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Human Capital Development and Product Innovation: Evidence from Middle Eastern Banks

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ABSTRACT

This study examines the impact of human capital development, specifically employee training, on product innovation in the banking sector within selected Middle Eastern countries. The study employs panel Poisson regression analysis on a dataset of 190 bank-year observations, covering 38 banks from five Middle Eastern countries over the period 2016 to 2020. Results reveal two principal findings; first, employee training programs are positively and significantly associated with product innovation, highlighting the strategic value of human capital development. Second, financial performance moderates this relationship, with the innovation-enhancing effect of training being more pronounced in more profitable banks. The findings imply that investment in employees' competency, when aligned with a bank's financial capacity, can enhance innovation capabilities.

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ملخص

تتناول هذه الدراسة أثر تطوير رأس المال البشري، وبشكل خاص تدريب الموظفين، على الابتكار في المنتجات في القطاع المصرفي ضمن عدد من بلدان الشرق الأوسط. وقد اعتمدت الدراسة على تحليلانحدار بواسون اللوحي على مجموعة بيانات تتألف من 190 ملاحظة سنوية-مصرفية تغطي 38 مصرفا في خمس بلدان شرق أوسطية خلال الفترة 2016 - 2020. وكشفت النتائج عن حقيقتين أساسيتين، الأولى أن برامج تدريب الموظفين ترتبط إيجابيا وبشكل معنوي مع ابتكار المنتجات، مما يبرز القيمة الاستراتيجية لتطوير رأس المال البشري. والثانية أن الأداء المالي يعد عاملا معدلا لهذه العلاقة، حيث يكون تأثير التدريب في تعزيز الابتكار أكثر وضوحا في المصارف ذات الربحية الأعلى. وتشير هذه النتائج إلى أن الاستثمار في كفاءات الموظفين، عندما يتماشى مع القدرة المالية للمصرف، يمكن أن يعزز القدرات الابتكارية بشكل ملموس.

RÉSUMÉ

Cette étude examine l'impact du développement du capital humain, en particulier la formation des employés, sur l'innovation produit dans le secteur bancaire de certains pays du Moyen-Orient. Elle utilise une analyse de régression de Poisson sur un panel de 190 observations bancaires annuelles, couvrant 38 banques de cinq pays du Moyen-Orient sur la période 2016-2020. Les résultats révèlent deux conclusions principales : premièrement, les programmes de formation des employés sont associés de manière positive et significative à l'innovation produit, ce qui souligne la valeur stratégique du développement du capital humain. Deuxièmement, les performances financières modèrent cette relation, l'effet de la formation sur l'innovation étant plus prononcé dans les banques plus rentables. Ces résultats impliquent que l'investissement dans les compétences des employés, lorsqu'il est aligné sur la capacité financière d'une banque, peut renforcer les capacités d'innovation.

Keywords: human capital, employees' training, product innovation, Middle Eastern banks

JEL Classification: G21, J24, M53, O15

1. Introduction

Investment in human capital, encompassing education, training, and continuous skill development, is fundamental to organizational success, particularly in service-intensive sectors such as banking. As knowledge-based industries, banks require not only financial capital but also intellectual capital to maintain competitiveness and respond effectively to the dynamic global financial environment. In recent years, the Middle Eastern banking industry has undergone considerable transformation driven by increasing competition, technological change, evolving customer expectations, and global integration. These shifts underscore the urgent need for innovation and, consequently, strategic investments in human capital.

Organizations with a higher level of human capital have consistently demonstrated greater capacity for innovation, as employees serve not only as operational agents but also as the primary source of ideas and execution for innovation initiatives (Moradi et al., 2013). The process of innovation is intrinsically linked to knowledge acquisition, technical expertise, and organizational learning, outcomes that are largely facilitated through structured human capital development (Plessis & Lyttelton, 2003). Thus, developing the capabilities of employees is not merely a human resource function but a strategic imperative that drives long-term organizational growth and resilience.

