

The Relationship between “Labor Market Efficiency” and “Business Sophistication” in Global Competitiveness

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Abstract

The concept of competitiveness has considered by many researchers and governments over the last decade and many studies have been done about this subject. At the same time since 1979, World Economic Forum (WEF) has published annual Global Competitiveness Reports for enabling national economies to achieve sustained economic growth and long-term prosperity. The main objective of this research is survey of interactions between "labor market efficiency" and "business sophistication", from set of indices of global competitiveness among 142 countries surveyed by the World Economic Forum in 2011 to present data for improving national competitiveness among different countries around the world. Present study is practical and its method is "secondary analysis" and "descriptive - analytic". Time horizon considered in this study is "Cross-sectional" and to answer research questions "Canonical Correlation Analysis" was used. The results illustrates that there is a positive and significant relation between the sub-indices of "labor market efficiency" and "business sophistication".

Keywords: global competitiveness, labor market efficiency, business sophistication, canonical correlation, World Economic Forum

1. Introduction

Expansions of global markets and increasing communication among different countries have led to many developments in business environment and this is the same concept that is closely associated with economic globalization process. Today's increasingly dynamic business environment is forcing organizations to search for new ways to gain an advantage or an edge over their competitors (Terpstra & Limpaphayom, 2012). In globalization age, the economic competitions among countries and economic enterprises have increased globally and governments have done lot of efforts in this field. Maybe that's why the concept of competitiveness is considered as the most important key in the international economy. The concept of competitiveness has been applied by Michael Porter at a wide extend of competitiveness of enterprise and industry to national and global competitiveness, Porter and Schwab, define competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country (Porter and Schwab, 2008). In other words, economies with higher competitiveness level are usually able to provide higher levels of income for their citizens (Vares et al., 2011). In view of Organization for Economic Cooperation and Development (OECD), the ability of a country in producing commodities and services for presentation in international markets is one of the most important dimensions of competitiveness (Razavi et al., 2011).

Since 1979, World Economic Forum has published annual Global Competitiveness Reports for enabling national economies to achieve sustained economic growth and long-term prosperity. Also, the WEF has developed the Global Competitiveness Index (GCI) since 2005. The GCI contains 12 pillars and present research wants to investigate the interactions between "labor market efficiency" and "business sophistication", from set of indices of global competitiveness as the two basic pillars of GCI. Many commentators, policy makers and academics regularly work with broad aggregate labor market measures as the means to assess and compare economic performance across time or across countries (Wadsworth, 2002). In addition higher productivity in the

production of produce and services is result of business sophistication. This, in turn, result in increasing of efficiency, thus enhancing a competitiveness of a nation. Moreover business sophistication plays a main role in country's economy which means that it controls the quality of a country's business networks and strategy of individual firms in general. This study seeks correlations between "labor market efficiency" and "business sophistication" in the global competitiveness among 142 countries according to the competitiveness report of WEF 2011-2012 to help different countries around the world to make a good pattern for "labor market efficiency" to result in "business sophistication" in the global arena.

According to the WEF in 2011, Iran in the field of "labor market efficiency" and "business sophistication" has not a good position among 139 surveyed countries and overall rank of Iran is 69th in global competitiveness (Schwab, 2010). However the rank of "labor market efficiency" is 135 and the rank of "business sophistication" is 91 (Schwab, 2010). Additionally according to the report 2011-2012 published in October 2011, among 142 surveyed countries Iran's position has risen to 62th, but rank of "labor market efficiency" and "business sophistication" are respectively 139 and 92 and both have been rated worse (Schwab, 2011). Furthermore based on the reported data, among 20 studied countries in Middle East rank of Iran is very far to reach the region's first position in competitiveness index based on ratified Outlook of Iran.

