development of intellectual capital has done in two stages. The first phase started at 1990s and it focused on increase of information level, concepts definitions, consideration of case studies, development of basic concepts. The second phase started in 2000 and it all related to measurement, modeling and different levels of IC analysis. The world is confronted with a transformation in information technology, innovation and telecommunications that acts as an incentive for knowledge based economy. This issue requires such companies that designate IC as a competitive advantage (Seleim *et al.*, 2007). Intellectual Capital has three dimensions of Human Capital, Structural Capital and Relationship Capital (Edvinsson and Malone, 1997). In today's world labor counts not only as a vital business resource but it is the foundation of competitive advantage achievement. Research has shown that skillful personnel, knowledge and spirit of the staff and the quality of leadership can cause improvement in company's performance. Overall, it can be stated that individuals are the most valuable asset of the organization but rarely this issue is really accepted that knowledge is a capability to draw a route map for the organization. Human capital is one of the three dimensions of IC with two other dimensions of relational capital and structural capital. However human capital is described with different expressions such as organizational assets, human resource, cultural capital and staff's value (Habib *et al.*, 2010)

In the theory of enterprise's resources, researchers (Barney, 1991; Prahalad and Hamel, 1990) express that Human Capital is divided into two categories of internal competence of staff to create the value in the organization (the level of staff's potential to create competitive advantage) and organizational specific competencies (the amount of human capital which is unique and nontransferable from the organization). In the

field of management, definition of human capital encompasses all initiatives of intellectual capital to attract, develop and retain the staff (Tracey, 1991).

Edvinsson and Malone (1997) designate human capital as a combination of knowledge, skill, innovation and individual capabilities. In other word, human capital is described as a set of skills, experience, abilities and hidden knowledge of employees. Naturally, human capital is intangible and it depends on creative problem solving and decision making in complex situations. Employees of an organization count as owners of human capital and they can decide how much to invest in it. For this reason, the amount of investing in human capital is moving (Roos *et al.*, 1997).

Human Capital and Human Resource has different features. For this purpose, Garavan (2001) implied that flexibility, adaptability and employability are characteristics that can act the role of catalyst for turning around from human resources to human capitals. Among all benefits of human capital, high return of individual investment, increase of the reward, future leadership, opportunities of participation in paramount projects and enhancement of status and authority can be cited (Birasnav *et al.*, 2011). Some scientists believe that human or human capital is the only sustainable competitive advantage of the organization in whole of the world (Bontis, 1996). The concept of human capital has been ascertained through growth of physical capital and as an income growth. In most of organizations, intangible assets have a key role in economic development (Zidan, 2001). The work can be more qualitative by investing in human capital and it can cause individual capital to return, wages to raise, organizations to achieve greater economic benefits, increment of employment outlook and more job security. Generally, it can be stated that human capital planning enables organization to (Khasawneh, 2011):

- i. Determine all talents required to execute corporate strategies and operational requirements.
- ii. Designate number of people required during the period of strategic planning and operation of the institution (In this case, it's been needed to recognize talents abilities and signify the required future capacity)
- iii. Diagnose the talent gap and effective priorities and choose the best procedure to discard such gaps through realization of relative size.
- iv. Assign required activities to define the main strategy and the process of talent management and consequently to make more efficient decisions.

Human capital management approach from Bassi and McMurrer viewpoint

Strengths and weaknesses of HCM can be evaluated through assessing the performance of each of the 23 human capital management mechanisms which are

Table 1. Human Capital Management Drivers (Bassi and McMurrer).

