

PROCESS AND QUALITY MANAGEMENT PRACTICES AS DRIVERS OF ORGANIZATIONAL PRODUCTIVITY: A QUANTITATIVE MODELING STUDY

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ABSTRACT

This study examines the relationships between top leadership commitment, transformational leadership, process management, education/training and organisational productivity. Using a quantitative approach, data were collected from 162 management level respondents in the Tanzania Zambia Railway Authority (TAZARA) and analysed using Jamovi software. The results show that top leadership commitment has a significant positive effect on productivity, both directly and indirectly. Transformational leadership and education/training, while positively correlated with productivity, do not have significant direct effects. However, process management significantly increases productivity and partially mediates the relationship between leadership commitment and productivity. These findings underscore the critical role of leadership commitment and process optimisation in driving organisational performance, while highlighting the nuanced effects of training and transformational leadership. The study contributes to leadership and management theory by integrating these factors into a single framework, and offers practical insights for organisations seeking to improve productivity through strategic leadership and process management.

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1. INTRODUCTION

In today's dynamic organisational environment, leadership, process management, training and productivity are integral components that influence the overall performance and competitiveness of organisations. Transformational leadership, a model that emphasises innovation, motivation and the development of individual potential, has been recognised as a key driver of organisational success. Scholars argue that transformational leadership outperforms pragmatic leadership in fostering creativity and empowering individuals, thereby improving performance in various areas (Korejan & Shahbazi, 2016). By encouraging

subordinates to reach their full potential, transformational leaders create an environment where continuous improvement and innovation thrive, which has a direct impact on productivity and overall business outcomes.

Similarly, process management plays a critical role in achieving organisational goals by ensuring that business processes are interconnected and optimised for efficiency. The holistic approach of process management eliminates fragmented improvements and emphasises the alignment of people, technology, strategy and operations to achieve optimal results (Hung, 2006). Effective business process management is essential to maintaining a competitive advantage because it promotes

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consistency, quality and improved productivity through the systematic management of business processes. Education and training further enhances organisational performance by improving the knowledge and skills of employees. Research shows that continuous education and training reduces operational errors and improves the ability of organisations to adapt to changing market demands, thereby increasing their competitiveness (Godfrey 1977; Menon 2010; Hamburg, 2014). Developing a skilled workforce not only contributes to improved performance, but also supports organisational differentiation in an increasingly competitive global marketplace (Porter, 2008).

Leadership commitment, particularly from top management, is another important factor influencing organisational productivity. The extent to which top management supports quality management initiatives, allocates resources and drives the implementation of improvement strategies has a direct impact on organisational success (Saraph et al., 1989). Studies show that organisations with strong top management commitment achieve higher product quality and improved overall performance (Ahire & Ravichandran, 2001). However, the relationship between leadership and productivity remains complex, with factors such as employee commitment, strategic direction and organisational culture mediating the effects of leadership on performance.

The relationship between transformational leadership and productivity has been studied extensively across a range of industries, with research suggesting a positive relationship in sectors such as healthcare, education and logistics. While leadership behaviours such as enabling others to act and fostering motivation are central to improving employee performance, the direct impact of leadership on productivity is not always clear (Masi & Cooke, 2000; Vatankhah et al., 2017). The ability of transformational leadership to improve organisational outcomes is often mediated by employee motivation, trust and the overall work environment.

In addition, the impact of education, training and process management on productivity is well documented, with studies highlighting the need for targeted training programmes and efficient process management strategies. However, the effectiveness of these factors is context dependent and requires careful alignment with organisational goals and employee needs (De Grip & Sauermann, 2013; Benner & Tushman, 2003). The integration of transformational leadership, top management commitment, continuous training and efficient process management is essential for organisations seeking to increase productivity and achieve sustainable success in the modern business landscape.