As global markets become increasingly knowledge-intensive, attention has shifted toward viewing human capital as a critical strategic asset. Effective human capital development programs enhance an organization's ability to adapt to external pressures, stimulate internal creativity, and sustain competitive advantage (Onyebuchi, 2018). Particularly in the service-based industry, well-designed training programs and continuous learning systems are necessary to equip employees with the competencies required to design and implement innovative financial products and services (Toner, 2011). Furthermore, organizations with well-established learning cultures are better positioned to align employee development with strategic goals, ensuring that human capital investments directly contribute to innovation outcomes (Kuzey et al., 2021).

Human capital development thus plays a dual role: enhancing individual competency, hence productivity, and contributing to organizational performance and innovation. The resource-based view (RBV) suggests that intangible resources, such as employee skills, knowledge, and organizational capabilities, are central to achieving sustainable competitive advantage, especially in service-intensive sectors like banking. In such environments, product innovation relies heavily on the development and strategic deployment of human capital, which is both valuable and difficult to replicate. Cultivating a skilled and adaptive workforce through continuous training and learning not only enhances organizational performance but also supports the dynamic capabilities needed to innovate in response to shifting market demands (Teece et al., 1997; Collins & Smith, 2006).

Empirical evidence suggests that banks with strong human capital perform better in terms of intellectual capital, which directly correlates with higher profitability and sustainability (Ousama, Hammami, & Abdulkarim, 2020; Ozkan et al., 2017).

It is argued that financially stronger banks are more likely to allocate resources to structured training programs and research and development initiatives. Bank profitability provides both the capacity and confidence for banks to experiment with new ideas and innovate without immediate concern for short-term returns. Conversely, banks under financial pressure may cut investments in training and employee development, which in turn stifles innovation (Carvache-Franco, 2020). This suggests that financial performance may play a moderating role in the relationship between human capital development and innovation, further reinforcing the need for an integrated, resource-sensitive approach to workforce development.

Arab economies continue to face structural challenges that hinder innovation capacity. Notably, these include a lack of competitive domestic products and a strong dependence on imported technologies (Bentour, 2020). Such dependency limits the region's ability to contribute meaningfully to global innovation ecosystems and delays progress toward knowledge-based economic models. Bentour (2020) attributes much of this developmental lag to underinvestment in human capital and inadequate institutional capacity building. In response, the World Bank launched the Human Capital Project in 2016, highlighting the importance of education, skills development, and

health as fundamental components of economic development and long-term national competitiveness (Smedt, Giovannini, & Radermacher, 2021). As global financial institutions embrace FinTech, and personalized digital banking products, banks in the region must accelerate their innovation strategies to remain relevant. While several Arab countries have joined this initiative, there remains a dearth of empirical research assessing how human capital development translates into organizational outcomes, particularly innovation, within strategic sectors like banking (Debrah, Oseghale, & Adams, 2018).

This study employs a panel Poisson regression model using a dataset of 190 bank-year observations from 2016 to 2020 across selected Middle Eastern countries to examine the impact of human capital development on product innovation in the banking sector. Our findings show that, first, the number of training programs is positively and significantly associated with innovation in banking products and services. Second, the results indicate that financial performance moderates this relationship, specifically, the positive impact of training on innovation is stronger in more profitable banks. Our findings are robust across multiple panel model estimations, and after controlling for heteroskedasticity. From the perspective of RBV, our findings imply that the strategic integration of human and financial capital can strengthen a bank's innovation capability.

This study contributes to the banking and management literature by empirically examining the relationship between human capital development and product innovation within the banking sector of selected Middle Eastern countries. Specifically, it investigates whether investments in training programs and employee development are associated with more product and service innovation, and whether this relationship is moderated by the financial performance of the banks.