The issue of whether or not "labor market efficiency" may assist "business sophistication" or on the contrary how "business sophistication" influences "labor market efficiency" for improving national competitiveness among different countries, is the main question of this paper. Therefore main question is: What to extend is there relationship between "Labor market efficiency" and "Business sophistication" among countries? To respond this question, the researchers are going to find the answers of: 1. Is there any correlation between "Labor market efficiency" sub-indices and "Business sophistication" sub-indices? 2. How is the relationship among "Labor market efficiency" sub-indices together? 3. How is the relationship among "Business sophistication" sub-indices together? 4. In the "Labor market efficiency" set, which member has the most and which one has the least impact on creation a significant relationship between "Labor market efficiency" and "Business sophistication"? 5. In the "Business sophistication" set, which member has the most and which one has the least impact on creation a significant relationship between "Business sophistication" and "Labor market efficiency"?

2. Literature Review

2.1 Competitiveness

The concept of competitive advantage can be investigated in micro and macro aspects. From the macro view, this concept is propounded in national economy, but the micro concept of competitiveness is more expanded than macro concept and contains the basic characteristics of producers in the field of competition in market share, profit from the production and export. Measure of competitiveness at the macro level is become mooted by the Institute of Management Development (IMD) and World Economic Forum and the micro approach has been used by the Organization for Economic Cooperation and Development (OECD).

Competitiveness is defined by the Global Competitiveness Report of the World Economic Forum as the set of policies, institutions, and factors that determine the level of productivity of a country (Schwab, 2010). According to OECD definition competitiveness for a nation is the degree to which a country can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over the long term (Ritchie & Crouch, 2005).

2.2 Pillars of Global Competitiveness

The GCI captures this open-ended dimension by providing a weighted average of many different components, each of which reflects one aspect of the complex reality that we call competitiveness (Schwab, 2009). Schwab grouped all these components into 12 pillars of economic competitiveness: Institutions, Infrastructure, Macroeconomic environment, Health and primary education, Higher education and training, Goods market efficiency, Labor market efficiency, Financial market Development, Technological readiness, Market size, Business sophistication, Innovation (Schwab, 2010). Among these pillars, the seventh and eleventh pillars are evaluated in this study, that in continue we describe them.

2.3 Labor Market Efficiency

The ability of companies to flexibly manage their workforce and quickly hire and fire employees is an important factor in general business competitiveness. When human resource is seriously under evaluated, it is harmful for cultivating of core competitiveness of enterprises (Yao & Cui, 2010). Labor markets must therefore have the flexibility to shift workers from one economic activity to another rapidly and at low cost, and to allow for wage fluctuations without much social disruption (Schwab, 2010). The Labor market efficiency sub-indices are:

Cooperation in labor-employer relations, Flexibility of wage determination, Rigidity of employment, Hiring and firing practices, Redundancy costs, Pay and productivity, Reliance on professional management, Brain drain, Female participation in labor force (Porter & Schwab, 2008).

2.4 Business Sophistication

Business sophistication leads to higher productivity in the production of goods and services. This, in turn, result in increasing of efficiency, thus enhancing a competitiveness of a nation. Business sophistication is relevant to the quality of a country's overall business networks and the quality of individual companies' operations and strategies (Schwab, 2010). The Business sophistication sub-indices are: Local supplier quantity, Local supplier quality, State of cluster development, Nature of competitive advantage, Value chain breadth, Control of international distribution, Production process sophistication, Extent of marketing, Willingness to delegate authority (Porter & Schwab, 2008).

2.5 Canonical Correlation Analysis (CCA)

Canonical correlation analysis is a manner to measure the linear relationship between two multidimensional variables. It finds two bases, one for each variable, that are optimal with respect to correlations and, at the same time, it finds the corresponding correlations. In fact, it finds the two bases in which the correlation matrix between the variables is diagonal as well as the correlations on the diagonal are maximized. The dimensionality of these new bases is equal to or less than the smallest dimensionality of the two variables. A significant property of canonical correlations is that they are invariant with respect to affine transformations of the variables. This is the most important difference between CCA and ordinary correlation analysis which highly depends on the basis in which the variables are described (Borga, 2001).