This study aims to deepen the understanding of the relationships between top management commitment, transformational leadership, process management, education/training and productivity by examining both their direct and indirect effects. Given the lack of previous empirical research that integrates these factors

within a single framework, this study seeks to fill this gap by examining their interactions and overall impact on organisational performance. Specifically, it examines the influence of top management commitment on productivity, taking into account the mediating roles of transformational leadership, process management, and education and training. To the best of our knowledge, this is the first empirical study to comprehensively examine these relationships.

2. LITERATURE REVIEW

2.1 Transformational leadership

A transformational leader is innovative, creative and motivational, guiding individuals to perform at their best within the organisation while encouraging creativity and innovation in their respective fields. Transformational leaders enable their subordinates to realise their potential. Theorists and scholars argue that transformational leadership is significantly more effective than pragmatic leadership (Korejan & Shahbazi, 2016).

2.2 Process Management

Process management takes a holistic approach and seeks to eliminate fragmented improvements in specific parts of a business process, which often produce sub-optimal results. It examines the interdependence of people, processes, technology and strategy in achieving business objectives (Hung, 2006). Business process management is one of the most effective management methods for organisations to maintain a competitive advantage. Process management, defined as a sequence of steps that transform inputs into outputs, is the traditional definition of a process. As one process output can serve as an input for another, organisations need to improve the process to increase quality.

2.3 Education and Training

In addition, education and training make it easier for managers to establish a unified quality lexicon across the organisation and promote behavioural change and commitment to quality improvement (Mosadeghrad, 2014). Improving the knowledge and skills of employees through education and training reduces operational errors and increases the competitiveness of the organisation (Hamburg, 2014). Porter (2008) states that an organisation's ability to differentiate itself from its competitors is significantly influenced by the training, experience and talents of its employees. The training process must be continuous to maintain competitiveness (Singh et al., 2019).

2.4 Productivity

Productivity is commonly defined as a measure of the efficiency with which goods and services are produced. It reflects the success of an organisation in terms of efficiency, performance and effectiveness. More specifically, productivity is the ratio of the output produced to the inputs required for production (Yangailo,

2022). However, productivity is a multifaceted concept and its interpretation may vary depending on the context in which it is applied (Prasad et al., 2015). Ultimately, it serves as a key indicator of how efficiently goods or services are produced (Yangailo et al., 2023).

2.5 Top management Leadership Commitment

Top management commitment refers to the extent to which top management establishes quality management objectives and strategies, allocates essential resources, participates in quality improvement initiatives, and evaluates the implementation and effectiveness of quality management (Saraph et al., 1989). Ahire and O'Shaughnessy (1998) assert that first, firms with strong top management commitment produce high quality products regardless of individual differences, and second, in firms with weak top management commitment, four additional constructs - customer focus, supplier quality management, empowerment, and use of internal quality information - serve as the main predictors of product quality. Top management commitment is typically a prerequisite for the adoption and practice of total quality management to improve organisational performance (Ahire & Ravichandran, 2001). Adopting QM and improving performance is not possible without strong support from senior management (Flynn et al., 1995).

2.6 Empirical Review

The studies reviewed highlight the complex relationship between leadership engagement and productivity across industries. Mitchell (2015) found that while transformational leadership behaviours were present in an investment services firm, their overall impact on productivity was mixed, with 'enabling others to act' significantly increasing job satisfaction. Ahmad et al. (2023) concluded that while leadership did not significantly affect productivity in a government agency, employee engagement played a dominant role. Lozada (2024) emphasised the role of trust, work-life balance and organisational culture in shaping engagement and productivity in the public sector. Meanwhile, Nasomboon (2024)'s study in the petrochemical industry showed that leadership commitment directly affects both organisational performance and employee commitment, with mediating factors such as employer branding, strategic alignment and human resource practices refining these relationships.

In all of these studies, leadership commitment appears to increase productivity indirectly through employee engagement and strategic alignment. However, the direct impact of leadership on productivity remains inconclusive, highlighting the need for leadership strategies that foster engagement and trust.

