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The Mediating Role of Process Management: Education and Training and Productivity

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Abstract: Education and training are essential activities in organizations that increase productivity, as managers recognize the need for a continuously skilled workforce in the dynamic business environment of the 21st century. While previous studies have linked education and training to productivity, few have included contingency variables to provide deeper insights into this relationship. The study introduces process management as a contingency variable to examine its mediating role between education, training, and productivity. Using a sample of 149 managers from the Tanzania-Zambia Railway Authority, data were analyzed in Jamovi using descriptive statistics, regression, and mediation models. The results indicate that education and training significantly increase productivity, while process management partially mediates this relationship. These findings contribute to the literature on human capital theory and process management by empirically validating these relationships. The study has practical implications for organizations, suggesting that structured training programs should be integrated with process improvement strategies to maximize productivity. In addition, policymakers are encouraged to support workforce development initiatives that align training with operational efficiency. Future studies should examine these relationships across different industries and over longer time horizons to improve generalizability.

Keywords: education and training, process management, productivity, mediation analysis

1. Introduction

In today's highly competitive and rapidly evolving business environment, organizations are constantly looking for ways to improve productivity and operational efficiency. One of the most effective strategies for achieving this is through robust process management, a systematic approach to optimizing business operations. Process management has received considerable attention for its potential to improve organizational performance and drive innovation. However, its successful implementation depends largely on the skills, competencies, and adaptability of the workforce. Comprehensive education and training play a key role in equipping employees with the necessary expertise [1] to effectively implement and sustain process management strategies. A well-trained and skilled workforce enables organizations to perform tasks more efficiently, thereby increasing productivity and ensuring long-term sustainability [2].

Process management focuses on streamlining operations, integrating advanced technologies, and aligning strategic objectives to achieve operational excellence [3]. However, its impact on innovation depends on the adaptability and flexibility of the organization. To create and manage business processes, the interdisciplinary field of business process management (BPM) combines operational competencies and technology [4].

The interplay between process management and people development underlines the importance of structured training programs in improving productivity. Training equips employees with a standardized knowledge base, enabling them to effectively implement methodologies such as Lean, Six Sigma, and total quality management (TQM).

Despite the widely recognized benefits of education and training, research suggests that their impact on productivity is not uniform. [5] challenges the assumption that higher education is directly correlated with productivity and advocates qualitative approaches to assessing the effectiveness of education.

Given the complex association between process management, education and training, and productivity, this study aims to investigate how organizations can effectively integrate structured training programs with process management methods to improve both efficiency and innovation. For the first time, this research empirically tests the mediating effect of process management on the relationship between education and training and productivity. Specifically, it examines whether ambidextrous organizational structures contribute to higher productivity and assesses the role of education and training in optimizing process management practices. By adopting a holistic approach, this study aims to provide valuable insights into the evolving dynamics of process management and workforce development, particularly in the context of technological advances and changing economic conditions.

The Tanzania-Zambia Railway Authority (TAZARA), a binational railway linking Tanzania and Zambia, serves as a vital artery for regional trade but faces persistent productivity declines.

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Freight volumes have declined due to operational inefficiencies, while staff skills gaps have exacerbated maintenance backlogs. This study selects TAZARA as a critical case to explore how education and training and process management can address sector-specific productivity barriers, providing insights for comparable infrastructure-dependent economies.

The following objectives were established for this study to address the gap in the literature:

1) Relate education and training to productivity
2) Determine whether process management mediates the relationship between education and training and productivity.

2. Literature Review

2.1. Process management

Process management takes a holistic approach by addressing the entire business process rather than making isolated improvements in specific areas, which often lead to suboptimal results. It considers the interdependence of people, processes, technology, and strategy in achieving business objectives [3]. As one of the most effective management methods, BPM enables organizations to maintain a competitive advantage by optimizing operations and improving efficiency.

The conventional definition of process management is a series of actions that convert inputs into outputs. Since the output of one process can serve as the input for another, continuous process improvement is essential to improve quality and overall performance. Historically, BPM has been a key driver of operational efficiency and optimization. However, in the digital era, organizations must go beyond efficiency and embrace responsiveness and agility to remain competitive [6]. The primary goal of BPM is to streamline business operations, leading to improved system performance, increased revenue, faster response times, and better service delivery [7].

Effective process management requires careful monitoring, standardization, and continuous improvement to increase efficiency and performance in different sectors. Composting, for example, requires careful management to remain efficient and trouble-free, requiring the monitoring of key indicators and timely adjustments [8]. Similarly, companies establish standardized systems to ensure consistency from input to output, with their credibility and value based on collaboration and well-structured processes [9]. BPM, like Lean Management, has emerged as a key approach to improving organizational performance through continuous improvement [10]. As a modern strategy, BPM is increasingly influencing industrial, service, and business sectors. More recently, its application has been extended to optimize various processes, including clinical ones [11].