3. Research Methodology

Research method used in this paper from the aiming view point is practical and from method of data collection and analysis view point is descriptive-correlation. Analyzing secondary data source was done through the use of secondary analysis method. The statistical population in this work was 142 countries whose data was included in global competitiveness report in 2011. De Vaus identified data collected by other individuals or organizations to address the relevant research questions as secondary data resource. Vaus believed that using these kind of data would be appropriated (De Vaus, 2002). Therefore data issued by World Economic Forum in 2011 is used as our secondary data resource.

4. Data Analysis

For sub-questions (1), (2) and (3), the Pearson Correlation Coefficient is used. *First sub-question:* Is there any correlation between "Labor market efficiency" sub-indices and "Business sophistication" sub-indices?

According to table 1, one half of the sub-indices of "labor market efficiency" and "business sophistication" have significant correlation together that among them the relation between "reliance on professional management" and "willingness to delegate authority" with a high correlation 0.84 and the relation between "reliance on professional management" and "production process sophistication", with correlation coefficient 0.822 has the strong correlation together. Moreover the sub-indices of "cooperation in labor-employer relations", "pay and productivity", and "reliance on professional management", have a positive correlation with all sub-indices of "business sophistication".

Table 1. Correlation coefficient between labor market efficiency" sub-index and "business sophistication" sub-index

Labor market efficiency \ Business sophistication	Local supplier quantity	Local supplier quality	State of cluster development	Nature of competitive advantage	Value chain breadth	Control of international distribution	Production process sophistication	Extent of marketing	Willingness to delegate authority
Cooperation in labor-employer relations	0.382	0.651	0.617	0.639	0.644	0.619	0.671	0.633	0.727
Flexibility of wage determination	0.079	0.038	0.044	0.017	0.082	0.084	0.048	0.033	-0.048
Rigidity of employment	-0.166	-0.094	-0.139	-0.04	-0.044	-0.098	-0.062	-0.077	-0.147
Hiring and firing practices	-0.009	-0.083	0.032	0.024	0.015	0.017	-0.076	-0.056	0.043

Redundancy costs	-0.056	-0.152	-0.026	-0.200	-0.167	-0.044	-0.159	-0.109	-0.079
Pay and productivity	0.366	0.495	0.537	0.478	0.521	0.507	0.540	0.572	0.493
Reliance on professional management	0.462	0.816	0.726	0.668	0.683	0.669	0.822	0.810	0.840
Brain drain	0.096	0.165	0.212	0.119	0.150	0.183	0.192	0.21	0.150
Female participation in labor force	-0.163	0.064	-0.044	0.089	0.007	-0.117	0.042	0.02	0.072

Second sub-question: How is relation among “Labor market efficiency” sub-indices together?

As can be seen in table 2, only a few of the sub-indices of “labor market efficiency” have correlation together which among them sub-index “hiring and firing practices” with “cooperation in labor-employer relations” and “pay and productivity” has the highest correlation. Also the highest correlation belonging to correlation between “cooperation in labor-employer relations” and “pay and productivity”, with a correlation coefficient 0.63 and “cooperation in labor-employer relations” and “reliance on professional management” with a correlation coefficient of 0.69.

Table 2. Correlation coefficient among “labor market efficiency” sub-index

“Labor Market Efficiency” Sub-indices	Cooperation in labor-employer relations	Flexibility of wage determination	Rigidity of employment	Hiring and firing practices	Redundancy costs	Pay and productivity	Reliance on professional management	Brain drain	Female participation in labor force
Cooperation in labor-employer relations	1								
Flexibility of wage determination	0.161	1							
Rigidity of employment	-0.240	-0.052	1						
Hiring and firing practices	0.336	0.095	-0.345	1					
Redundancy costs	-0.127	0.007	0.130	-0.174	1				
Pay and productivity	0.639	0.234	-0.295	0.433	-0.189	1			
Reliance on professional management	0.692	0.000	-0.207	-0.000	-0.025	0.501	1		
Brain drain	0.208	0.034	-0.125	0.015	-0.025	0.166	0.2261	1	
Female participation in labor force	0.069	-0.035	0.010	-0.001	-0.134	0.027	0.2025	-0.063	1

Third sub-question: How is relation among Business sophistication” sub-index together?