The studies reviewed highlight the critical role of transformational leadership in improving productivity in a variety of settings, including the military, health care, logistics, education and business. Masi and Cooke (2000) highlight the complexity of leadership effectiveness in a military setting and show that leadership styles influence productivity, albeit inconsistently. Vatankhah et al.

(2017) find a strong positive relationship between transformational leadership and employee productivity in the healthcare sector, advocating for leadership training programmes. Similarly, Sayan and Sürücü (2024) show that transformational leadership improves logistics performance, with employee productivity moderating this effect. Narulita et al. (2019) and Strukan et al. (2017) further emphasise the role of leadership in improving teacher and business performance, respectively, highlighting the need for leadership development strategies. In all of these studies, employee motivation emerges as a key factor influencing the effectiveness of transformational leadership.

The reviewed studies highlight the central role of transformational leadership in shaping organisational commitment in various sectors, including business, education and healthcare. Yucel et al. (2014) found a non-linear relationship between transformational leadership and top executive commitment, highlighting the mediating role of affective commitment. Korek et al. (2010) showed that strong transformational leadership combined with employee consensus fosters both affective and normative commitment, with meaningful work and organisational climate serving as mediators. Eliyana and Ma'arif (2019) found that although transformational leadership increases job satisfaction and commitment, it has a limited direct impact on job performance. Similarly, Alzoraiki et al. (2023) confirmed that teacher commitment mediates the relationship between transformational leadership and sustained teaching performance in educational settings.

Other studies, including Lo et al. (2010) and Selamat et al. (2013), show that transformational leadership enhances organisational commitment by promoting adaptability and motivation. However, Mesu et al. (2015) found that this effect varied by industry, being significant in service-based SMEs, but requiring a directive leadership component in manufacturing SMEs. These findings highlight the complexity of leadership dynamics and the need to consider contextual factors when analysing leadership effectiveness.

Education and training are widely recognised as key drivers of productivity, yet research presents a nuanced understanding of their actual impact. While De Grip and Sauermann (2013) confirm that training generally benefits workers and employers, they also highlight an unexplored gap in understanding how these benefits translate into productivity gains. Conversely, Little (1980) challenges the conventional belief that higher education directly increases productivity and emphasises the need for qualitative rather than quantitative assessments of education. Other studies, such as Priatna (2020) and Colombo and Stanca (2014), show that well-structured training programmes significantly increase productivity, with the frequency of delivery and duration of training playing a crucial role. Labarca (1998) and El-Obeidy (2016) emphasise the importance of basic education and its alignment with labour market needs, especially in developing countries. In addition, studies by Treľová and Olšovský (2016) and Shuibin et al. (2020)

highlight the role of training policies and employee satisfaction in shaping productivity outcomes. Taken together, these findings suggest that while education and training are essential, their impact depends on contextual factors such as policy clarity, workforce readiness and strategic implementation.

Taken together, the studies reviewed highlight the complex relationship between process management and productivity. Benner and Tushman (2003) argue that the effectiveness of process management in promoting innovation and organisational adaptation depends on the stability of the environment. While it promotes efficiency in stable contexts, it may hinder radical innovation in dynamic environments. Their later study Benner and Tushman (2015) revisits these findings, acknowledging the changes in the innovation landscape due to technological advances and calling for a re-examination of innovation processes. Armistead and Machin (1998) provide a practical perspective, discussing business process management (BPM) as an evolution of business process reengineering (BPR) and total quality management (TQM), and demonstrating its impact on service productivity through a case study of the Royal Mail. Taken together, these studies suggest that while process management can improve productivity, its wider impact on innovation and adaptability must be carefully considered.

2.7 Conceptual Framework

Based on the association between the variables used in this study and the literature review, a hypothesised model was formulated as shown in Figure 1.