2.2. Education and training

Education and training are fundamental drivers of global development and societal progress, playing a crucial role in reducing crime rates, fostering political participation, and promoting critical thinking for informed decision-making [12]. At the individual level, education enhances personal growth by improving skills, knowledge, and overall development. According to [12], "education and training" has a transformative impact on the future by increasing employability and preparing individuals to make meaningful contributions to society. Well-designed training programs create dynamic and engaging learning experiences that allow students to develop practical skills in a safe and controlled environment, further enhancing their ability to apply knowledge effectively.

Education and training are key components of human resource management programs aimed at developing human capital. These initiatives play a critical role in addressing global concerns related to career development and skills enhancement [13]. Employee performance has been found to be significantly influenced by educational characteristics, while training and work experience do not necessarily have a direct impact on work productivity [14].

In addition to developing skills, education and training also help managers to establish a shared quality framework within an organization, fostering behavioral change and a commitment to continuous improvement. Improving employees' knowledge and skills reduces operational errors and strengthens an organization's competitive advantage. To maintain long-term competitiveness, the training process must be continuous and adaptable to the evolving demands of the industry [15].

2.3. Productivity

The efficiency with which products and services are produced is the common definition of productivity. In terms of effectiveness, performance, and efficiency, it shows how well an organization is doing. More specifically, productivity is defined as the ratio of output to the inputs required for production [16]. However, the concept of productivity is complex, and its meaning can change depending on the situation [17]. Ultimately, it is a critical determinant of the production efficiency of goods or services [18].

2.4. Empirical review

2.4.1. Education, training, and productivity

A large body of research highlights the crucial role of education and training in increasing labor productivity. In contrast, [5] questions the assumption that higher education is directly correlated with productivity. Through empirical studies in Mexico, Sri Lanka, and Ghana, he finds that differences in educational attainment do not significantly affect productivity within the same occupational category. His findings suggest the need for a more nuanced, qualitative approach to measuring the effectiveness of education.

Reference [19] examines the impact of education and training programs on the productivity of civil servants and concludes that well-structured programs significantly improve performance. Similarly, [20] stresses the fundamental role of basic education and argues that vocational training cannot compensate for deficiencies in basic education.

The study by [21] found that formal education had a positive impact on both fertilizer adoption and maize productivity. The study also concluded that agricultural extension training had a highly significant impact on maize productivity. [22] examine training and development within the Ghana Education Service, identifying gaps in awareness and implementation that hinder productivity gains.

The study by [23] examines how the performance of government workers in Tanggul District, Jember Regency, is influenced by their work environment, motivation, education, and training. The study, which used questionnaires administered to 60 government employees, found that education, training, and the workplace all had a significant and positive effect on employee performance. Although motivation had a positive effect, it was not very strong. In essence, the study highlights the importance of funding education, training, and developing a good working culture to improve the productivity of public sector workers.

The study by [24] examines the impact of training and education on employee productivity in the offset printing section of Perum Peruri Karawang, West Java. The research uses a simple descriptive-quantitative method with two variables – independent and dependent – to analyze the contribution of training and education to employee productivity. The total population of 58 employees was used as the sample. Data were collected through questionnaires using a Likert scale. The results indicate that training and education are crucial for increasing employee productivity in the offset printing sector, especially given the high precision and quality standards required for national identity documents.

Reference [25] examined the impact of education and training on worker productivity. The research approach is descriptive-quantitative, focusing on the causal relationship between education and training as independent factors and productivity as the dependent variable. The results indicate that training has a positive and significant impact on employee productivity, highlighting the need to invest in effective training programs to improve individual skills, knowledge, and overall organizational efficiency.

Given the extensive literature linking education and training to productivity, the following hypothesis is adopted in this study:

Hypothesis 1 (H1): Education and training have significant positive impact on productivity.

2.4.2. Education, training, and process management

Education and training play a fundamental role in process management by equipping individuals with the necessary skills to increase efficiency, standardization, and continuous improvement [1]. Structured training programs facilitate the adoption of methodologies such as Lean, Six Sigma, and TQM, leading to reduced errors and increased productivity. Training also enables employees to adapt to technological advances, including automation and artificial intelligence-driven processes.

Recognizing the intrinsic link between education, training, and process management, this study adopts the following hypothesis:

Hypothesis 2 (H2): Education and training have significant positive association with process management.

2.4.3. Process management and productivity

Process management is a critical determinant of organizational effectiveness and innovation. While process management improves efficiency in stable environments, it can inhibit radical innovation and change. They argue for ambidextrous organizational structures that balance both exploitative and exploratory strategies to effectively foster innovation.