HMC incentives	HMC practices
Leadership Practices	<p>Communication: Managers connections are effective and open</p> <p>All inclusive: Management collaborates with staff and wants them to comment</p> <p>Supervisory skills: Supervisors discard barriers, provide feedbacks and reinforce employee's self confidence</p> <p>Management skills: Managers discard barriers, provide feedbacks and reinforce employee's self confidence</p> <p>Systems: Leadership development and effective transition systems are influential</p>
Employees Engagement	<p>Jobs design: Work would be well-organized and staff's skill can be well-applied</p> <p>Commitment: There would be job security, employees are recognized and there would be an opportunity to progress</p> <p>Time: Workload is in a way that allows staff to do assignments well and retain the balance between their personal life and their work life</p> <p>Systems: employee's participation is appeased continuously.</p>
Knowledge Accessibility	<p>Accessibility: Job-related information and education easily available.</p> <p>Collaboration: team work is rewarded and opportunities are provided to support it</p> <p>Information Sharing: Best procedures of working are shared and improved.</p> <p>Systems: Systems provided to collect information simplify information accessibility</p>
Workforce Optimization	<p>Processes: Work processes are well defined and training would be effective.</p> <p>Conditions: Working conditions support qualitative performance.</p> <p>Accountability: High performance is accepted and rewarded.</p> <p>Hiring: employees are chosen based on skills. New employees accomplish a thorough orientation.</p> <p>Systems: Employees performance management systems are efficient.</p>
Learning Capacity	<p>Innovation: New ideas are welcomed.</p> <p>Training: Training is practical and support organizational goals.</p> <p>Development: Staff has formal professional development program.</p> <p>Value and support: Leaders indicate that learning is valuable.</p> <p>Systems: A learning management systems automates aspects of learning.</p>

categorized in to 5 stimuli of human capital management. Generally, decline or improvement of organizational performance can be directly connected to decline or improvement of human capital management approaches that this issue with mentioned stimuli of HCM are hinted briefly (Bassi and McMurrer, 2007; Table 1).

METHODOLOGY

This research studies principle components of HCM. For

this purpose, the first step is to determine HCM indicators and collect data related to each of indices. In the following, the status of each HCM scale in Foolad Technic International Engineering Company is analyzed. Then applying Principle Component Analysis, principle components of HCM are specified. Lastly, principle components of HCM indices are signified individually. Foolad Technic International Engineering Company selected as the case of the survey. Foolad Technic is an International Engineering Company which provides servicethrough effective conduction of public and private

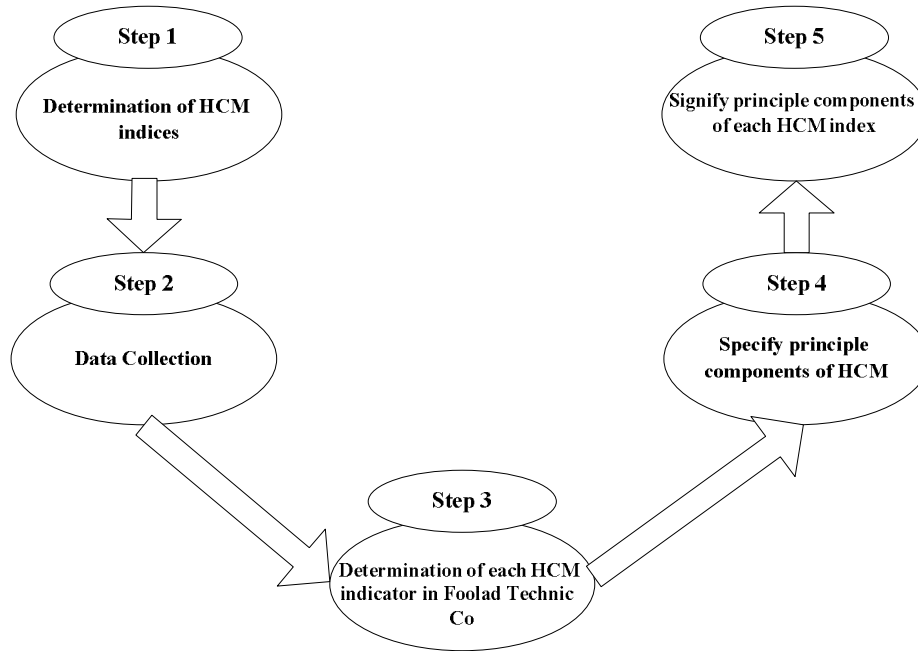


Figure 1. Methodology

sector investment in industrial and civil projects in the form of feasibility studies, management, engineering, procurement and construction, in domestic and foreign markets which are integrated or separated. Among all company's objectives doing attempt to augment human capital can be noted. Stages of this study are illustrated in Figure 1.