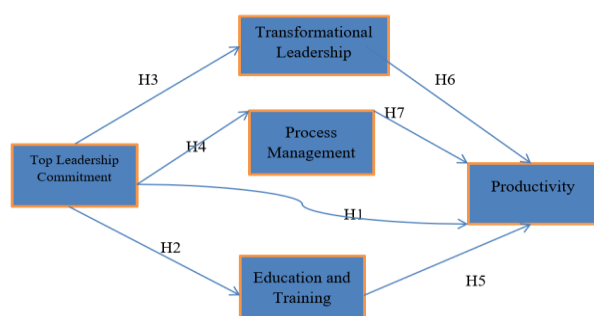


Figure 1. Hypothesised Model

The following are the hypotheses developed based on the previous studies and the hypothesised model of this study:

- Hypothesis 1: Top leadership commitment has a positive significant effect on productivity
- Hypothesis 2: Top leadership commitment has a positive significant relationship with education and training
- Hypothesis 3: Top leadership commitment has a positive significant relationship with transformational leadership
- Hypothesis 4: Top leadership commitment has a positive significant relationship with process management

- Hypothesis 5: Education and training has a positive significant effect on productivity
- Hypothesis 6: Transformational leadership has a positive significant effect on productivity
- Hypothesis 7: Process management has a positive significant effect on productivity
- Hypothesis 8: Transformational leadership has a mediating effect on the relationship between top leadership commitment and productivity
- Hypothesis 9: Process management has a mediating effect on the relationship between top leadership commitment and productivity
- Hypothesis 10: Education and training has a mediating effect on the relationship between top leadership commitment and productivity

3. METHODOLOGY

The Tanzania Zambia Railway Authority (TAZARA) was selected for this study. Since its establishment in 1975, TAZARA has operated under the 50:50 ownership of Tanzania and Zambia. Out of a target population of 240, 200 management respondents were given a structured questionnaire. The questionnaire was completed and returned by 162 respondents. The data was analysed using a quantitative research approach and as this study involved modelling, calculations were performed using Jamovi software.

Table 1. Determine Size of the sample of a given Population using Krejcie and Morgan (1970) formula

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Five-point Likert scales were adopted and used to assess the constructs, with strongly agree (5) and strongly disagree (1). Transformational leadership, top leadership commitment, process management, education and training and productivity measures were adopted from quite a number of studies (Coşkun, 2011; Aquilani et al., 2017; Ang et al., 2000; Grayson et al., 2016; Prajogo & Sohal, 2006; Porter & Parker, 1993; Bayraktar et al., 2008; Siu Mane David Lai Wai et al., 2011).

The sample size of 162 out of 240 people met and exceeded the minimum required to conduct a scientific study as recommended by Krejcie and Morgan (1970). For further confirmation of the recommended sample size based on the Krejcie and Morgan (1970) formula, see Table 1:

4. DATA PRESENTATION AND ANALYSIS

The analysis of the results of this study was based on statistical methods using Jamovi software. The results are presented in the form of descriptive statistics, figures, tables and hypothesis tests.

4.1 The Response Rate

Of the 200 questionnaires distributed to the target population of 240, a total of 162 respondents completed and returned the questionnaire, representing a response rate of 81%.

4.2 Demographic Characteristics

Demographic profile of 162 respondents that participated in the study based on their gender are shown on Table 2. Of the 162 respondents, 27 (16.7%) were female and 135 (83.3%) were male.

Table 2. Demographic Profile

Description	Frequency	Percentage
Gender		
Male	135	83.3
Female	27	16.7
Total	162	100

4.3 Descriptive Statistics

The five constructs' mean, skewness, kurtosis and standard deviation, are presented on Table 3.