The study by [26] examines the conventional principles of BPM modeling, infrastructure alignment, and procedural agency – in the context of digital transformation. Through an ethnographic study, the researchers found that these established logics create tensions when applied to digitally transforming organizations. They propose updated logics: "light touch processes," which emphasize flexibility over rigid models; "infrastructural flexibility," which recognizes the need for adaptable technology; and "mindful agents," which emphasize the importance of human adaptability and awareness. The research highlights the different nature of digital transformation compared to IT-enabled transformation and suggests new management approaches for BPM to better address the dynamic and evolving digital landscape.

This study by [27] highlights the disconnect between research on digital innovation and process management, two fields that should be closely intertwined given the rapid pace of digital change. It argues that these fields operate with fundamentally different assumptions, which hinders effective collaboration and understanding. The authors propose a necessary synthesis of these assumptions and suggest specific updates to facilitate a unified research approach. They also argue for cross-fertilization of methodologies between the two fields. By combining insights and approaches, the paper aims to provide a stronger foundation for reassessing and advancing BPM research in the context of ongoing digital innovation. The paper, together with the included empirical studies, aims to create a more relevant and responsive approach to BPM in a digitally driven world.

Reference [28] examines the influence of BPM, which has evolved from business process reengineering and TQM, on service productivity. Using the Royal Mail as a case study, they show how a process-centric approach can improve productivity in the service sector by optimizing workflow efficiency and resource allocation.

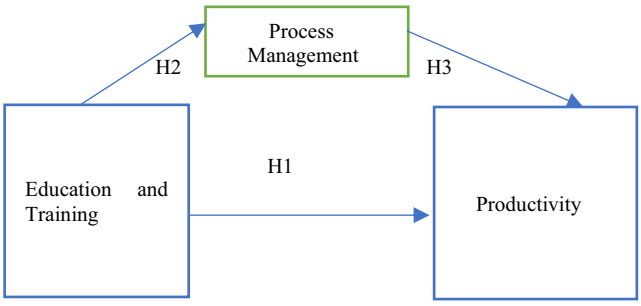
Given the established relationship between process management and productivity, the study proposes the following hypothesis:

Hypothesis 3 (H3): Process management has a significant positive impact on productivity.

2.5. Conceptual framework

A hypothesized model was constructed, as shown in Figure 1, based on the correlation between the variables used in this research and the literature review. A hypothesized model was constructed, as shown in Figure 1, based on the correlation between the variables used in this research and the literature review.

Figure 1
Hypothesized model



2.6 Hypotheses

The following hypotheses are derived from the objectives of this study, the results of the literature review, and the proposed model.

H1: Education and training have a significant positive impact on productivity.

H2: Education and training have a significant positive association with process management.

H3: Process management has a significant positive impact on productivity.

H4: Process management has a mediating effect on the relationship between education and training and productivity.

3. Methodology

TAZARA was selected for this study. Since its inception in 1975, TAZARA has operated under a 50:50 ownership

Table 1
Determine the size of the sample of a given population

N	S	N	S	N	S
10	10	220	140	1,200	291
15	14	230	144	1,300	297
20	19	240	148	1,400	302
25	24	250	152	1,500	306
30	28	260	155	1,600	310
35	32	270	159	1,700	313
40	36	280	162	1,800	317
45	40	290	165	1,900	320
50	44	300	169	2,000	322
55	48	320	175	2,200	327
60	52	340	181	2,400	331
65	56	360	186	2,600	335
70	59	380	191	2,800	338
75	63	400	196	3,000	341
80	66	420	201	3,500	346
85	70	440	205	4,000	351
90	73	460	210	4,500	354
95	76	480	214	5,000	357
100	80	500	217	6,000	361
110	86	550	226	7,000	364
120	92	600	234	8,000	367
130	97	650	242	9,000	368
140	103	700	248	10,000	370
150	108	750	254	15,000	375
160	113	800	260	20,000	377
170	118	850	265	30,000	379
180	123	900	269	40,000	380
190	127	950	274	50,000	381
200	132	1,000	278	75,000	382
210	136	1,100	285	1,000,000	384

Note: S is the sample size, and N is the size of population.

structure between Tanzania and Zambia. Out of a target population of 240, 190 management respondents completed a structured questionnaire. A total of 149 respondents completed and returned the questionnaire. The data were analyzed using a quantitative research methodology, and due to the nature of the study, computations were performed using Jamovi software. The sample size of 149 out of a total of 240 met and exceeded the minimum criteria for conducting a scientific study as recommended by [29]. For further validation of the suggested sample size according to the [29] formula, see Table 1.

Five-point Likert scales were used to assess the constructs, ranging from strongly agree (5) to strongly disagree (1). Education and training, process management, and productivity were derived from numerous studies [30–34]. Table 2 summarizes the operationalization of the measurements used in this study.