As can be seen in table 3 sub-indices of “Business sophistication” has a positive correlation together which among them relation between “Extent of marketing” and “Production process sophistication” with correlation coefficient of 0.94, relation between “Value chain breadth” and “Nature of competitive advantage” with correlation coefficient 0.91, and also relation between “Production process sophistication” and Local supplier quality” with correlation coefficient 0.907 have the highest correlation together other and relation between “Willingness to delegate authority” and “Local supplier quantity” has the least correlation together.

Table 3. Correlation coefficient among “business sophistication” sub-indices

“Business sophistication” sub-indices	Local supplier quantity	Local supplier quality	State of cluster development	Nature of competitive advantage	Value chain breadth	Control of international distribution	Production process sophistication	Extent of marketing	Willingness to delegate authority
Local supplier quantity	1								
Local supplier quality	0.655	1							
State of cluster development	0.603	0.780	1						
Nature of competitive advantage	0.533	0.781	0.723	1					
Value chain breadth	0.632	0.858	0.812	0.910	1				
Control of international distribution	0.588	0.782	0.741	0.722	0.798	1			
Production process sophistication	0.616	0.907	0.817	0.854	0.895	0.802	1		
Extent of marketing	0.601	0.902	0.787	0.780	0.832	0.813	0.942	1	
Willingness to delegate authority	0.491	0.773	0.751	0.717	0.717	0.724	0.825	0.798	1

Canonical Correlation Analysis (CCA) method

To review the main theory and answer the main question and sub-questions 4 and 5 canonical correlation analysis is used.

Table 4. Canonical correlation analysis summary

<i>Business sophistication</i>	<i>Labor market efficiency</i>	N=142
9	9	Number of variables
100.000%	100.0%	Extracted variance
64.0155%	25.89%	Redundancy index
Local supplier quantity	Cooperation in labor-employer relations	Variables: 1
Local supplier quality	Flexibility of wage determination	2
State of cluster development	Rigidity of employment	3
Nature of competitive advantage	Hiring and firing practices	4
Value chain breadth	Redundancy costs	5
Control of international distribution	Pay and productivity	6
Production process sophistication	Reliance on professional management	7
Extent of marketing	Brain drain	8
Willingness to delegate authority	Female participation in labor force	9

Table 4 is showing enveloped data variation by CCA. The extracted variance for “Labor market efficiency” and “Business sophistication” is showing that 100% of canonical roots are covered by internal “Labor market efficiency” variation and also internal “Business sophistication” variation. These data are extremely noticeable and verify utilization of CCA.

Table 5. Statistical tests

Canonical roots	Chi-square Tests With Successive Roots Removed					
	Canonical R	Canonical R ²	Chi-sqr	df	p	Lambda Prime
0	0.9313	0.8673	376.3	81	0.0000	0.057159
1	0.5375	0.2889	110.6	64	0.0002	0.430930
2	0.4419	0.1953	65.85	49	0.0544	0.606028
3	0.3541	0.1254	37.28	36	0.4100	0.753140
4	0.3264	0.1065	19.655	25	0.7643	0.861137
5	0.1640	0.0269	4.845	16	0.9964	0.963824
6	0.0721	0.0052	1.256	9	0.9985	0.990490
7	0.0616	0.0038	0.569	4	0.9663	0.995676
8	0.0228	0.0005	0.068	1	0.7930	0.999477

Meaningful level of CCA for interpretation is 0.05. We used P-value in this research; first, second canonical variables are statistically significant. Moreover, additional statistical tests such as "Lambda Prime" and " " confirm these outcomes.

According to the figure 1, the first canonical variable is considered. However we connived at second variables explanation since their canonical cross loading and redundancy index are feeble.