Table 3. Mean, Kurtosis & Skewness of Constructs (N = 162)

	P	TL	TMCL	ET	PM
N	162	162	162	162	162
Mean	2.88	3.10	3.25	2.78	3.34
Median	2.89	3.00	3.20	2.88	3.33
Standard deviation	0.754	0.848	0.764	0.941	0.748
Minimum	1.00	1.00	1.00	1.00	1.00
Maximum	4.89	5.00	5.00	4.75	5.00
Skewness	-0.0105	0.0213	-0.247	-0.0615	-0.579
Std. error skewness	0.191	0.191	0.191	0.191	0.191
Kurtosis	0.0776	-0.0769	0.102	-0.632	0.848
Std. error kurtosis	0.379	0.379	0.379	0.379	0.379

The mean values for all five constructs indicate that respondents responded positively. Both kurtosis and skewness are within the recommended range of -2 to +2, indicating no serious deviation from normality for the four constructs.

4.4 Validity and Reliability

The instrument factorability of 27 items was measured and it was found that all items correlated at least 0.3 with another item, indicating good factorability. The measure of sampling adequacy (Kaiser Meyer Olkin) was 0.887 above the value of 0.6, while Bartlett's test of sphericity was significant (χ^2 (351) = 2120, $p < .001$). Principal components analysis was appropriate for the 27 items, as shown in Table 4.

Table 4. Test results of Kaiser-Meyer-Olkin and Bartlett's

Kaiser-Meyer-Olkin and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.887
Bartlett's Test of Sphericity	Approx. Chi-Square	2120
	Degrees of freedom	351
	Significance	.000

A minimum of 150 cases is usually required to conduct principal component analysis (Fan et al., 2008), therefore our sample size of 162 was sufficient to conduct component analysis. Cronbach alpha for the five construct scale was calculated by conducting reliability analysis with the required threshold of (0.6) point six (Gallais et al., 2017; Straub et al., 2004; Taherdoost, 2016) to obtain reliable measures to determine good internal fit and consistency of the measures. The alpha coefficients of the instrument ranged between 0.685 and 0.869. The alpha coefficient for the transformational leadership scale was 0.837, the alpha coefficient for the leadership commitment scale was 0.756, the alpha coefficient for the education and training scale was 0.832, the alpha coefficient for the process management scale was 0.685, and the alpha coefficient for the productivity scale was 0.869. All five Cronbach alpha coefficients were within the required acceptable range of over 0.6, as shown in Table 5.

Table 5. Test Results of Cronbach Alpha

Items	Cronbach's Alpha	Number of Items	Comment
Overall	.927	27	Accepted
Transformational Leadership	.837	6	Accepted
Top Leadership Commitment	.756	5	Accepted
Education and Training	.832	4	Accepted
Process Management	.685	3	Accepted
Productivity	.869	9	Accepted

The linearity assumption was verified by the computation of Pearson correlation coefficients as presented in Table 6.

Table 6. Correlation Matrix

		P	TL	TMCL	ET	PM
P	Pearson's r	—				
	df	—				
	p-value	—				
	Spearman's rho	—				
	df	—				
TL	p-value	—				
	Pearson's r	0.540	***	—		
	df	160	—			
	p-value	< .001	—			
	Spearman's rho	0.473	***	—		
TMCL	df	160	—			
	p-value	< .001	—			
	Pearson's r	0.568	***	0.714	***	—
	df	160	—	160	—	
	p-value	< .001	< .001	< .001	—	
ET	Spearman's rho	0.508	***	0.685	***	—
	df	160	—	160	—	
	p-value	< .001	< .001	< .001	—	
	Pearson's r	0.444	***	0.485	***	0.468
	df	160	—	160	—	160
PM	p-value	< .001	< .001	< .001	< .001	—
	Spearman's rho	0.410	***	0.440	***	0.433
	df	160	—	160	—	160
	p-value	< .001	< .001	< .001	< .001	—
	Pearson's r	0.546	***	0.492	***	0.508
Overall	df	160	—	160	—	160
	p-value	< .001	< .001	< .001	< .001	—
	Spearman's rho	0.522	***	0.502	***	0.466
	df	160	—	160	—	160
	p-value	< .001	< .001	< .001	< .001	—