4. Results

The results of this research were analyzed using statistical methods with Jamovi software. The results are presented using descriptive statistics, figures, tables, and hypothesis testing.

4.1. Response rate

Of the 190 questionnaires distributed to the population target of 240, a total of 149 respondents completed and submitted back the questionnaire, representing 78.42%.

4.2. Rate demographic characteristics

The demographic profile of the 149 respondents who participated in the study, categorized by gender and experience, is presented in Table 3. Of the 149 respondents, 25 (16.8%) were female, and 124 (83.2%) were male.

4.3. Descriptive statistics

Table 4 shows the mean, skewness, kurtosis, and standard deviation of the three constructs.

The values of means for all constructs indicate that respondents responded favorably. Kurtoses and skewness are in the recommended range threshold of –2 of +2, showing no serious deviation from normality for the three constructs.

Table 2
The operationalization of study variables

Variable	Operationalization Statements	Literature
Process Management	- To have clear limitations and steps of processes - To aim at avoiding and reducing accidents at all levels of operations - To emphasize the quality of goods and services in relation to costs and/or schedule objectives - To have an effective performance measurement system to track the overall performance of the organization - To improve information consistency and produce the very information for different levels of need - To embrace innovative application of technology	[30, 33, 35, 32]
Education and Training	- We provide training for employees in problem-solving - We provide team building and group dynamics training for employees in the departments - Specific work-skills training (technical and vocational) is given to employees - Quality-related training is given to managers and supervisors	[34]
Productivity	- To have high employees' morale - To have high employees' commitment to the organization - To have high employees' job performance - To have low employees' absenteeism - To have an accurate and faster data flow in the company - To have continuous improvement in work design - To have a work environment that is very pleasant - Ability to deliver in full on time to customers - To have high employee productivity	[31, 36]

Table 3
Demographic profile

Description	Frequency	Percentage
Gender		
Female	25	16.8
Male	124	83.2
Total	149	100

Table 4
Mean, kurtosis, and skewness of constructs (N = 149)

	ET	PM	P
N	149	149	149
Mean	2.80	3.35	2.92
Median	3.00	3.33	2.89
Standard deviation	0.934	0.751	0.748
Minimum	1.00	1.00	1.00
Maximum	4.75	5.00	4.89
Skewness	–0.07	–0.54	–0.03
Std. error skewness	0.199	0.199	0.199
Kurtosis	–0.56	0.78	0.17
Std. error kurtosis	0.395	0.395	0.395

4.4. Validity and reliability

The Cronbach's alpha for the three construct scale was computed using reliability analysis, maintaining the required threshold of 0.6 [37, 38] to ensure reliable measurements that indicate strong internal coherence and consistency.

The instrument factorability of 16 items was measured, and it was observed that all items correlated at least 0.3 with one other item signifying good factorability. The Kaiser–Meyer–Olkin measure of sample adequacy was 0.880, exceeding the threshold of 0.6, while Bartlett's test of sphericity was significant (χ^2 (120) = 942, $p < 0.001$). Principal component analysis for the 16 items was appropriate, as shown in Table 5.

The Cronbach's alpha for the instrument was significantly above the required level of 0.6. The alpha coefficients of the instrument varied between 0.679 and 0.864. The alpha coefficient for the productivity measures was 0.864; for the training scales, it was 0.820; and for the process management scales, it was 0.679. All three Cronbach's alpha coefficients were in the acceptable range, above 0.6, as can be seen in Table 6.

4.5. Linearity

The assumption of linearity was confirmed by calculating Pearson correlation coefficients, as presented in Table 7.

The results indicate significant positive relationships between education and training, process management, and productivity. The Pearson correlation coefficient between productivity and education and training is 0.454, indicating a significant positive relationship, while the correlation between productivity and process management is 0.553, also indicating a significant positive relationship. The Pearson correlation coefficient between training and process management is 0.494, indicating a significant positive relationship.

The correlations indicate the absence of multicollinearity problems, as they remain below the acceptable level of 0.85.

Table 5
Test results of Kaiser–Meyer–Olkin and Bartlett's

Kaiser–Meyer–Olkin and Bartlett's Test		
Kaiser–Meyer–Olkin Measure of Sampling Adequacy		0.880
Bartlett's Test of Sphericity	Approx. chi-square	942
	Degrees of freedom	120
	Significance	0.000

Table 6
Test results of Cronbach's alpha

Items	Cronbach's Alpha	Number of Items	Comment
Overall	0.889	16	Accepted
Productivity	0.864	9	Accepted
Education and Training	0.820	4	Accepted
Process Management	0.679	3	Accepted

Table 7
Correlation matrix

		P		ET		PM
P	Pearson's *r*	—				
	df	—				
	p-value	—				
	Spearman's rho	—				
	df	—				
	p-value	—				
ET	Pearson's *r*	0.454	***	—		
	df	147		—		
	p-value	<0.001		—		
	Spearman's rho	0.409	***	—		
	df	147		—		
	p-value	<0.001		—		
PM	Pearson's *r*	0.553	***	0.494	***	—
	df	147		147		—
	p-value	<0.001		<0.001		—
	Spearman's rho	0.524	***	0.463	***	—
	df	147		147		—
	p-value	<0.001		<0.001		—

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.6. Fitness of the model

A regression model test was run before estimating the proposed model of this study. Regression models were tested on the following hypotheses.