Step 1: Determination of HCM indices

In this stage, to determine human capital indices initially literature of the research is reviewed and the model of Bassi and McMurrer is selected through academic and industry experts surveys. This model includes 5 significant dimensions of HCM and contains Leadership Practices, Employees Engagement, Knowledge Accessibility, Workforce Optimization, Learning Capacity. Each dimension of HCM comprises form several driversthat should be exerted to execute HCM dimensions. HCM model of Bassi and McMurrer and its dimensions are demonstrated in Table 1.

Step 2: Data collection

Data would be collected in this stage and for this aim standard questionnaire of Bassi and McMurrer is used. This questionnaire is conformed to the case of study and academic experts of human resource management confirmed its validity. To assess the reliability of questionnaire Cronbach's alpha coefficienthas been

applied and it verified with the value of 0.969 as it's greater than 0.7. Thereby, Cronbach's alpha coefficient of each HCMdrivers calculated and all are shown in Table 2:

The next stage evaluates the level of HCM in Foolad Technic Company and each of five criteria's level and their drivers are determined. The Statistical population of this survey is all Foolad Technic International Engineering Company's personnel in the year of 1391 which is selected through Simple Random Sampling Method and based on Morgan sampling table, 148 individuals of 27 organizational units are selected as statistical population. Sample's status is demonstrated in Table 3.

Step 3: Determination of each HCM indicator in Foolad Technic Co

In the first stage of questionnaires data analysis, in order to determine the level of HCM, one sample T-Test is applied. The statistical hypothesis is expressed as shown:

$$H_0: \mu = 3$$

$$H_1: \mu \neq 3$$

Hypothesis of H_1 claims that if the average score of questions related to HCM incentives is opposed to 3, then H_1 would be accepted and the hypothesis of H_0 would be rejected. Otherwise H_1 would not be verified and generally the hypothesis will be rejected. As a result

Table 2. Cronbach's alpha coefficient

Scales	Cronbach's alpha coefficient
Leadership Practices	0.910
Employees Engagement	0.891
Knowledge Accessibility	0.877
Workforce Optimization	0.884
Learning Capacity	0.897
Total	0.969

Table 3. Statistical sample status in terms of education, age and employment record

Education	Count	Age	Count	Employment Record	Count
Diploma	9	20-29	42	0-5 years	51
Junior College Diploma	10	30-39	71	5-10 years	41
Bachelor	96	40-49	19	10-15 years	33
Master's Degree or Higher	33	50 or higher	16	15-20 years	11
				More than 20 years	12

according to Table 4, observed t is significant in the level of $P \leq 0.05$. Then, the hypothesis of H_0 is rejected and the hypothesis of H_1 is approved for each test.

Due to each of HCM incentives average value which is greater than 3, it can be claimed that all HMC incentives are at desirable level.

Step 4: Specify principle components of HCM

This stage of the survey applies method of PCA to signify principle component of HCM. Purposely, the software of SPSS and method of PCA are used. For this aim, initially the method of PCA is carried out for all HCM indices and new components are produced which are described high percentage of HCM in Foolad Technic Co. Obtained results from principle components analysis of HCM are illustrated in Table 5.

As it is shown in Table 5, among created components of PCA method, one of them has Eigenvalue greater than one and this component can describe more than 85 percent of HMC indicators variance. In other words, it can be stated that if HCM scales are replaced by this index, more than 85 percent of the variance can be described by just one component. According to this point, in the following, the level of new component would be considered and to this end each of variable's coefficients in linear combination of the new component is specified that is demonstrated in Table 6.

