

**FACTOR ANALYSIS OF HUMAN RESOURCES
PRODUCTIVITY IN MOGHAN'S AGRO-INDUSTRY
COMPANY**

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ABSTRACT

The main focus of this study, is surveying the Factor Analysis of Human Resources Productivity in Moghan's Agro- Industry Company. The population is employees that have more than 5 year experience and have at least Bachelor degree. Data has collected from 280 employees of this Company by researcher-made questionnaires with 28 items. Sampling has done by KMO and Bartlett's Test, and To analysis of items, we used Exploratory Factor Analysis. The results of exploratory factor analysis conducted on the 28 items, 15 items were approved and explore four factors. We named the factors; Job factors, Individual and Professional Factors, Relational Factors and Partnership Factors.

Key words: *Factor Analysis, Human Resources Productivity, Productivity*

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1 INTRODUCTION

In 1950 "Organization for European Economic Cooperation (OEEC) has offered a complete definition of productivity that productivity is the quotient of one of the production factors, if the efficiency relationship with the capital, investment or with the raw material or etc. will be studied, therefore, we can mention the capital productivity, investment productivity, and raw material productivity (Dyer & Forman, 1991). And also international labor organization ILO has defined the productivity such as "the productivity is proportion of the profits to one on of the production factors (land, capital, labor force, and management). In this definition "management" is notably considered as one of the production factors. Proportion of production to each of these factors is reckoned as a scale for evaluation of productivity (Abtahi & Kazemi, 2003). Productivity is combination of both "Efficiency" and "Effectiveness". In other words, organizational performance will be productive when activities turn "Efficient" and "Effective" and each of which solely can't indicate productivity growth. Then, as for as productivity concept is concerned, firstly, activity which is done, should be beneficial and accurate and secondly, such activity should be carried out in the best is possible in line with materialization of objectives."Productivity" is the concept which is used for showing proportion of output of an individual unit and organization. The more productivity of an organization is increased, the less production cost will be witnessed in that unit (Haghi & Bohlooli, 2011).

The concept of productivity is deeply rooted in the context of mass manufacturing and this may be the reason for the prolonged neglect of the productivity issue on service management (Adam and Gravesen 1996). Productivity defined as the ratio of output to input or as the relationship between inputs and outputs (Singh et al, 2000). Published research shows that productivity and similar terms are not used consistently (Kinnader and Grondahl, 1999). Different factors impact the ratio of growth and productivity of organizations (Ramsey, 1983). Nowadays, productivity and human resource element are one of the main issues that assure stability in organizations and keep succeeding with consistency (Eastaugh 2002, Dehghan et al, 2006).

There are number of measures for output that we can use to calculate the effectiveness and efficiency of the HR systems, which may include profits, turnover could also be used for this purpose at the same time absenteeism is also a very good indicator. However, labor productivity is used most often because of number of reasons. First, labor productivity is used as the most fundamental organizational outcome.

Productivity of the labor is the ratio of the total output to the total input, which show how the organization is working at a particular point of time. Secondly, there is big connection between the productivity and the human capital and the most important connection is with the productivity of the labor. There is a direct link between the two so it is the most valid tool that can be used to measure the success rate of the organization (Dyer & Reeves, 1995). Third, the theorists pertaining to SHRM have elaborated the point that for workforce performance, productivity of labor is a crucial indicator (Delery & Shaw, 2001). Finally, in literature pertaining to SHRM much work has been accomplished using labor productivity as tool to calculate outcome (Boselie & Dietz, 2003).

The OECD defines it as "the ratio of a volume measure of output to a volume measure of input" (OECD, 2002) Volume measures of output are normally gross domestic product (GDP) or gross value added (GVA), expressed at constant prices i.e. adjusted for inflation. The three most commonly used measures of input are:

1. hours worked;

2. workforce jobs; and
3. Number of people in employment.

Measured labor productivity will vary as a function of both other input factors and the efficiency with which the factors of production are used (total factor productivity). So two firms or countries may have equal total factor productivity (productive technologies) but because one has more capital to use, labor productivity will be higher.

Output per worker corresponds to the "average product of labor" and can be contrasted with the marginal product of labor, which refers to the increase in output those results from a corresponding (marginal) increase in labor input (khaki, 2000)

In business literature and research, productivity has usually been discussed in terms of hypothetical variables that could improve the outcome. For instance, researchers (1993) reported that employees with higher levels of job satisfaction and skills directly related to their jobs had significantly higher productivity ratings than their co-workers. Another study revealed that practices such as performance appraisal had a strong effect on productivity. In addition, training programmes for new employees increased their productivity. While Grosskopf, Margaritis and Valdmanis (2001) evaluated effects of teaching on hospital productivity. Hall (2003) assessed the contribution of knowledge and skill, and factors such as organizational trust and commitment on nursing productivity Curtin (1995) described how patient classification could be used to improve staff productivity. However a concept analysis done by Holcomb, Hoffart and Fox (2002) revealed the complexity of the concept and its measurement (Dehghan, et al, 2005).