H0: $\beta 1 = \beta 2 = \beta 3 \ldots \ldots \ldots$ i = 0

Ha: One regression coefficient is at least not equal to zero

Table 8 shows the robust and significant relationships between the constructs identified by the regression analysis carried out. The first model, which illustrates the expected impact of education and training on productivity, shows a satisfactory fit with remarkable values of R(0.454), R^2(0.206), and a substantial F-value of 38.2. This means that training accounts for 20.6% of the variance in productivity. The second model indicates that process management affects productivity and shows a strong fit with R (0.553), R^2 (0.306), and a substantial F-value of 64.8. This means that process management accounts for 30.6% of the variability in productivity. The final model indicating the influence of education and training on process management shows a satisfactory fit with significant values of R (0.494), R^2 (0.244), and a substantial F-value of 47.5. Training accounts for 24.4% of the variance in process management.

4.7. Testing of the hypotheses

The research tested four hypotheses about direct and mediated effects. Tables 9 and 10 present the results of the hypotheses tested.

Table 9 shows the significance and path coefficients for the model of this research. All the proposed relationships are supported.

The first hypothesis, concerning the effect of education and training on production (ET ⇒ P), is statistically significant

Table 8
Summary of regression model fit measure

				Overall Model Test		
Model		*R*	R^2	Adjusted R^2	*F*	*P*
1	ET predicting P	0.454	0.206	0.201	38.2	< 0.001
2	PM predicting P	0.553	0.306	0.301	64.8	<0.001
3	ET predicting PM	0.494	0.244	0.239	47.5	< 0.001

Note: P = Productivity, PM = Process Management, ET= Education and Training

Table 9
The mediation and model estimates

Mediation Estimates								
Effect			Label	Estimate	SE	*Z*	*p*	% Mediation
Indirect			$a \times b$	0.172	0.0390	4.42	< 0.001	47.4
Direct			*c*	0.191	0.0608	3.14	0.002	52.6
Total			$c + a \times b$	0.363	0.0584	6.22	< 0.001	100.0
Path Estimates								
			Label	Estimate	SE	Z	*p*	
ET	→	PM	*a*	0.397	0.0573	6.94	< 0.001	
PM	→	P	*b*	0.433	0.0756	5.72	< 0.001	
ET	→	P	*c*	0.191	0.0608	3.14	0.002	

Table 10
Hypotheses

No	Hypothesis	Results
1.	Education and training have a significant positive impact on productivity.	Supported
2.	Education and training have a significant positive association with process management.	Supported
3.	Process management has a significant positive impact on productivity.	Supported
4.	Process management has a mediating effect on the relationship between education and training and productivity.	Supported

(γ = 0.363, p < 0.001), thus supporting Hypothesis 1. After the mediating effect of process management, the direct effect remains statistically significant (γ = 0.191, p < 0.05).

Second, education and training have a significant positive impact on process management (γ = 0.397, p < 0.001), supporting Hypothesis 2. Third, process management has a significant positive impact on production (γ = 0.433, p < 0.001), supporting Hypothesis 3.

The indirect effect of education and training on productivity through process management (ET ⇒ PM ⇒ P) shows a positive and statistically significant (p < 0.001, γ = 0.172; ratio effect = 0.474). This indicates a partial mediation effect of process management, supporting Hypothesis 4. Overall, the model indicates that the mediator (process management) partially mediates the relationship between education and training and productivity.

4.8. Discussion

The results of the study provided robust support for the theoretical model linking education and training, process management, and productivity. The primary objective of the study was to determine whether education and training have a significant impact on production. This study corroborates and strengthens previous research that indicates that education and training have a significant positive impact on production [2, 39–41, 25, 19, 42].

The results of the study present that education and training are positively correlated with process management, which in turn significantly increases productivity. This is consistent with previous research, including [28], which found similar results.

The second and final purpose of this study was to determine whether process management mediates the relationship between "education and training" and production. The results indicate that process management partially mediates the relationship between "education and training" and production. This study is the first empirical examination of the mediating influence of process management on this relationship. Further research is needed to confirm the accuracy of these findings.