In Table 6, the coefficients of the linear combination of new components obtain trough PCA method and using that, new components of each organizational unit would be gained. Linear combination of the first PCA component is shown in the following.

$$PCA\ 1 = 0.204X_1 + 0.222X_2 + 0.213X_3 + 0.222X_4 + 0.222X_5$$

Then, each HCM indicator's impact is discussed and for this purpose, each of indices loading coefficient is applied that indicates the correlation between HCM scales and new components obtained from PCA method. Table 7 demonstrates loading coefficients.

Loading coefficients of each HCM index shows that three factors of Employees Engagement, Workforce Optimization and Learning Capacity have the most impact on new components obtained though PCA method among all HCM scales and its variations has the most influence on PCA 1. Thus, it can be expressed that in order to better execution of HCM, organization's management should concentrate on these three factors to achieve better results.

Step 5: Signify principle components of each HCM index

Given that each of HCM factors composed of several drivers, in this stage principle component of each scale is ascertained. As it has done in pervious step, SPSS software and PCA method are utilized. Therefore, PCA method is done for all five HCM measurements and using this method, new HCM components are produced which would describe the high percentage of each HCM factor's drivers in the company of Foolad Techninc. The principle component analysis of HCM indices results are shown in Table 8.

Table 8 depicts that for each of HCM measurements there is just one principle component that has the Eigenvalue greater than 1, thereby it can be stated that

Table 4. One Sample T-Test related to Human Capital incentives.

First Question	Average	T	Degree Of Freedom	N	P
Leadership Practices , (Then hypothesis of H ₁ is confirmed) t ₀ =64.7 > t _{0.05,148} =1.96	3.45	64.70	147	148	0.000
Second Question	Average	T	Degree Of Freedom	N	P
Employees Engagement , Then hypothesis of H ₁ is confirmed) t ₀ = 60.517 > t _{0.05,148} =1.96	3.18	60.517	147	148	0.000
Third Question	Average	T	Degree Of Freedom	N	P
Knowledge Accessibility , Then hypothesis of H ₁ is confirmed) t ₀ = 75.052> t _{0.05,148} =1.96	3.48	75.052	147	148	0.000
Fourth Question	Average	T	Degree Of Freedom	N	P
Workforce Optimization , Then hypothesis of H ₁ is confirmed) t ₀ = 67.293 > t _{0.05,148} =1.9(3.31	67.293	147	148	0.000
Fifth Question	Average	T	Degree Of Freedom	N	P
Learning Capacity , Then hypothesis of H ₁ is confirmed) t ₀ = 74.308> t _{0.05,148} =1.9(3.415	74.308	147	148	0.000

Table 5.Obtained results from principle components analysis of HCM.

Obtained variables from principle components analysis of HMC	Eigenvalue	Cumulative
PCA 1	4.250	85.000
PCA 2	.335	91.705
PCA 3	.195	95.601
PCA 4	.123	98.064
PCA 5	.097	100.000

Table 6. Each of variable’s coefficients in linear combination of the new component

HCM indices	PCA 1
Leadership Practices	0.204
Employees Engagement	0.222
Knowledge Accessibility	0.213
Workforce Optimization	0.222
Learning Capacity	0.222

for each HCM index just one principle component can be comprised that describes the high percentage of the variance. As it is shown in Table 6 PCA component of leadership practices expresses more than 75% of variance. Similarly, new components of workforce optimization, employees engagement, knowledge accessibility and learning capacity describe 66, 65, 65

and 64% of their subfactors variance.

In the following, the impact of each driver in each factor of HCM is investigated and applying loading coefficients, the impact of each driver in new components variations would be investigated. Each parameter loading coefficient is defined as it comes in Table 9:

As it is shown in Table 9, it can be implied that almost

Table 7. Loading coefficients of each variable with new components of HCM

HCM indices	loading coefficient
Leadership Practices	0.868
Employees Engagement	0.945
Knowledge Accessibility	0.904
Workforce Optimization	0.945
Learning Capacity	0.944

Table 8. The principle component analysis of HCM indices results.