This study is conducted in Moghans's agro-industry company personnel and its results can pave the way to the manager in increasing the productivity of their personnel and decreasing waste of resources and not to achieve the organization goals in this company. What is certainly has a great part in subjective challenge of this company managers is adequate attention to the labor force as the best and shortest way of qualitative and quantitative development and growth of the company and it is the goal of Iran. Naturally managers have a tendency to utilize all the management tools to have productive and dynamic personnel's. And to accomplish this they need to recognize the factors that increase the productivity of the personnel's. And this kind of studies will help the managers a lot. Increase of productivity will reduce the costs, time, and cause a quantitative and qualitative increase, efficiency increase and more motivation in the personnel. One of the most important gaps that exist about the productivity is that the effective factors on productivity in each organization are different. And the effective factors on productivity in different organizations must be classified. Result of Previous studies verifies this issue. Many researches about the effective factors on company personnel had been conducted in these researches effective factors on personnel productivity were mentioned but they didn't mention the scale of each of these factors. In this research by use of factor analysis, we can cover this weak point and mention the effective factors on HR productivity.

2 METHODOLOGY

The main focus of this study, is surveying the Factor Analysis of Human Resources Productivity of Moghan's Agro- Industry Company in Iran, to answer to this question that: what are the effective factors on HR productivity in Moghan's agro-industry Company? And how much is the effect of each of them? The population is Moghan's Agro- Industry Company's employees that have more than 5 year experience and have at least Bachelor degree. Data has collected from 280

Employees of this Company by researcher-made questionnaires with 28 items. Questionnaires reliability was estimated by calculating Cronbach's Alpha via SPSS software that is 0.87. Sampling has done by KMO and Bartlett's Test, and To analysis of items, we used Exploratory Factor Analysis.

Exploratory factor analysis (EFA) is a statistical method used to uncover the underlying structure of a relatively large set of variables. EFA is a technique within factor analysis whose overarching goal is to identify the underlying relationships between measured variables (Norris & at el , 2009). It is commonly used by researchers when developing a scale (a *scale* is a collection of questions used to measure a particular research topic) and serves to identify a set of latent constructs underlying a battery of measured variables (Fabrigar & at el , 1999). It should be used when the researcher has no a priori hypothesis about factors or patterns of measured variables (Finch & West, 1997). *Measured variables* are any one of several attributes of people that may be observed and measured. An example of a measured variable would be the physical height of a human being. Researchers must carefully consider the number of measured variables to include in the analysis (Fabrigar & at el , 1999). EFA procedures are more accurate when each factor is represented by multiple measured variables in the analysis. There should be at least 3 to 5 measured variables per factor (Maccallum, 1990).

EFA is based on the common factor model. Within the common factor model, measured variables are expressed as a function of common factors, unique factors, and errors of measurement. Common factors influence two or more measured variables, while each unique factor influences only one measured variable and does not explain correlations among measured variables (Norris & at el, 2009). An assumption of EFA is that any indicator / measured variable may be associated with any factor. When developing a scale, researchers should use EFA first before moving on to confirmatory factor analysis (CFA). EFA requires the researcher to make a number of important decisions about how to conduct the analysis because there is no one set method.

If the human is motivated or powerful or productive, he can use the rest of resources in an effective and desirable manner and can achieve any kind of productivity, and eventually he can make the organization productive. Otherwise, recession and regression would be the result of passive and de-motivated human force. But how human force can be productive or their productivity will be increased is a question that it's answer in different institutions and organizations in regard to their purpose and their personnel needs will be different. However, these needs and factors might be similar, but certainly their severity and precedence effect on personnel productivity will not be the same. For example in productive organization maybe consideration of proficiency, wage and salary are more important than other factors whereas in agro-industry companies maybe motivation and partnership of personnel in making decision is precedence to others.