2. Literature Review and Hypotheses Development

Human capital, defined as the skills, knowledge, and experience acquired through education and professional development, represents one of the most valuable organizational assets. Becker (1995) emphasized that education and training are central to developing effective human capital capable of driving innovation and economic value. Accordingly, human capital development

activities, particularly training, improve employee capabilities and organizational competitiveness (Egungwu & Egungwu, 2019; Marimuthu & Ismail, 2009; Mcmurrer, 2006)

RBV similarly highlights that a firm's internal resources, such as employee knowledge, technical expertise, are primary sources of sustainable competitive advantage (Wernerfelt, 2014; Collins & Smith, 2006). To sustain competitive advantage, organizations must continuously build and adapt capabilities through learning and strategic resource management (Chahal, 2016; Emmanuel Oke & Raphiri, 2014; Jogaratnam, 2017). Teece et al. (1997) further extended RBV through the concept of dynamic capabilities, emphasizing the need for firms to adapt, innovate, and reconfigure resources in response to changing market conditions. Galbreath (2005) tests RBV-related hypotheses and document that organizational capabilities are the most critical form of firm resources, surpassing both tangible and intangible assets in contributing to firm success.

The banking sector provides a vivid illustration of how innovation shapes competitive advantage, as seen through financial innovations such as internet and mobile banking, which have revolutionized interactions between banks and customers. In this context, sustaining competitiveness necessitates continuous creativity and innovation in banking products and services (Zaionts, 2020). A bank’s survival, reputation, and sustainability depend heavily on its capacity for service innovation, with human capital development playing a pivotal role (Dostie, 2018).

The significance of human capital extends to the organizational level, particularly in the contemporary knowledge economy. The link between human capital and organizational performance is particularly pronounced in technology-driven sectors, where the quality of human capital significantly influences project success (Shrader & Siegel, 2007). Organizations that prioritize human capital development, including training and education, are better positioned to maintain market leadership and sustainability (Rodrigues, Dorrego, & Jardon, 2010).

Training, as a core component of human capital development, plays a crucial role in enhancing employees’ skills, knowledge, and innovative capabilities. Defined as the process through which individuals improve their competencies

and behaviors (Elnaga & Imran, 2018), training ensures that employees remain adaptable and capable in rapidly evolving work environments. By acquiring new skills and knowledge, employees improve job performance and remain updated with evolving tools and technologies. According to a review conducted by the Organisation for Economic Co-operation and Development (OECD, 2011), a wide range of skills, including language, academic, technical, problem-solving, management, entrepreneurship, and soft skills, play a pivotal role in supporting innovation activities.

Empirical evidence shows that on-the-job training programs are particularly effective in skill development (Hanaysha & Tahir, 2016), and that education initiatives directly correlate with improved employee performance and innovative output (Al-Rifai, & Al-Momany, 2015). Several studies also report that investment in training, whether on-the-job or off-the-job, positively and significantly influences innovation outcomes, particularly in new product development (Dostie, 2018; Khadan, 2018; Manresa, Bikfalvi, & Simon, 2019; Maurer, 2019). Furthermore, training enhances employee performance, which, in turn, improves the organization's innovative capabilities (Alrazehi, & Amirah, 2020).

Numerous studies across different countries affirm the positive relationship between training and innovation. Training has been identified as a key enabler for enhancing employees' innovative capacities. Edralin (2007) highlighted that training and development are crucial human resource strategies that stimulate innovation and drive competitive advantage. Similarly, Børing (2017) reported a positive association between the adoption of training methods and institutional innovation activities. Naranjo-Valencia et al. (2018) further confirmed that comprehensive training practices significantly impact innovation, especially in companies with mature innovation cultures. Their findings emphasize that strategic alignment between training initiatives and innovation needs plays a critical role in strengthening overall organizational performance. Based on the preceding discussion, this study formulates the following hypothesis:

H1: *There is a significant effect of human capital development on product innovation in Middle Eastern banks.*

Prior research suggests that firms with stronger financial performance are better positioned to invest in human capital development, which in turn fosters product innovation (Carvache-Franco, 2020). Conversely, firms facing financial constraints may be limited in their ability to allocate resources toward employee training and development, potentially hindering innovation outcomes.

In the banking sector, strong financial performance should enhance banks' ability to fund training programs, leadership development, and knowledge-sharing initiatives (Karem & Ismail, 2016). Such investments not only strengthen the organization's human capital but also cultivate a culture conducive to innovation. Financially stable banks are more likely to experiment with new ideas, support research and development, and launch innovative financial products, driven by a higher risk tolerance and strategic agility (Kuzey et al., 2021).