Cumulative	Eigenvalue	Variables obtained from PCA components analysis of HCM indicators	HCM incentives	Cumulative	Eigenvalue	Variables obtained from PCA components analysis of HCM indicators	HCM incentives
66.094	3.305	Component 1		75.646	3.782	Component 1	
81.876	.789	Component 2		86.161	.526	Component 2	
90.209	.417	Component 3	Workforce Optimization	94.499	.417	Component 3	Leadership Practices
96.103	.295	Component 4		100.000	.275	Component 4	
100.000	.195	Component 5		100.000	-8.949E-17	Component 5	
65.846	2.634	Component 1		65.869	2.635	Component 1	
84.420	.743	Component 2	Knowledge Accessibility	86.777	.836	Component 2	Employees Engagement
95.674	.450	Component 3		95.939	.366	Component 3	
100.000	.173	Component 4		100.000	.162	Component 4	
				64.514	3.226	Component 1	
				81.346	.842	Component 2	
				89.963	.431	Component 3	Learning Capacity
				97.785	.391	Component 4	
				100.000	.111	Component 5	

majority of subcriteria have a great impact on HCM variables and the only subfactor of employees engagement that has a low loading coefficient is time. Consequently, it can be said that it has the least impact on new component of employees engagement.

Conclusion

In today's world and due to increase of competition between organizations, as an intangible capital human capital is a vital issue for the organizations and it is counted as one of the competitive advantage factors. As well as it can be as one of the organization's economic development factors. Given the importance of human capital human capital management is a highly paramount issue and its continuous improvement should be noted through deliberation and assessment. This survey has

considered the level of HCM and signified its principle components to achieve the optimized management and for this reason, International Engineering Company of Foolad Technic was selected as the research's case. To this end, primarily, using one sample T-Test each HCM incentive level has been considered. Then PCA method has been applied to designate HCM principle components and the impact of each HMC scales on principle component variation has been determined. Thereupon, principle component of each HMC measurement has been specified. The obtained results of this survey show that among human capital incentives, knowledge accessibility has the highest level. Although, HCM PCA implications show that HCM scales is so important in composition of principle component and among these scales employees engagement and workforce optimization are the most significant ones and in order to improve company's HCM

Table 9. Loading Coefficients of each subfactors with each HMC variable's new component.

Loading Coefficients of HCM indices	HCM subfactors	HCM incentives	Loading Coefficients of HCM indices	HCM subfactors	HCM incentives
.845	Processes		.849	Relationship	
.823	Conditions		.855	All inclusive	
.880	Accountability	Workforce Optimization	.930	Supervisory skills	Leadership Practices
.674	Hiring		.930	Management skills	
.828	Systems		.774	Systems	
.793	Accessibility		.846	Jobs plan	
.844	Collaboration		.853	Commitment	
.753	Information Sharing	Knowledge Accessibility	.563	Time	Employees Engagement
.852	Systems		.935	Systems	
			.700	Innovation	
			.850	Training	Learning Capacity
			.942	Development	
			.796	Value and support	
			.701	Systems	

level, managers should focus on their executive measurements to achieve desired consequences.

These results indicate some managerial lessons for organizations managements. For better managing, human capital can put the most focus on augmentation of the scales that has greater impact on HCM and in lower levels to plan for HCM measurements execution managers must pay attention to HCM drivers which has the greatest impact on composition of each index's principle component.

In addition to mentioned advantages, this study has confronted with some kind of constraints. In this research, organization has been considered generally which can be developed to organizational units in the future surveys. Then managers can spend time and money in their enforcement actions in a targeted way. Besides, with more theoretical studies and applying methods like regression factors that affect on HMC can be considered.