4.8.1. Theoretical implications

This study adds to the field of management science by empirically illustrating the links between training, process management, and productivity. The results provide several theoretical contributions.

The study supports human capital theory, which suggests that investment in education and training improves worker performance. The significant correlation between education and training and productivity underlines the importance of skills development in improving efficiency and output. Second, it extends the process management literature by illustrating its mediating role in the relationship between education and training and output. This study provides empirical evidence in support of process management frameworks [28], which highlight systematic methods for optimizing work processes to improve organizational performance.

The study also makes an empirical contribution to mediation research. While previous studies have examined direct relationships between training and productivity, this study is among the first to identify process management as a partial mediator. This novel finding opens up new research directions for further testing in different industry settings and economic contexts. Finally, the study is consistent with the resource-based view of the firm by emphasizing how internal capabilities (education, training, and process management) contribute to a firm's competitive advantage through improved productivity.

4.8.2. Practical managerial implications

The findings have significant implications for managers, policymakers, and business leaders who want to improve organizational performance through systematic training and process improvement.

Organizations should prioritize continuing professional development as a strategic investment. Industry-specific training programs can improve the skills of the workforce, leading to increased production and competitive advantage. In addition, process management must be seen as a fundamental part of business operations rather than a secondary concern. Organizations should adopt best practices, optimize workflows, and use automation tools to improve efficiency and productivity.

Since process management partially mediates the impact of "education and training" on productivity, managers must ensure that training programs are aligned with well-structured operational plans. This will maximize the benefits of training by consolidating acquired skills into effective processes. Policymakers should support organizations by providing incentives for continuous training and skills development. National human resource plans need to include organized training programs alongside business process optimization to improve national productivity levels.

Training programs need to be aligned with key performance indicators and organizational goals. Organizations that align training initiatives with strategic goals are more likely to see measurable productivity improvements. In addition, organizations should foster a culture that encourages continuous learning and facilitates employee contributions to process improvement. Incentive structures, recognition initiatives, and collaborative decision-making can increase employee motivation and engagement.

5. Conclusion

This study is the first to examine the relationship between "education and training," process management, and production. The research shows a partial mediating influence of process management on the relationship between education and training and productivity. This study provides robust evidence that training has a significant impact on production, with process management acting as a partial mediator. Theoretical contributions extend current management theories and suggest new research directions.

Practical implications highlight the need for organizations to adopt strategic training programs, integrated with process management initiatives, to drive productivity improvements. Policymakers should facilitate skills development and operational efficiency through targeted support mechanisms. Future research should extend the study by testing the model in different industries and geographical contexts to enhance its generalizability. In addition, longitudinal studies could provide deeper insights into how these relationships evolve over time. Through the use of training, structured processes, and data-driven decision-making, organizations can create sustainable competitive advantage in an increasingly dynamic business environment.

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Ethical Statement

This study does not contain any studies with human or animal subjects performed by the author.

Conflicts of Interest

The author declares that he has no conflicts of interest to this work.

Data Availability Statement

Data are available on request from the corresponding author upon reasonable request.

Author Contribution Statement

Tryson Yangailo: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration.

References

[1] Yangailo, T., & Mkandawire, R. (2023). Assessing the influence of education and training on important innovations through quality results: The case of railway sector. *International Journal of Knowledge Management in Tourism and Hospitality*, *3*(1), 31–49. https://doi.org/10.1504/IJKMTH.2023.127651

[2] Banureka, R., Padmalakshmi, S., Devi, G., & Boomikasri, R. (2021). Effectiveness of training and development on employees' performance and productivity. *Turkish Online Journal of Qualitative Inquiry*, *12*(4), 653–659.

[3] Hung, R. Y.-Y. (2006). Business process management as competitive advantage: A review and empirical study. *Total Quality Management & Business Excellence*, *17*(1), 21–40. https://doi.org/10.1080/14783360500249836

[4] Beverungen, D., Buijs, J. C. A. M., Becker, J., di Ciccio, C., van der Aalst, W. M. P., Bartelheimer, C., ..., & Wolf, V. (2021). Seven paradoxes of business process management in a hyperconnected world. *Business & Information Systems Engineering*, *63*(2), 145–156. https://doi.org/10.1007/s12599-020-00646-z

[5] Little, A. (1980). Is education related to productivity? *The IDS Bulletin*, *11*(2), 13–19. https://doi.org/10.1111/j.1759-5436.1980.mp11002003.x

[6] Kir, H., & Erdogan, N. (2021). A knowledge-intensive adaptive business process management framework. *Information Systems*, *95*, 101639. https://doi.org/10.1016/j.is.2020.101639