Given the above arguments, financial performance may play a moderating role by strengthening or weakening the relationship between human capital development and product innovation. In high-performing banks, the positive effects of human capital development on innovation may be amplified, whereas in financially weaker banks, the same efforts may yield limited outcomes. Therefore, the following hypothesis is proposed.

H3: *Financial performance moderates the relationship between human capital development and innovation in Middle Eastern banks.*

3. Methodology

3.1 Data description

The sample of this study comprises 38 banks, selected based on the availability of the required data following a thorough data screening process. The sample distribution includes 10 banks from Jordan, 11 banks from the United Arab Emirates, 5 banks from Egypt, 5 banks from the Sultanate of Oman, and 7 banks from the Kingdom of Saudi Arabia. The study covers a five-year period from 2016 to 2020, resulting in a total of 190 bank-year observations.

Data are primarily sourced from sample banks' annual reports, which are publicly accessible through their official websites. Annual reports serve as valuable repositories of corporate information, often used by management to disclose material updates, organizational achievements, and detailed financial data (Guthrie & Petty, 2000). Key corporate information relating to product innovation and human capital development (HCD) initiatives was systematically coded to transform qualitative disclosures into quantifiable data suitable for empirical analysis. Additional information on banks' product innovation efforts was also extracted directly from their official websites.

3.2 Empirical Model and Variable Measurement

Our empirical analysis in this study attempts to provide evidence that human capital development influences the expected frequency of events in innovation. To test the hypotheses, the model specified in this study takes the following form:

$$INN_{it} = \alpha_{1+} \beta_1 HCD_{it} + \beta_2 FP_{it} + \beta_3 (HCD \times FP) + \beta_4 CONTROL_{it} + e_i \quad (1)$$

where;
INN = Innovation
HCD = Human capital development
FP = Financial performance
CONTROL = a set of control variables

The dependent variable in this study is a count variable as it takes on nonnegative integer values. The Poisson regression model allows us to estimate the effects on the conditional expected frequency (Wooldridge & Netlibrary, 2002). Previous studies indicate that product or service innovation can be measured by existing product development, and by new innovation of products and services (Okebukola, 2009; Al-Shuaib, 2016). Following previous studies, banks' innovation is measured by the number of product development (PD), and the number of innovative products or services (PI).

Corporate annual reports indicate the development of human capital through two main dimensions: The first dimension is the training opportunity provided by banks to employees, as the reports referred to training programs in terms of the quality of the training programs provided and the average number of training hours, the number of training programs, and the number

of bank employees benefiting from these training programs. Following Dostie (2018), we employ these proxies of human capital development.

Profitability indicators such as return on asset (ROA) have been widely used in the finance literature as measures for firm financial performance (Zhao & Wijewardana, 2012). We adopt this measure to test the moderating effect of financial performance on the relationship between bank innovation and human capital development.

As is standard practice in the accounting and finance literature, we include a set of control variables that are shown to be significant predictors of bank innovation (Seraphine, 2017; Uchechukwu & Ph, 2020; Cozzarin & Percival, 2020), namely, firm size, measured by natural logarithm of total assets, and firm leverage, measured by total debt to total assets. The summary of our test variables is provided in Table 1.

Table 1: Summary of variable measurement

Variable	Measurement
Training	HrsT = The number of training hours TP = The number of training programs TRNE = The number of trainees
Innovation	1) The number of product development (PD) 2) The number of new products or services innovated and offered for the first time (PI)
Financial performance	ROA = Net income/total asset
Control variables	Asset = Natural logarithm of total assets DTA = Debt-to-asset ratio

Table 2 presents the summary statistics for the study variables from 2016 to 2020. The data show that both product innovation (PI) and product development (EPD) reached their highest average levels in 2020, suggesting that banks in the Middle East intensified their innovation efforts during the COVID-19 pandemic. The full sample mean values for PI and EPD are 5.458 and 5.005, respectively. We observe that (untabulated) Abu Dhabi Commercial Bank has the highest average number of product innovations (22.2) during the study period, whilst Sharjah has the lowest average number of product innovation.