Note. * p < .05, ** p < .01, *** p < .001

The results show significant positive correlations between top leadership commitment, transformational leadership, process management, education and training and productivity. Productivity and transformational leadership have a positive significant Pearson coefficient of 0.540, productivity and top leadership commitment have a positive significant Pearson coefficient of 0.568, productivity and education and training have a positive significant Pearson coefficient of 0.444, and productivity and process management have a positive significant Pearson coefficient of 0.546. Transformational leadership and top leadership commitment have a positive significant Pearson coefficient of 0.714, transformational leadership and education and training have a positive significant Pearson coefficient of 0.485, and transformational leadership and process management have a positive significant Pearson coefficient of 0.492. Top leadership commitment and education and training have a positive significant Pearson coefficient of 0.468, and top leadership commitment and process management have a positive significant Pearson coefficient of 0.508. Education and training, and process management have a positive significant Pearson coefficient of 0.497. The correlations show that there are no multicollinearity problems as the correlations are below the required acceptable cut-off of 0.85 (Hair et al., 2010).

4.5 Fitness of the Model

A regression model test was run before estimating proposed model of this study.

Overall Regression Model Test: Regression models were tested on the following hypotheses.

$$H_0: \beta_1 = \beta_2 = \beta_3 = \dots = \beta_i = 0$$

H_a : One regression coefficients is at least not equal to zero

Table 7 shows that there were strong significant relationships between the constructs based on the

regression analyses conducted. The first model, which shows the proposed effect of top leadership commitment on productivity, has a good fit with significant values of $R(0.568)$, $R^2(0.323)$ and a significant F-value of 76.3. This indicates that top leadership commitment explains 32.3% of the variation in productivity. The second model that suggests the impact of transformational leadership on productivity shows good fit significant values of $R(0.540)$, $R^2(0.292)$ and significant F-value of 66.0. This indicates that transformational leadership explains 29.2% of the variation in productivity. The third model that suggests the impact of education and training on productivity, shows good fit significant values of $R(0.444)$, $R^2(0.197)$ and significant F-value of 39.3. This shows that education and training explains 19.7% of the variation in productivity. The fourth model that suggests the impact of process management on productivity shows good fit significant values of $R(0.546)$, $R^2(0.298)$ and significant F-value of 68.0. This indicates that process management explains 29.8% of the variation in productivity. The Fifth model that proposed the effect of top leadership commitment on transformational leadership shows good fit significant values of $R(0.514)$, $R^2(0.510)$ and a significant F-value of 167. This indicates that top leadership commitment explains 51.0% of the variation in transformational leadership. The sixth model which proposed the effect of top leadership commitment on training and development shows good fit significant values of $R(0.468)$, $R^2(0.219)$ and significant F-value of 44.9. This indicates that top leadership commitment explains 21.9% of the variation in education and training. The seventh model, which proposes the effect of top leadership commitment on process management, shows good fit significant values of $R(0.508)$, $R^2(0.258)$ and a significant F-value of 55.6. This indicates that top leadership commitment explains 25.8% of the variation in process management.

Table 7. Summary of Regression Model Fit Measure

Model	R	R ²	Adjusted R ²	Overall Model Test	
				F	P
1 TLC predicting P	0.568	0.323	0.319	76.3	< .001
2 TL predicting P	0.540	0.292	0.288	66.0	< .001
3 ET predicting P	0.444	0.197	0.192	39.3	< .001
4 PM predicting P	0.546	0.298	0.294	68.0	< .001
5 TLC predicting TL	0.714	0.510	0.507	167	< .001
6 TLC predicting ET	0.468	0.219	0.214	44.9	< .001
7 TLC predicting PM	0.508	0.258	0.253	55.6	< .001

PM= Process Management

TLC = Top Leadership Commitment

TL= Transformational Leadership

P= Productivity

ET=Education and Training

4.6 Testing of the Hypotheses

The study tested seven hypotheses with respect to direct and mediation effects. Tables 8 and 9 show results of the hypotheses tested.

