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Impact of Human Capital Development and Human Capital Isolation Mechanisms on Innovative Performance: Evidence from Industrial Companies in Jordan

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Abstract
The aim of this study was to investigate the impact of human capital development mechanisms (training, incentives structure and attraction of skilled employees) and human capital isolation mechanisms (specificity of company resources and internal characteristics of knowledge in the company) on organizational human capital development and enhancement (well-educated, well-trained employees with suitable job experience). In addition, the study tried to examine the impact of organizational human capital on innovative performance (introduction of new products, replacement of old products, quality of new products and work processes innovations). A questionnaire was developed to collect data from a sample consisting of 500 managers working in selected industrial Jordanian companies at different levels of management. A total of 463 questionnaires were returned giving a response rate of 92.6%. The results found significant as well as positive impacts of human capital development mechanisms and human capital isolation mechanisms on organizational human capital, which in turn significantly affected innovative performance. The results of the study confirmed the acceptance of all hypotheses. The originality of the current study is that it tested and confirmed the important role played by different variables related to the development of organizational human capital which in turn delivers improvements in innovation performance. In light of these results, the study recommends the need to protect human capital through the use of isolation mechanisms in addition to the use of development mechanisms employed in the current study. For future studies, the study recommends the use of additional mechanisms associated with the development and isolation of human capital as this has demonstrated a positive impact in improving innovation performance.
Keywords: human capital development, human capital isolation mechanisms, innovative performance.
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1. Introduction

Human capital has long been debated by managers and researchers for a number of reasons. The most important of these is that human capital is a key element that can be used to explain why some companies perform well and

others perform poorly (Crook et al., 2011; Al-Hawary, 2011). Human capital theory developed in the early 1960s when Theodore Schultz in 1961 proposed the idea that knowledge and skills were in themselves capital. Becker (1962) is also one of the pioneers of this theory by expanding the definition of the concept of human capital by identifying possible mechanisms for its development, such as education and training related to work tasks (Dawson, 2012).

Human capital has been defined as the knowledge, skills and capabilities possessed by individuals (Crook et al., 2011; Al-Hawary & Metabis, 2012). At the level of the organization as a whole, human capital is defined as the sum of knowledge and skills possessed by the staff of the company (Coff et al., 2011). Human capital is at the core of strategic management as it is a source of value for management and individuals (Al-Hawary, 2015; Osikominu, 2012). Crook et al. (2011) cited a wide range of factors that can be used to measure human capital. Examples include the company's expertise in its field of work, the expertise of the senior management team, the technical and logistical capabilities, education, the senior management team's qualifications, leadership in the organization, and the level of knowledge of information technology in the company.

According to human capital theory, knowledge is an important element for increasing the efficiency and productivity of workers (Al-Hawary & Shdefat, 2016; Adelakun, 2011). Human capital can be developed using different methods, such as training on work assignments (Al-Hawary & Alajmi, 2017; Osikominu, 2012), international scholarship programs (Perna et al., 2014), entrepreneurship education and training (Al-Hawary & Al-Kumait, 2017; Martin et al., 2013), values-based recruitment and selection, systematic mentoring programs (Green and Roberts, 2012) and knowledge management practices such as knowledge creation (Shih et al., 2010). In terms of the effects of human capital, studies have shown that human capital has a positive effect on many variables such as the performance of innovation (Alpkan et al., 2010), improving the effectiveness of the organization and the level of service performance (Ployhart et al., 2011), and financial performance (Jiang et al., 2012).

Perhaps the most important point when discussing human capital is the inability of organizations to imitate the knowledge and skills possessed by the employees of the company (Al-Hawary & Nusair, 2017; Osikominu, 2012). However, competitive companies still have the opportunity to seize workers who own human capital. Here, the importance of the mechanisms that the company can use to prevent competing companies from benefiting from their human capital in the event of the transition of workers to competition companies has emerged. Organizations need to develop their human capital at the same time as focusing on specific skills. Therefore, the present study aims to identify the impact of human capital development mechanisms and the mechanisms of human capital isolating on organizational human capital, as well as the impact of organizational human capital on innovative performance.