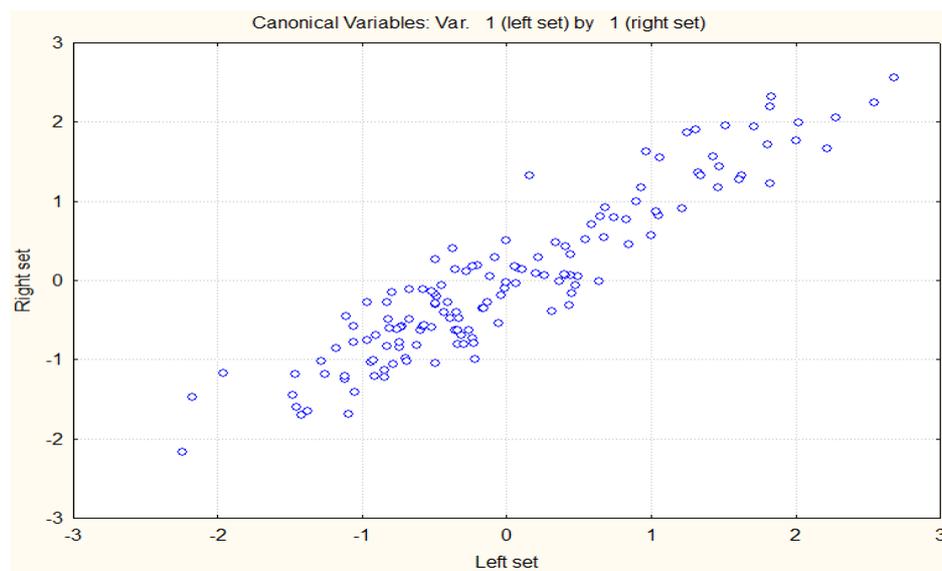


Figure 1. Paired correlation between first canonical variable

To response the main question, the research focuses on table 4 and 5. Relationship importance between "Business sophistication" and "Labor market efficiency" is assigned by canonical correlation (R_c) and Eigen value (R_c^2). According to the table 5, first variable R_c is 0.93 and R_c^2 is 0.86. In view of the fact that R_c cannot provide the shared variation directly, we used index of redundancy. This index for R_c^2 is in analysis of multiple regression. Table 4 supports that more than 64% of changes in "Business sophistication" are predictable by investigating changes in "Labor market efficiency". Furthermore more than 25% changes in "Labor market efficiency" are predictable by investigating alteration in "Business sophistication". These results are showing a significant relationship between "Business sophistication" sub-indices and "Labor market efficiency" sub-indices.

To response the fourth and fifth sub-questions we used canonical cross loading for evaluating. In general the researcher faces the choice of interpretation of the functions using canonical weights (standardized coefficients), canonical loadings (structure correlations) or, canonical cross loadings. Given a choice, it is suggested that for interpretation cross loadings are superior to loadings, which are in turn superior to weights (Hair et al, 1998). According to table 6, all variables in "Business sophistication" set have a high canonical cross loading in

creating a canonical variable in their sets. So they are very effective in creating a meaningful relationship, that among these sub-indices, “Production process sophistication”, “Willingness to delegate authority”, and “Local supplier quality” have the most effect and “Local supplier quantity” and “Control of international distribution” has the least effect to create this relation. Furthermore, in the “Labor market efficiency” sub-indices, only three sub-indices including “Reliance on professional management”, “Cooperation in labor-employer relations” and “Pay and productivity” have the effective role in creating a meaningful relationship. In addition, based on high amount of canonical cross loading in both sets, we can conclude that “Business sophistication” sub-indices and “Labor market efficiency” sub-indices have correlation and a positive impact on together. Furthermore, for validity of CCA, researchers utilized sensitivity analysis on independent variables. For this validation, researchers skipped one of “Business sophistication” sub-indices every time and utilize CCA. Outputs depicted no impression change in construct coefficient of variables. So we assured that data were valid.