[7] Viriyasitavat, W., Xu, L. D., Bi, Z., & Sapsomboon, A. (2020). Blockchain-based business process management (BPM) framework for service composition in Industry 4.0. *Journal of Intelligent Manufacturing*, *31*(7), 1749. https://doi.org/10.1007/s10845-018-1449-0

[8] Rynk, R., Ziegenbein, J., Oshins, C., Koerting, N., Hardin, J., & Gage, J. (2022). Process management. In R. Rynk (Ed.), *The composting handbook: A how-to and why manual for farm, municipal, institutional and commercial composters* (pp. 501–548). Elsevier. https://doi.org/10.1016/B978-0-323-85602-7.00011-X

[9] Oakland, J. S., Oakland, R. J., & Turner, M. A. (2021). Process management. In J. S. Oakland, R. J. Oakland, & M. A. Turner (Eds.), *Total quality management and operational excellence: Text with cases* (5th ed., pp. 201–223). Routledge. https://doi.org/10.4324/9781315561974

[10] Uriona Maldonado, M., Leusin, M. E., Bernardes, T. C. D. A., & Vaz, C. R. (2020). Similarities and differences between business process management and lean management. *Business Process Management Journal*, *26*(7), 1807–1831. https://doi.org/10.1108/BPMJ-09-2019-0368

[11] de Ramón Fernández, A., Ruiz Fernández, D., & Sabuco García, Y. (2020). Business Process Management for optimizing clinical processes: A systematic literature review. *Health Informatics Journal*, *26*(2), 1305–1320. https://doi.org/10.1177/1460458219877092

[12] Kumar, S., & Erkol Bayram, G. (2025). The effect on education and training. In S. Grima, K. Sood, E. Ozen, & R. Dalli Gonzi (Eds.), *Greening our economy for a sustainable future* (pp. 177–185). Elsevier. https://doi.org/10.1016/B978-0-443-23603-7.00014-5

[13] Anityaningrum, U., & Kurniawan, B. D. (2020). The relationship between education and training on state civil apparatus work productivity (case study at BKPP office in Yogyakarta City 2018. In *Proceedings of Universitas Muhammadiyah Yogyakarta Graduate Conference, 1*(1), 10–21.

[14] Bawamenewi, K. P., & Telaumbanua, E. (2025). The impact of education, training, and work experience programs on the work productivity of nias police laka lantas unit personnel. *Ekombis Review: Jurnal Ilmiah Ekonomi dan Bisnis*, *13*(1), 325–338. https://doi.org/10.37676/ekombis.v13i1.6686

[15] Singh, S. K., Chen, J., del, Giudice., M, & El-Kassar, A.-N. (2019). Environmental ethics, environmental performance, and competitive advantage: Role of environmental training. *Technological Forecasting and Social Change*, *146*, 203–211. https://doi.org/10.1016/j.techfore.2019.05.032

[16] Yangailo, T. (2022). The impact of quality results and important innovation as tqm practices on organisational productivity: The case of railway sector. *Proceedings on Engineering Sciences*, *4*(3), 203–216. https://doi.org/10.24874/PES04.03.010

[17] Prasad, K. D., Jha, S. K., & Prakash, A. (2015). Quality, productivity and business performance in home based brassware manufacturing units. *International Journal of Productivity and Performance Management*, *64*(2), 270–287. https://doi.org/10.1108/IJPPM-02-2014-0029

[18] Yangailo, T., Kabela, J., & Turyatunga, H. (2023). The impact of total quality management practices on productivity in the railway sector in African context. *Proceedings on Engineering Sciences*, *5*(1), 175–188. https://doi.org/10.24874/PES05.01.015

[19] Priatna, D. K. (2020). Evaluation of education and training program for civil servants: A new approach to improving employee productivity. *Sosiohumaniora: Journal of Social Sciences and Humanities*, *22*(3), 274–280. https://doi.org/10.24198/sosiohumaniora.v22i3.28500

[20] Labarca, G. (1998). Education in basic skills and training for productive work. *International Review of Education*, *44*(5), 413–439. https://doi.org/10.1023/A:1003428928788

[21] Cheruiyot, J. K. (2022). Evaluating agricultural extension training and education as information-inputs for maize productivity in a rural set-up of North-Rift, Kenya. *Asian Journal of Research in Agriculture and Forestry*, *8*(4), 51–60. https://doi.org/10.9734/ajraf/2022/v8i430164

[22] Shuibin, G., Benjamin, T., & Naam, Y. D. (2020). An assessment on the impact of training and development on employee productivity in Ghana education service, Wa. *International Journal of information, Business and Management*, *12*(1), 42–70.