2. Literature review and hypotheses development

2.1 Human capital development mechanisms and human capital enhancement

Human capital theory suggests that a company develops its human resources if it improves future outputs such as productivity (Al-Hawary & Al-Namlan, 2018; Mudor & Tooksoon, 2011). The researchers cited a number of ways in which human capital could be improved, including education, training, and attracting individuals with knowledge and skills (Al-Lozi et al., 2018; Osikominu, 2012; Green & Roberts, 2012; and Martin et al., 2013). Shaw et al. (2013) suggested that companies use human resources management practices to develop their human capital, such as training, attracting skilled staff, and incentives structured to increase skill levels and to not allow replication by competitors. Training and education were found to be key drivers of human capital (Al-Lozi et al., 2013, 2017; Martin et al., 2013; Al-Hawary et al., 2013). Jiang et al. (2012) found a positive relationship between practices that lead to improved skills and human capital. Incentives structures, according to Gambardella et al. (2015), can be used to manage organizations' human capital. Previous studies have shown that human capital development using several strategies leads to improved human capital. Given the conviction of companies in promoting the role of human capital in improving organizational performance and achieving competitive advantage, managers seek to attract the best employees (Metabis & Al-Hawary, 2013; Sokro, 2012).
In order to verify the use of these mechanisms in the Jordanian industrial companies and their impact on the provision of human capital, the following hypothesis was proposed:
H1: Human capital development mechanisms lead to human capital enhancement in Jordanian industrial companies.

2.2 Human capital isolation mechanisms and human capital protection

The idea, though not explicitly mentioned, of the mechanisms for the isolation of human capital, dates back to Beckerin (1975), where he distinguished between two types of human capital: the general human capital of total education and experience in life; and education and experience in a specific field (Dimov, 2010). Another idea that attracted attention to the isolation of human capital was Shih et al.'s, (2010) definition of this concept, which was defined as capabilities of the company's employees, as well as capabilities that the human resources outside the company possessed and which the company could reach. Campbell et al. (2012) defined the mechanisms of human capital isolation as the mechanisms used by companies to prevent competitors from benefiting from their human capital. The authors said that the privacy or specificity of company resources is one of the factors that help the company to apply the mechanisms of human capital isolation, since the resources of a particular company cannot be used in another competitive company. Returning to Becker's definition of human capital, the specific type of human capital falls under the second type of human capital - private human capital. Another study argues that focusing on the internal characteristics of knowledge to be limited to the company is another way of isolating human capital (Kim, 2013). Leiblein (2011) emphasized the importance of ways of isolating human capital, as it protects scarce resources for the organization. In order to investigate the effect of human capital mechanisms on maintaining human capital in the Jordanian industrial companies, the following hypothesis was proposed:

H2: Human capital isolation mechanisms lead to human capital enhancement in Jordanian industrial companies.

2.3 Human capital and Innovative performance

Innovation performance relates to athe company's ability to adapt to market changes and to work on developing new products and markets (Al-Hawary & Aldaihani, 2016; Zehir et al., 2012). Innovative performance was measured in previous studies using two factors: development of new products; and products improvement (Maurer et al., 2012). Alpkan et al. (2010) used five factors to measure this construct: percentage of new products added to existing products; number of projects dedicated to the development of new products; the company's ability to produce and deliver new products and market to its competitors; innovative methods added to the company's operations; and the quality of the products provided by the company to the customers. In terms of the impact of human capital on improving the performance of innovation, Alpkan et al. (2010) found a significant impact of human capital on innovative performance. In a study conducted by Cabello-Medina et al. (2011) on Spanish firms, the results indicated a positive impact of human capital on firm innovativeness. Therefore, the following hypothesis was presumed:

H3: Organization human capital results in enhanced innovative performance in Jordanian industrial companies.

Furthermore, human capital development mechanisms and human capital isolation mechanisms were assumed to have a significant impact on innovative performance. According to Dostie (2018), training as a factor in human capital development is regarded as a key determinant of innovativeness. Haneda and Ito (2018) indicated that incentive structures play a significant role in innovative performance. Karanja et al. (2018) found a positive effect of attraction of skilled employees on innovativeness. In addition, Chen and Dimitrov (2017) described cost of imitation as a major factor that affects innovative performance. Ferraris et al. (2017) indicated that knowledge is a first step in the development on innovation. In a study conducted by Zhang and Zhu (2016), company resources have a significant impact on innovative performance. Consequently, the following hypotheses were proposed means that:

H4: Human capital development mechanisms are positively associated to innovative performance in Jordanian industrial companies.

H5: Human capital isolation mechanisms impact positively on innovative performance in Jordanian industrial companies.

3. Methodology

3.1 Research sample and data collection

The population of this study consisted of managers at different managerial levels in the selected industrial companies in Jordan. Out of the 64 companies, 50 companies were agreed to participate in the study. A sample consisting of 500 managers was selected with 10 questionnaires being distributed per company. A total of 463 questionnaires were returned complete and valid for the purpose of data analysis, giving a response rate of 92.6%.