3 ANALYSIS AND CONCLUSION

3.1- Descriptive Analysis

Almost all of the participants work full time. Ninety-one percent are male and nine percent are female. ninety-seven percent are married. The responder's degree is 3.6 percent PHD, 23.6 percent MA and 73 present have BA degree. It means that all of the employees have university degree. (Table 1)

Table1- Responders degree

		Degree			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BA	204	72.9	72.9	72.9
	PhD	10	3.6	3.6	76.4
	MA	66	23.6	23.6	100.0
	Total	280	100.0	100.0	

Table 2. shows work experience of the responders. According to table 4, from the precedence point of view about 21.8 percent of responders have between 5-10 years' work experience, and 12.5 percent have between 11-15, 47.9 percent 16-20 and finally 17.9 percent have more than 21 years of managing experience. It shows that, most of the peoples have more than 15 years experience.

Table 2- Work Experience of the responders

		Work Experience			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5-10	61	21.8	21.8	21.8
	11-15	35	12.5	12.5	34.3
	16-20	134	47.9	47.9	82.1
	More than 21	50	17.9	17.9	100.0
	Total	280	100.0	100.0	

Table 3 reports descriptive statistics including means and standard deviation for samples.

Table 3. Means and standard deviations for variables

Descriptive Statistics			
	N	Mean	Std. Deviation
Job engagement	277	4.24	1.211
Job skills	280	4.40	.993
Job recognition	280	4.43	.818
Symmetry of the worker and the job	278	4.38	.764
New and advanced equipment	280	4.22	.871
Job satisfaction	280	4.03	.994
Wages and salaries	279	3.94	1.174
Making desirable condition for creativity exhibition	275	3.73	.920
Workday reduction	279	3.90	.880
Possibility of communication with others	277	3.72	1.038
Manager informal relation with the personnel	279	3.94	.903

Conducting inquiry session surveying the personnel problems	277	3.73	.891
Appointing competent managers	274	3.09	1.115
Provide opportunities for planning	277	3.18	1.304
Exhibition of precise information	280	3.56	1.059
Provide consistent feedback	278	3.12	1.054
Partnership in decision	278	3.31	.883
Team approach to problem-solving	279	3.19	1.195
Experience related to the job	278	3.59	1.000
Level of education	279	3.10	.983
Age	278	3.21	.941
Learning as a part of service	278	3.18	1.194
Level of income	279	3.09	1.230
Gender	278	3.01	1.320
Marital status	274	3.70	.978
Rank of work	278	3.10	1.310
Involvement with work	274	3.08	1.368
Time spent in professional employment	274	3.05	1.289

3.1- Factor Analysis

The output of correlation matrix showing how each of the 28 items is associated with each of the other 26. Note that some of the correlations are high (e.g., + or - .60 or greater) and some are low (i.e., near zero). The high correlations indicate that five items are associated and will probably be grouped together by the factor analysis.

Next, several assumptions are tested. The determinant (located under the correlation matrix) should be more than .00001. Here, it is .001 so this assumption is met. If the determinant is zero, then a factor analytic solution cannot be obtained, because this would require dividing by zero. This would mean that at least one of the items can be understood as a linear combination of some set of the other items.

The Kaiser-Meyer-Olkin (KMO) measure should be greater than .70, and is inadequate if less than .50. (Brian, 2003). Here, it is .776. The Bartlett test should be significant and it is 0.000.; this means that the variables are correlated highly enough to provide a reasonable basis for factor analysis.

Table 4: KMO and Bartlett's Test Results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.776
Bartlett's Test of Sphericity	Approx. Chi-Square	2081.659
	df	378
	Sig.	.000

The Total Variance Explained table 5 shows how the variance is divided among the 28 possible factors. Note that nine factors have Eigen-values (a measure of explained variance) greater than

1.0, which is a common criterion for a factor to be useful. When the Eigen-value is less than 1.0, this means that the factor explains less information than a single item would have explained. Most researchers would not consider the information gained from such a factor to be sufficient to justify keeping that factor. Thus, if you had not specified otherwise, the computer would have looked for the best nine-factor solution by "rotating" four factors. Because we specified that we wanted only four factors rotated, only four will be rotated.

For this we use an orthogonal rotation. This means that the final factors will be as uncorrelated as possible with each other. As a result, we can assume that the information explained by one factor is independent of the information in the other factors. We rotate the factors so that they are easier to interpret. Rotation makes it so that, as much as possible, different items are explained or predicted by different underlying factors, and each factor explains more than one item.

This is a condition called simple structure. Although this is the goal of rotation, in reality, this is not always achieved. One thing to look for in the Rotated Matrix of factor loadings is the extent to which simple structure is achieved.