Table 2: Summary statistics of variables by year

Year	PI	PD	HrsT	TP	TRNE	ROA	Asset	DTA
2016	5.289	4.474	9.204	4.872	7.349	0.344	23.034	0.048
	3.352	*3.889*	*1.637*	*2.12*	*1.325*	*1.421*	*1.293*	*0.046*
2017	5.553	4.789	9.349	5.052	7.567	0.164	23.033	0.054
	3.547	*2.395*	*1.519*	*2.126*	*1.25*	*0.308*	*1.255*	*0.05*
2018	4.842	5.132	9.313	4.944	7.432	0.206	23.12	0.056
	3.15	*3.919*	*1.657*	*1.967*	*1.398*	*0.35*	*1.303*	*0.051*
2019	5.737	4.789	9.683	4.746	7.594	0.177	23.158	0.062
	5.092	*2.849*	*1.873*	*2.11*	*1.415*	*0.289*	*1.33*	*0.053*
2020	5.868	5.842	9.505	4.871	7.526	0.123	23.237	0.063
	5.251	*4.989*	*1.97*	*1.936*	*1.618*	*0.15*	*1.394*	*0.052*
Full	5.458	5.005	9.411	4.897	7.494	0.203	23.116	0.057
Sample	*4.149*	*3.711*	*1.729*	*2.034*	*1.396*	*0.681*	*1.302*	*0.05*

Note: This table displays the mean and standard deviation values for the full sample by year. The value of standard deviation is italicized. All variables are defined in Table 1.

Regarding human capital development, the average number of training hours per employee (HrsT) peaked in 2019 (9.683) before declining in 2020, reflecting pandemic-related constraints. The overall mean training hours across the sample is 9.411. Similarly, the average number of training programs (TP) was highest in 2017 at 5.052, with a full sample mean of 4.897. The average number of trainees (TRNE) was also highest in 2019 (7.594) and declined slightly in 2020, consistent with the trend in training hours. The full sample mean for TRNE is 7.494.

In terms of financial indicators, the mean log of total assets increased steadily, peaking in 2020 (23.237), with an overall sample mean of 23.116. Return on asset (ROA), however, showed a decline in 2020, reflecting reduced profitability during the pandemic. The average ROA across the full sample is 0.281. Lastly, the average debt-to-asset ratio (DTA) is low, with a full-sample mean of 0.057, indicating a relatively conservative leverage structure among the sampled banks.

4. Results and Discussion

Table 3 presents the pairwise correlation coefficients among the study variables. This analysis provides preliminary insights into the relationships between independent variables and the dependent variables across the sample

banks. Notably, none of the correlation coefficients exceed 0.80, suggesting that multicollinearity issues should not be a concern, in line with the threshold recommended by Gujarati (2012).

The two dependent variables, product innovation (PI) and product development (PD), exhibit a relatively strong positive correlation (r = 0.521), indicating potential substitutability in measuring banks' innovation outcomes. This supports the notion that both indicators capture similar underlying innovation activities.

Proxies for human capital development, including training hours (HrsT), training programs (TP), and number of trainees (TRNE), are all positively correlated with both PI and PD, albeit at modest levels. These findings provide preliminary support for the Resource-Based View (RBV), which posits that investment in human capital enhances innovation capacity.

Importantly, the correlations among independent variables remain low to moderate, with most coefficients below 0.50. For instance, correlations among the human capital development measures range from 0.04 to 0.435, while correlations between human capital and accounting variables (ROA, Assets, DTA) are also relatively low.

Table 3: Pairwise correlations

Variable	PI	PD	HrsT	TP	TRNE	ROA	Asset	DTA
PI	1							
PD	0.521	1						
HrsT	0.119	0.044	1					
TP	0.207	0.117	0.123	1				
TRNE	0.207	0.117	0.315	0.435	1			
ROA	0.14	-0.042	0.166	0.071	0.037	1		
Asset	0.369	0.204	0.391	-0.11	0.148	0.454	1	
DTA	-0.03	-0.03	0.116	-0.324	0.068	0.06	0.255	1

Note: This table presents the Pearson pairwise correlations. All variables are defined in Table 1.