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3.2 Research conceptual model

Figure 1 shows the conceptual model of the research. It comprises four latent variables (human capital development mechanisms, human capital isolation mechanisms, organizational human capital, and innovative performance). The figure contains five one-way arrows that represent the structural regression coefficients amongst latent variables by which hypotheses are accepted or rejected.

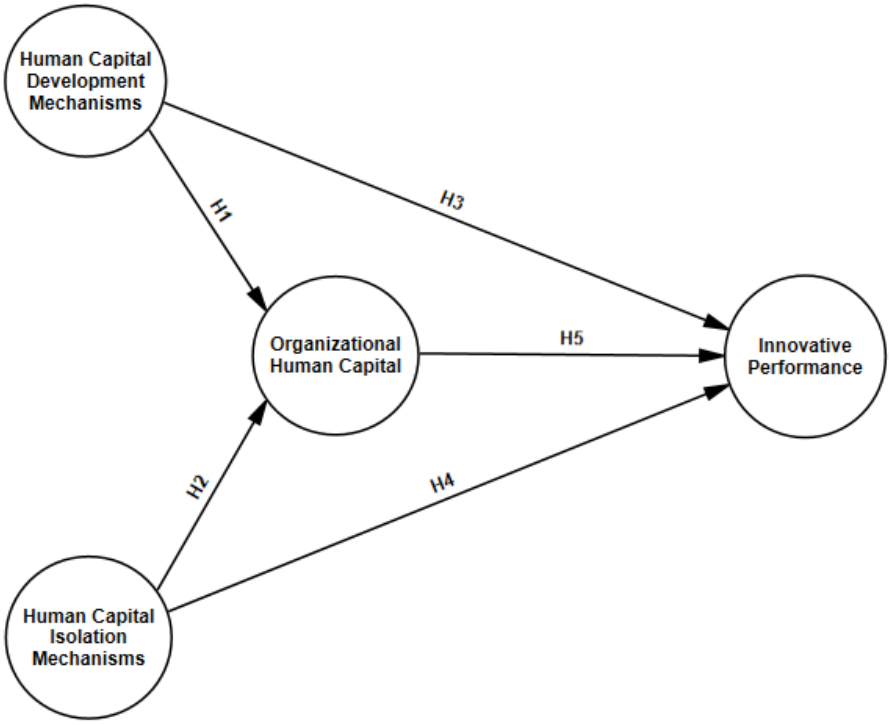

Figure 1. Research conceptual model

3.3 Measurements

Human capital development was evaluated by three dimensions as reported by Shaw et al. (2013) which were: training; incentives structure; and attraction of skilled employees. Human capital isolation mechanisms were measured based on Leiblein (2011), Campbell et al. (2012) and Kim (2013) using three dimensions related to: specificity of company resources; internal characteristics of knowledge; and cost of imitation. Human capital was assessed by three factors represented by the availability of well-educated, well-trained employees, who hold suitable job-related experience adopted from Wright and McMahan (2011). Innovative performance was measured using four dimensions adopted from Alpkan et al. (2010) and Cabello-Medina et al. (2011) such as: introduction of new products and replacement of old products. Table 1 shows the factors and indicators used in the study constructs. All items were measured on the basis of a Likert scale anchored from 1 to 5, where 1 refers to strongly disagree and 5 represents strongly agree.

3.4 Validity and reliability

Cronbach's alpha was used to measure the internal consistency. Values of Cronbach's alpha as suggested by many scholars should be higher than 0.7 (Rahim, 2013). The authors indicated that average variance extracted (AVE) along with its square root and factor loadings can be used to assess the convergent and discriminant validity. Based on the results in Table 2, it was found that the scale used in this study was both valid and reliable. Factors loadings were greater than 0.6 (ranging from 0.736 to 0.887) and AVE values were greater than 0.5 (ranging from 0.720 to 0.861) which confirms the convergent validity. Cronbach's alpha values also were greater than 0.7, which indicated an acceptable internal consistency (Zhang and Zhu, 2016). Discriminant validity was also established on the basis of AVE Sqrt. values.