Table 8. Indirect and Total Effects

Type	Effect	Estimate	SE	95% C.I. (a)		β	z	p
				Lower	Upper			
Indirect	TLC $\Rightarrow$ TL $\Rightarrow$ P	0.1190	0.0626	-0.00369	0.242	0.1206	1.90	0.057
	TLC $\Rightarrow$ PM $\Rightarrow$ P	0.1413	0.0414	0.06014	0.222	0.1432	3.41	< .001
	TLC $\Rightarrow$ ET $\Rightarrow$ P	0.0470	0.0341	-0.01979	0.114	0.0476	1.38	0.168
Component	TLC $\Rightarrow$ TL	0.7936	0.0611	0.67386	0.913	0.7144	12.99	< .001
	TL $\Rightarrow$ P	0.1499	0.0780	-0.00299	0.303	0.1688	1.92	0.055
	TLC $\Rightarrow$ PM	0.4975	0.0663	0.36754	0.627	0.5078	7.50	< .001
	PM $\Rightarrow$ P	0.2840	0.0741	0.13874	0.429	0.2820	3.83	< .001
	TLC $\Rightarrow$ ET	0.5769	0.0856	0.40916	0.745	0.4680	6.74	< .001
	ET $\Rightarrow$ P	0.0815	0.0578	-0.03185	0.195	0.1018	1.41	0.159
	Direct TLC $\Rightarrow$ P	0.2534	0.0867	0.08339	0.423	0.2568	2.92	0.003
Total	TLC $\Rightarrow$ P	0.5606	0.0640	0.43522	0.686	0.5682	8.76	< .001

Note. Confidence intervals computed with method: Standard (Delta method)
 Note. Betas are completely standardized effect sizes

The first hypothesis (H1), which examines the effect of top leadership commitment on productivity (TLC $\Rightarrow$ P), is statistically significant ($\gamma = 0.5606$, $p < 0.001$), indicating support for H1. After accounting for the mediating effects of transformational leadership, process management, and education and training, the direct effect remains statistically significant ($\gamma = 0.2534$, $p < 0.05$). Second, top leadership commitment has a significant positive relationship with education and training ($\gamma = 0.5769$, $p < 0.001$), supporting H2. Third, top leadership commitment is positively and significantly associated with transformational leadership ($\gamma = 0.7936$, $p < 0.001$), confirming H3. Fourth, top leadership commitment also has a significant positive relationship with process management ($\gamma = 0.4975$, $p < 0.001$), supporting H4. Conversely, education and training has no significant effect on productivity ($\gamma = 0.0815$, $p = 0.159$), indicating that H5 is not supported. Similarly, transformational leadership has no significant effect on productivity ($\gamma = 0.1499$, $p = 0.055$), rejecting H6. However, process management has a significant positive effect on productivity ($\gamma = 0.2840$, $p < 0.001$), supporting H7.

Table 9. Hypotheses

No	Hypothesis	Results
1.	Hypothesis 1: Top leadership commitment has a positive significant effect on productivity	Supported
2.	Hypothesis 2: Top leadership commitment has a positive significant relationship with education and training	Supported
3.	Hypothesis 3: Top leadership commitment has a positive significant relationship with transformational leadership	Supported
4.	Hypothesis 4: Top leadership commitment has a positive significant relationship with process management	Supported
5.	Hypothesis 5: Education and training has a positive significant effect on productivity	Not Supported
6.	Hypothesis 6: Transformational leadership has a positive significant effect on productivity	Not Supported
7.	Hypothesis 7: Process management has a positive significant effect on productivity	Supported
8.	Hypothesis 8: Transformational leadership has a mediating effect on the relationship between top leadership commitment and productivity	Not Supported
9.	Hypothesis 9: Process management has a mediating effect on the relationship between top leadership commitment and productivity	Supported
10.	Hypothesis 10: Education and training has a mediating effect on the relationship between top leadership commitment and productivity	Not Supported

The indirect effect of top leadership commitment on productivity through transformational leadership (TLC $\Rightarrow$ TL $\Rightarrow$ P) is not statistically significant ($\gamma = 0.1190$, $p = 0.057$). This suggests that transformational leadership does not mediate the relationship and therefore H8 is not supported.