Table 4 reports the results of our baseline regression using panel Poisson estimation method. The default estimation of panel Poisson in Stata is based

on random effect estimation (xtpoisson). The dependent variables are product innovation and product development (PD), both of which are measures of the bank's innovation. We find that training programs (TP) are positively associated with bank's product innovation and development. The incidence rate ratio is significant at the 5% level; hence, it indicates that a 1% increase in the number of training programs is associated with a 1.111 time increase in the number of product innovations and a 1.022 time increase in development of existing product committed by the bank. We do not find that training hours (HrsT) and the number of trainees are significant in predicting banks' innovation. The impact of human capital development on banking innovation finds a strong positive relationship between investments in employee training and the bank's ability to develop innovative products and services. In this respect, these results are consistent with those of several previous studies (e.g. Rahman, & Akhter, 2021; Siepel, Camerani, & Masucci, 2021).

Concerning control variables, the results show that bank size and profitability appear with positive incidence rate ratios, and the values are statistically significant at the 1% level. To be precise, a 1% increase in the bank's total assets is associated with an increase of 1.281 times in product innovations and 1.258 times in product development. Furthermore, a 1% increase in the bank's profitability (ROA) is associated with an increase of 0.809-time product innovations and 0.685 time product development. Our findings in this respect are consistent with several previous studies (Seraphine, 2017; Uchechukwu & Ph, 2020; Cozzarin & Percival, 2020).

To ensure the robustness of our baseline regression results, we estimate the fixed effect models. The panel fixed effect has several robustness properties as far as the Poisson distribution is concerned, where interactions between time-constant and time-varying explanatory variables are allowed (Wooldridge & Netlibrary, 2002). Our results, as shown in Table 5, are consistent with that obtained using random effect estimations, particularly with regard to the economic significance of the hypothesis-testing variable. Specifically, we find that TP is positively associated with the bank's product innovation. The incidence rate ratio is significant at the 10% level, which indicates that a 1% increase in the number of training programs is associated with a 1.115-time increase in the number of product innovations and a 0.961-time increase in development of existing products.

Table 4: Results of random effect regressions

	PI	PD
HrsT	0.965	0.948
	(0.99)	(1.26)
TP	1.111	1.022
	(2.53)**	(2.47)**
TRNE	1.068	0.954
	(1.13)	(0.79)
ROA	0.809	0.749
	(3.12)***	(3.05)***
Asset	1.281	1.258
	(3.59)***	(3.17)***
DTA	0.692	0.685
	(0.26)	(0.26)
lnalpha	0.208	0.237
	(5.26)***	(4.66)***
Obs.	161	161

Note: This table presents the baseline regression using random effect model. The dependent variables are PI and PD, both measure bank innovation. *, **, and *** indicate that the coefficients are significant at 10%, 5%, 1%, respectively. All variables are defined in Table 1.

We perform a Hausman test to determine whether a fixed or random-effect regression model is more suitable for our data. The test yielded a statistical value of χ^2=408.88 (p-value=0.00), rejecting the null hypothesis that random effects is the preferred model. Accordingly, the fixed effects model is deemed more appropriate for our analysis.

To test the moderating effect of bank profitability on the relation between human capital development and bank innovation, we re-estimate the fixed-effect Poisson regressions with interaction terms between ROA and human capital development proxies. Results are reported in Table 6. Specifications (1) to (3) respectively include the interaction terms of ROA with training hours (HrsT), training programs (TP); and the number of trainees (TRNE), which are run separately against bank innovation (PI). We find that the interaction term of TP x ROA and TRNE x ROA are significant, both

economically and statistically. Specifically, for profitable banks, an increase in the number of training programs and the number of trainees participated are associated with a 0.976-time and 1.156-time increase in bank innovation, respectively.