Table 1. Study factors and indicators

Factors	Indicators	Author (s)
Human capital development	– Training – Incentives structure – Attraction of skilled employees	Shaw et al. (2013)
Human capital isolation mechanisms	– Specificity of company resources – Internal characteristics of knowledge – Cost of imitation	Leiblein (2011); Campbell et al. (2012); and Kim (2013)
Human capital	– Well-educated employees – Well-trained employees – Suitable job-related experience	Wright and McMahan (2011)
Innovative performance	– Introduction of new products – Replacement of old products – Quality of new products – Work processes innovations	Alpkan et al. (2010) and Cabello-Medina et al. (2011)

Table 2. Results of validity and reliability

Variables	Indicators	Factor loadings	AVE	AVE Sqrt.	Cronbach's alpha
HCDM	HCDM1	0.841	0.774	0.880	0.810
	HCDM2	0.887			
	HCDM3	0.751			
	HCDM4	0.861			
	HCDM5	0.841			
	HCDM6	0.736			
HCIM	HCIM1	0.772	0.861	0.930	0.899
	HCIM2	0.881			
	HCIM3	0.790			
	HCIM4	0.746			
	HCIM5	0.730			
	HCIM6	0.873			
OHC	OHC1	0.861	0.720	0.850	0.872
	OHC2	0.794			
	OHC3	0.766			
	OHC4	0.891			
	OHC5	0.761			
	OHC6	0.774			
IP	IP1	0.880	0.782	0.884	0.805
	IP2	0.781			
	IP3	0.734			
	IP4	0.729			
	IP5	0.747			
	IP6	0.852			
	IP7	0.841			
	IP8	0.789			

HCDM: human capital development mechanisms, HCIM: human capital isolation mechanisms, OHC: organizational human capital, and IP: innovative performance. All significance levels at $p < 0.001$.

3.5 Correlation matrix

The results in Table 3 show a significant correlation between human capital development mechanisms and human capital isolation mechanisms (r = 0.48, P = 0.000), organizational human capital (r = 0.57, P = 0.001), and innovative performance (r = 0.47, P = 0.000). Human capital isolation mechanisms as a whole construct was significantly correlated to organizational human capital (r = 0.44, P = 0.001) and to innovative performance capital (r = 0.61, P = 0.001). Finally, the results indicate that organizational human capital is significantly associated to innovative performance (r = 0.40, P = 0.003).

Table 3. Correlations matrix

Variables	Means	Standard deviations	1	2	3	4
1. HCDM	3.77	0.65	-			
2. HCIM	3.71	0.48	0.48	-		
3. OHC	3.78	0.57	0.56	0.44	-	
4. IP	3.81	0.71	0.47	0.61	0.40	-
Correlations are significant at the 0.05 level						

4. Data analysis and results

4.1 Model fit

The results in Table 4 show that the model fits the data well. Values of GFI, AGFI and CFI were all greater than 0.90. RMSEA was lower than 0.05. Values of PNFI and PCFI were greater than 0.50.

Table 4. Model fit indicators

Indices	Criteria	Value	Result
GFI	>0.90	0.922	Confirmed
RMSEA	< 0.05	0.028	Confirmed
AGFI	>0.90	0.942	Confirmed
CFI	>0.90	0.940	Confirmed
PNFI	>0.50	0.692	Confirmed
PCFI	>0.50	0.661	Confirmed

4.2 Hypotheses testing

The results of the structural equation modeling as shown in Figure 2 provide full support for the hypotheses 1, 2, 3, 4 and 5. Basically, human capital development was positively and significantly affected organizational human capital (ß = 0.40, t = 3.45, P < 0.01) and innovative performance (ß = 0.37, t = 3.34, P < 0.01). Human capital isolation variable was positively and significantly affected organizational human capital (ß = 0.49, t = 4.56, P < 0.05) and innovative performance (ß = 0.21, t = 2.97, P < 0.01). Finally, the results confirmed a positive as well as significant impact of organizational human capital on innovative performance (ß = 0.51, t =9.22, P < 0.05).