Table 6. Canonical loading and canonical cross loading for meaningful canonical variables in “business sophistication” & “labor market efficiency”

	Canonical variable 1		Canonical variable 2	
	Loading	Cross loading	Loading	Cross loading
Criterion pillar (Business sophistication)				
Local supplier quantity	0.5338	0.4253	-0.3852	-0.2877
Local supplier quality	0.9243	0.8344	-0.0428	-0.1102
State of cluster development	0.8132	0.7201	-0.3518	-0.2466
Nature of competitive advantage	0.7884	0.6911	0.0953	0.0199
Value chain breadth	0.8082	0.7139	-0.1019	-0.2011
Control of international distribution	0.7780	0.6820	-0.3432	-0.3255
Production process sophistication	0.9435	0.8507	-0.1159	-0.1620
Extent of marketing	0.9173	0.8237	-0.2672	-0.2988
Willingness to delegate authority	0.9326	0.8402	0.0352	0.0186
predictor pillar (Labor market efficiency)				
Cooperation in labor-employer relations	0.7758	0.5238	0.0826	0.0992
Flexibility of wage determination	-0.0097	-0.0029	-0.2293	-0.1478
Rigidity of employment	-0.1172	-0.1377	0.1383	0.1932
Hiring and firing practices	-0.0546	-0.0843	-0.0662	-0.0988
Redundancy costs	-0.1369	-0.1391	-0.3737	-0.2979
Pay and productivity	0.5629	0.4133	-0.4370	-0.3865
Reliance on professional management	0.9597	0.8322	-0.0090	-0.007
Brain drain	0.1973	0.0951	-0.2990	-0.3210
Female participation in labor force	0.1016	0.0688	0.6149	0.5701

5. Discussion and Conclusion

The main goal of present research is to study the relationship between “Business sophistication” and “Labor market efficiency” by using CCA for GCI 2011 data. According to the result of Pearson Correlation Coefficient, one half of the indicators of “labor market efficiency” and “business sophistication” have a significant correlation together that among them the relation between “reliance on professional management” and “willingness to delegate authority” with correlation more than 0.84 and the relation between “reliance on professional management” and “Production process sophistication”, with correlation coefficient 0.822 has the highest correlation together.

Based on the research outcomes, there is an important relationship between “Business sophistication” sub-indices and “Labor market efficiency” sub-indices and they have a direct effect on together. Thus it can be said with the development of each of these two pillars causes promotion of other pillar and consequently causes improve competitiveness ranking position among the nations of the world.

There are a high canonical cross loading among all variables in Business sophistication set to create a canonical variable in their sets. Therefore they are very efficient to create a significant relationship, thus it can be said all sub-indices of “Business sophistication” participate in promotion of “Labor market efficiency” of countries. As a result a balanced approach in improvement and promotion of “Business sophistication” causes promotion of

“Labor market efficiency” and this matter improves competitiveness position among the nations of the world.

Among “Business sophistication” sub-indices, “Production process sophistication”, “Willingness to delegate authority”, and “Local supplier quality” have the strong effect and “Local supplier quantity” and “Control of international distribution” has the least effect to create this relation. Also, in the “Labor market efficiency” sub-indices, only three sub-indices including “Reliance on professional management”, “Cooperation in labor-employer relations” and “Pay and productivity” have the effective role in creating a meaningful relationship.

Therefore it could be said that these three indices have greater share in the progress of “Business sophistication” of countries. As a result, more attention to these indicators, which are promoting the “Business sophistication”, which ultimately led to improvement of competitiveness in the world.

According to the high correlation between sub-indices “reliance on professional management” and “willingness to delegate authority” and sub-indices “reliance on professional management” and “Production process sophistication” it can be said that development and improvement of “reliance on professional management” causes to progress of “Business sophistication” of countries and consequently effects on improvement of competitiveness in the world.

Being familiar with national competitiveness indices provides a suitable ability for different industry agents to analyze their country environment with regional countries and even world countries.

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