[23] Tidariyani, F. I., Satoto, E. B., & Rahayu, J. (2023). The Effect of training, education, motivation and work environment on the performance of civil servants In Tanggul District, Jember District. *International Social Sciences and Humanities*, *2*(3), 797–803. https://doi.org/10.32528/issh.v2i3.358

[24] Rustomo, R., Cahyono, A., & Rahman, E. (2024). The Influence of training and education on employee productivity in offset printing section in Perum Peruri Karawang, West Java. *Innovative: Journal of Social Science Research*, *4*(4), 5419–5429. https://doi.org/10.31004/innovative.v4i4.13110

[25] Pantih, S. (2024). The effect of education and training on employee productivity. *Golden Ratio of Data in Summary*, *4*(2), 347–354. https://doi.org/10.52970/grdis.v4i2.646

[26] Baiyere, A., Salmela, H., & Tapanainen, T. (2020). Digital transformation and the new logics of business process management. *European Journal of Information Systems*, *29*(3), 238–259. https://doi.org/10.1080/0960085X.2020.1718007

[27] Mendling, J., Pentland, B. T., & Recker, J. (2020). Building a complementary agenda for business process management and digital innovation. *European Journal of Information Systems*, *29*(3), 208–219. https://doi.org/10.1080/0960085X.2020.1755207

[28] Armistead, C., & Machin, S. (1998). Business process management: Implications for productivity in multi-stage service networks. *International Journal of Service Industry Management*, *9*(4), 323–336. https://doi.org/10.1108/09564239810228849

[29] Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610. https://doi.org/10.1177/001316447003000308

[30] Aquilani, B., Silvestri, C., Ruggieri, A., & Gatti, C. (2017). A systematic literature review on total quality management critical success factors and the identification of new avenues of research. *The TQM Journal*, *29*(1), 184–213. https://doi.org/10.1108/TQM-01-2016-0003

[31] Grayson, K., Nyamazana, M., & Funjika-Mulenga, P. (2016). *Management quality, productivity, and profitability in Zambia (F-41303-ZMB-1)*. *International Growth Centre*. Retrieved from. https://www.theigc.org/sites/default/files/2016/11/Grayson-et-al-2016-working-paper.pdf

[32] Prajogo, D. I., & Sohal, A. S. (2006). The relationship between organization strategy, total quality management (TQM), and

organization performance—The mediating role of TQM. *European Journal of Operational Research*, *168*(1), 35–50. https://doi.org/10.1016/j.ejor.2004.03.033

[33] Bayraktar, E., Tatoglu, E., & Zaim, S. (2008). An instrument for measuring the critical factors of TQM in Turkish higher education. *Total Quality Management & Business Excellence*, *19*(6), 551–574. https://doi.org/10.1080/14783360802023921

[34] Lai Wai, L. S. M. D., Keshwar Seebaluck, A., & Teeroovengadum, V. (2011). Impact of information technology on quality management dimensions and its implications. *European Business Review*, *23*(6), 592–608. https://doi.org/10.1108/09555341111175426

[35] Coşkun, S. (2011). Strategic management and total quality management: similarities, differences and implications for public administration. *Amme Idaresi Dergisi*, *44*(2), 43–69.

[36] Kontoghiorghes, C., & Gudgel, R. (2004). Investigating the association between productivity and quality performance in two manufacturing settings. *Quality Management Journal*, *11*(2), 8–20. https://doi.org/10.1080/10686967.2004.11919107

[37] Gallais, B., Gagnon, C., Forgues, G., Côté, I., & Laberge, L. (2017). Further evidence for the reliability and validity of the fatigue and daytime sleepiness scale. *Journal of the Neurological Sciences*, *375*, 23–26. https://doi.org/10.1016/j.jns.2017.01.032

[38] Straub, D., Boudreau, M.-C., & Gefen, D. (2004). Validation guidelines for is positivist research. *Communications of the Association for Information Systems*, *13*, 380–427. https://doi.org/10.17705/1CAIS.01324

[39] Bastian, B., Syekh, S., & Zahari, M. (2024). The influence of training and discipline on employee performance is governed by work competence at the job training center and productivity jambi province. *Dinasti International Journal of Education Management And Social Science*, *6*(2), 948–961. https://doi.org/10.38035/dijemss.v6i2.3351

[40] Muafueshiangha, I. M. (2024). The role of financial education and training in agricultural development in Ngoketunjia. *International Journal of Business Management and Economic Review*, *7*(03), 39–46. https://doi.org/10.35409/IJBMER.2024.3578

[41] Mulyani, S. (2020). Influence of education and training on motivation and productivity of civil servant lecturers. In *Proceedings of the International Conference on Science and Education and Technology*, *443*, 461–465. https://doi.org/10.2991/assehr.k.200620.090

[42] Yunida, H., Riyadi, & Sarifah, I. (2023). Meta analysis of the influence of training on work productivity. *East Asian Journal of Multidisciplinary Research*, *2*(6), 2605–2618. https://doi.org/10.55927/eajmr.v2i6.4464

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