Table 5: Results of fixed effect regressions

	PI	**PD**
HrsT	0.98	0.98
	(0.73)	(0.43)
TP	1.115	0.961
	(1.86)*	(1.78)*
TRNE	1.115	0.928
	(1.36)	(0.97)
ROA	0.748	0.719
	(4.87)***	(6.52)***
Asset	0.959	1.874
	(1.71)*	(2.11)**
DTA	0.205	0.067
	(0.61)	(0.88)
Obs.	161	161

Note: This table presents the results of fixed effect regression with robust standard errors. The dependent variables are PI and PD, both measure bank innovation. *, **, and *** indicate that the coefficients are significant at 10%, 5%, 1%, respectively. All variables are defined in Table 1. Furthermore, the same set of independent variables and interaction terms are run against product development (PD) in specifications (4) to (6). Results show that TP x ROA and TRNE x ROA significantly predict bank product development, reinforcing our previous results. Consistent with several recent studies such as AlQershi, Mokhtar, & Abas (2021), and Onoriode (2022), our findings thus indicate that banks with strong financial performance can better capitalize on their investment in human capital development to drive innovation.

Table 6: Results of fixed effect regressions with interaction terms

	PI			PD		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
HrsT	0.977	0.966	0.962	0.939	0.94	0.937
	(0.59)	(0.93)	(1.05)	(1.35)	(1.42)	(1.50)
HrsT x ROA	0.958			1.037		
	(0.70)			(0.51)		
TP	1.112	1.116	1.109	1.022	1.000	1.014
	(2.54)**	(2.34)**	(2.48)**	(0.46)	(0.00)	(0.28)
TP x ROA		0.967			1.174	
		(2.22)**			(1.98)**	
TRNE	1.067	1.042	1.042	0.954	0.95	0.865
	(1.12)	(1.57)	(0.57)	(0.78)	(0.85)	(1.92)*
TRNE x ROA			1.156			1.786
			(2.57)**			(2.18)**
Asset	1.279	1.281	1.287	1.26	1.259	1.289
	(3.54)***	(3.58)***	(3.63)***	(3.19)***	(3.19)***	(3.32)***
ROA	1.172	0.945	0.281	0.546	0.352	0.011
	(1.30)	(1.87)*	(1.68)*	(1.85)*	(1.34)	(2.32)**
DTA	0.696	0.713	0.72	0.682	0.595	0.612
	(0.25)	(0.23)	(0.23)	(0.26)	(0.35)	(0.33)
	161	161	161	161	161	161

Note: This table presents the results of fixed effect regression with robust standard errors. The dependent variables are PI and PD, both measure bank innovation. The interaction term between ROA and each proxy of employees training is run separately in each specification. *, **, and *** indicate that the coefficients are significant at 10%, 5%, 1%, respectively. All variables are defined in Table 1.

5. Conclusion

The Middle Eastern banking industry has undergone significant growth and transformation in recent years, driven by rising competition, evolving customer expectations, and technological advancements. In response,

innovation in products and services has become increasingly vital for banks seeking to maintain relevance and competitive advantage. This study examines the role of human capital development in fostering bank innovation, utilizing a panel Poisson regression approach on a sample of 190 bank-year observations from 2016 to 2020.

Our analyses yield two key findings. First, the number of training programs is positively and significantly associated with innovation in banking products and services. This underscores the importance of a well-trained and skilled workforce as a strategic resource capable of generating and implementing innovative ideas. Second, the result reveals that bank profitability moderates the relationship between human capital development and innovation. Specifically, the positive impact of employees training on innovation is pronounced for profitable banks, suggesting that financial strength enhances the effectiveness of human capital investments.

While the results provide important contributions to the literature and practical implications for bank management, they should be interpreted with caution due to certain limitations. First, the measurement of human capital development in this study is confined to training-related indicators disclosed in annual reports, which may not capture the full scope of development initiatives. Second, the study sample is limited to banks for which data are consistently available throughout the period of analysis, and thus does not cover all institutions in the Middle East.

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