REFERENCES

- Ax, C. and Marton, J. (2008). "Human capital disclosures and management practices". *J. Intellectual Capital* 9(3): 433-455.
- Barney, J. (1991). "Firm resources and sustained competitive advantage". *J. Manage.* 17(1): 99-129.
- Bassi, L. and McMurrer, D. (2007). "Maximizing Your Return on People". *Harv. Bus. Rev.* 8(71): 32-42.
- Becker, T.E. (1992). "Foci and Bases of Commitment: are They Distinctions Worth Making?". *Acad. Manage. J.* 35(5): 232-244.
- Birasnav, M., Rangnekar, S. and Dalpati, A. (2011). "Transformational leadership and human capital benefits: the role of knowledge management". *Leadersh. Organiz. Dev. J.* 32(2): 106-126.
- Bontis, N. (1996). "There's a price on your head: managing intellectual capital strategically". *Ivey Bus. Quart.* 60(94): 40-48.
- Cabrales, A., Real, J. and Valle, R. (2011). "Relationships between human resource management practices and organizational learning capability". *Personnel Rev.* 40(3): 344-363.
- Demartini, P. and Paoloni, P. (2011). "Assessing human capital in knowledge intensive business services". *Measur. Bus. Excel.* 15(4): 16-26.
- Edvinsson, L. and Malone, M.S. (1997). *Intellectual Capital: The Proven Way to Establish Your Company's Real Value by Measuring Its Hidden Brainpower*, Piatkus, London.
- Garavan, T., Morley, M., Gunnigle, P., Collins, E. (2001). "Human capital accumulation: the role of human resource development". *J. Eur. Ind.* 25(2): 48-68.
- Habib, M., Khan, Z., Khan, M. (2010). "Human capital disclosure practices of top Bangladeshi companies". *J. Hum. Resour. Cost. Account.* 14(4): 329-349.
- Harris, M.C., McMahan, G. and Wright, P. (2012). "Talent and Time Together: The Impact of Human Capital and Overlapping Tenure on Unit Performance". *Personnel Rev.* 41(4): 408-427.
- Husz, M. (1998). *Human Capital, Endogenous Growth, and Government Policy*. Frankfurt am Main: Peter Lang

- GmbH.
- Khasawneh, S. (2011). "Human capital planning in higher education institutions, A strategic human resource development initiative in Jordan". *Int. J. Educ. Manage.* 25(6): 534-544.
- Martin, F.M., Ciofica, L. and Cristescu, M.P. (2013). "Implication of Human Capital in the Development of SMEs through the ICT Adoption". *Proc. Econ. Finance.* 6(1): 748-753.
- Prahalad, L.K. and Hamel, G. (1990). "The core competencies of the corporation". *Harv. Bus. Rev.* 68(3) 79-91.
- Roos, G., Roos, J., Edvinsson, L. and Dragonetti, N.C. (1997). "Intellectual Capital – Navigating in the New Business Landscape". New York University Press, New York, NY.
- Roos, G. and Roos, J. (1997). "Measuring your company's intellectual performance". *Long Range Plann.* 30(3): 413-26.
- Seleim, A., Ashour, A. and Bontis, N. (2007). "Human capital and organizational performance: a study of Egyptian software companies". *Manage. Decis.* (4): 789-801.
- Shirouyehzad, H. and Tavakoli, M.M. (2013). "Performance evaluation and ranking of organizational units with the human capital management approach using data envelopment analysis: a case study". *Int. J. Logist. Syst. Manag.* 16(4): 365-385.
- Stewart, T.A. (1999). *Intellectual Capital: The New Wealth of Organizations*. New York: Currency Doubleday.
- Tavakoli, M.M. and Shirouyehzad, H. (2013). "Application of PCA/DEA method to evaluate the performance of human capital management: A case study". *J. Data Envel. Anal. Decis. Sci.* Vol. 2013 (1): 1-20.
- Tracey, W. (1991). "Human Resources Glossary: A Complete Desk Reference for HR Professionals". American Management Association, New York, NY.
- Zidan, S.S. (2001). "The role of HRD in economic development". *Hum. Resour. Dev. Quart.* 12(4): 437-443.