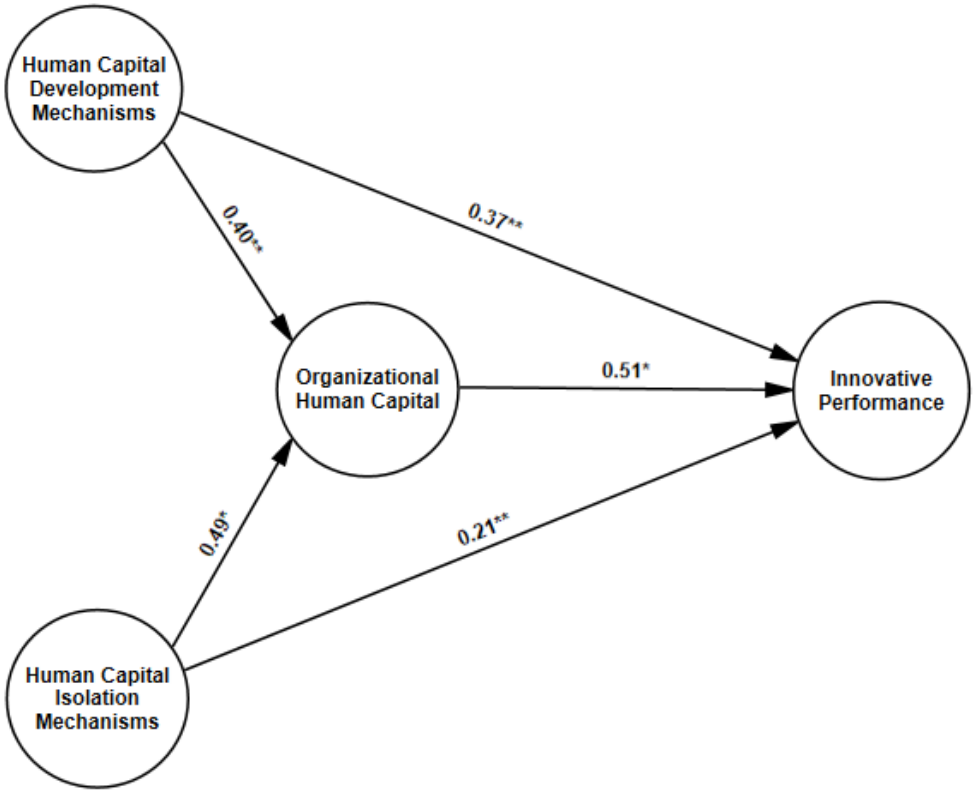

Figure 2. Research structural model

5. Discussion

The aim of this study was to investigate the impact of human capital development mechanisms on organizational human capital and innovative performance, the impact of human capital isolation mechanisms on organizational human capital and innovative performance, and finally the impact of organizational human capital on innovative performance. On the basis of data collected from managers of industrial companies based in Jordan, the results revealed that the study hypotheses were accepted. In fact, these results were also confirmed theoretically. Human capital development mechanisms such training, incentives structures and attraction of skilled employees were positively related to human capital development and enhancement (Mudor and Tooksoon, 2011; Osikominu, 2012; Green and Roberts, 2012; ; Shaw et al., 2013; Martin et al., 2013; Gambardella et al., 2015). Furthermore, mechanisms of human capital isolation, as ways used to prevent competitors from benefiting from their human capital (Campbell et al., 2012), such as specificity of company resources, internal characteristics of knowledge, and cost of imitation were also found to be correlated (Leiblein, 2011; Campbell et al., 2012 and Kim, 2013) and were found to have a positive impact on human capital development and enhancement. Additionally, it was revealed that human capital isolation mechanisms result in enhanced innovative performance. Consistent with the current findings, Alpkan et al. (2010) and Cabello-Medina et al. (2011) concluded that organizational human capital has a significant impact on innovative performance.

6. Conclusion, recommendations, limitations and future research

It was concluded that organizational capital is a cornerstone of innovativeness in a company. The human capital of well-educated and well-trained staff that have appropriate expertise in their field of work improves a company's ability to innovate. Human capital gives companies the ability to offer new products, replace old products with new products, improve the quality of the company's existing products and make improvements to the overall operations of the company. Given that human capital plays an important role in improving the innovative performance of the company, there are important variables that contribute to the improvement of human capital which must be acknowledged. The most important of these variables is the development of human capital through training, incentive structures of the company, and attracting and retaining skilled employees who have the necessary knowledge and experience. In addition, the isolation of human capital using mechanisms such as a company's resources, the characteristics of a company's knowledge, and the cost of imitation, represent further

important variables in the preservation of human capital. A company's resources and knowledge can make it difficult for competitors to use the same innovative methods. Conversely, if the cost of imitating innovation by competitors is high, this may prevent innovation. One of the most important limitations of the study is that its was designed as a cross-sectional study and therefore future studies may benefit from taking into account longitudinal studies. In addition, the study was based on specific indicators to measure the variables, as well as the sample, which was limited to managers who were selected from companies and who were willing to participate. The current study was not intended to identify the differences between industrial companies that can be attributed to the type of company and the sector to which it belongs, as well as the size of the company. Therefore, future studies should consider incorporating and examining such differences.

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