Table 5: Total Variance Explained

Total Variance Explained									
Factor	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.037	17.988	17.988	4.506	16.092	16.092	3.152	11.259	11.259
2	3.466	12.378	30.366	2.895	10.339	26.432	2.910	10.393	21.652
3	1.874	6.694	37.060	1.239	4.425	30.857	2.188	7.814	29.466
4	1.573	5.618	42.677	.922	3.291	34.148	1.311	4.682	34.148
5	1.338	4.780	47.458						
6	1.224	4.372	51.830						
7	1.106	3.951	55.780						
8	1.077	3.847	59.627						
9	1.021	3.646	63.273						
10	.907	3.239	66.512						
11	.884	3.157	69.669						
12	.845	3.018	72.687						
13	.787	2.812	75.499						
14	.719	2.567	78.066						
15	.694	2.480	80.546						
16	.611	2.182	82.728						
17	.595	2.124	84.852						
18	.551	1.966	86.818						

19	.527	1.882	88.700						
20	.474	1.692	90.392						
21	.448	1.600	91.993						
22	.428	1.530	93.523						
23	.370	1.320	94.842						
24	.342	1.222	96.064						
25	.315	1.125	97.189						
26	.296	1.058	98.247						
27	.278	.994	99.240						
28	.213	.760	100.000						

Extraction Method: Principal Axis Factoring.

The Rotated Factor Matrix table 6, which contains these loadings, is key for understanding the results of the analysis. Results show that 28 math attitude questions (item 01 to item 28) into four overlapping groups of items.

The rotated component matrix output shows that the factor loading of each variable on rotation of the remaining agents.

Eigen-value of the first factor of 4.506, 5 items with the load factor of at least 0.547 to a maximum of 0.769 were variable. The Eigen-value of second factor is 2.895 and 4 items with load factor between 0.654 to 0.787. In the third factor, The Eigen-value is 1.239, and load factor was oscillate between 0.570 to 0.739 with 4 items. And finally, The fourth factor with 0.922 Eigen-value and 2 items with load factor between 0.510 to 0.552.

Therefore, based on the results of exploratory factor analysis conducted on the 28 items, 15 items were approved and explore four factors (Table 6).

Table 6: Rotated Factor Matrix^a

Rotated Factor Matrix ^a				
	Factor			
	1	2	3	4
Symmetry of the worker and the job	.769	-.073	-.020	.038
Job recognition	.665	-.097	.033	.210
New and advanced equipment	.625	.023	.237	.087
Job skills	.597	-.150	.042	.074
Job satisfaction	.547	-.084	.392	-.096
Making desirable condition for creativity exhibition	.485	-.048	.162	-.058
Wages and salaries	.387	-.144	.134	-.214
Job engagement	.271	-.222	.064	.065
Involvement with work	-.058	.787	-.065	.064
Rank of work	-.116	.698	.028	.035

level of income	-.141	.692	-.012	.109
Time spent in professional employment	-.156	.654	.113	.080
Gender	-.136	.495	.057	-.001
Learning as a part of service	-.014	.430	-.122	.207
Provide opportunities for planning	.065	.346	.080	.247
Manager informal relation with the personnel	.389	-.013	.739	.054
Conducting inquiry session surveying the personnel problems	.166	-.085	.712	.034
Workday reduction	.469	.010	.603	-.020
Possibility of communication with others	.287	-.010	.570	.017
Exhibition of precise information	-.106	.115	.288	.044
Provide consistent feedback	-.047	.131	-.012	.552
team approach to problem-solving	-.151	.333	-.079	.510
Appointing COMPETENT managers	.027	.027	.189	.366
Experience related to the job	-.030	.148	-.082	.318
Level of education	.016	-.058	.052	.306
Partnership in decision	.084	-.102	-.028	.280
Age	.056	.146	.083	.248
Marital status	.036	.144	-.015	.228
Extraction Method: Principal Axis Factoring.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 7 iterations.				

CONCLUSION

The purpose of this study was surveying the Factor Analysis of Human Resources Productivity in Moghan's Agro- Industry Company that located in Islamic republic of Iran. We answered to this question that: what are the effective factors on HR productivity in Moghan's agro-industry Company? The results of exploratory factor analysis conducted on the 28 items, 15 items were approved and explore four factors. We named the factors; Job factors, Individual and Professional Factors, Relational Factors and Partnership Factors. Table 7 shows that results:

Table 7: Approved Factors

Factor	Items
Job factors	Symmetry of the worker and the job Job recognition New and advanced equipment Job skills Job satisfaction

Individual and Professional Factors	Involvement with work level of income Rank of work Time spent in professional employment
Relational Factors	Manager informal relation with the personnel Conducting inquiry session surveying the personnel problems Workday reduction Possibility of communication with others
Partnership Factors	Provide consistent feedback Team approach to problem-solving

Based on the obtained results, 4 factors which are in great importance than other factors.

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