In contrast, the indirect effect of top leadership commitment on productivity through process management (TLC $\Rightarrow$ PM $\Rightarrow$ P) is statistically significant and positive ($\gamma = 0.1413$, $p < 0.001$; 95% CI: [0.06014, 0.222]; ratio effect = 0.2521). This indicates a partial mediation effect of process management, supporting H9. The indirect effect of top leadership commitment on productivity via education and training (TLC $\Rightarrow$ ET $\Rightarrow$ P) is statistically insignificant ($\gamma = 0.0470$, $p = 0.186$), indicating no mediation effect. Therefore, H10 is not supported.

Overall, the results suggest that of the three proposed mediators, only process management partially mediates the relationship between top leadership commitment and productivity.

5. DISCUSSION

This study presents compelling findings on the relationship between top leadership commitment and productivity. The primary objective was to determine whether top leadership commitment has a positive and significant effect on productivity. The results confirm that top leadership commitment has a positive and significant effect on productivity, both in its total and direct effects, regardless of the mediating effects of the three variables examined. These findings contrast with studies such as Ahmad et al. (2023), which did not establish a positive relationship between leadership commitment and productivity, but are consistent with previous studies such as Strukan et al. (2017), which reported similar results.

Furthermore, the study finds that top leadership commitment has a significant positive relationship with education and training, transformational leadership and process management. However, it finds that education and training, although positively related to productivity, does not have a statistically significant impact. This finding is consistent with previous studies such as Little (1980), but contradicts the findings of Priatna (2020) and Colombo and Stanca (2014), who reported a significant effect.

Furthermore, the study does not find a significant positive effect of transformational leadership on productivity, which is inconsistent with previous research such as Vatankhah et al. (2017). In contrast, process management is found to have a significant positive impact on productivity, which supports previous findings by Armistead and Machin (1998).

The study also empirically examines whether process management, education and training, and transformational leadership mediate the relationship

between top leadership commitment and productivity. The results show that only process management partially mediates this relationship. This contribution is particularly significant as it is the first empirical test of this specific mediation effect, providing direct evidence that process management plays a partial mediating role between top leadership commitment and productivity.

5.1 Theoretical Implications

The findings of this study contribute to the theoretical discourse on leadership, process management, education and training and their impact on productivity. Specifically, the study extends existing leadership theories by demonstrating that top leadership commitment plays a pivotal role in influencing transformational leadership, process management, and education and training, which in turn enhance productivity.

First, the study supports transformational leadership theory, which posits that effective leadership fosters a culture of innovation, motivation and employee engagement. The results confirm that top management commitment has a significant impact on transformational leadership, reinforcing the argument that transformational leaders emerge when top management is committed to an organisation's vision and operational goals.

Second, the study is consistent with resource-based theory, which suggests that firms achieve competitive advantage through the use of internal resources such as leadership, training and management processes. The findings underline the need to invest in education and training to develop a skilled workforce, as leadership commitment enhances knowledge transfer and skills development, although education and training alone did not show a significant direct effect on productivity.

Third, the significant impact of process management on productivity supports the Total Quality Management (TQM) framework, which emphasises structured and continuous process improvement to achieve operational excellence. The study confirms that effective process management, supported by leadership, has a positive impact on productivity.

Finally, the study contributes to the broader theory of human capital, which argues that investment in education and training of the workforce yields economic benefits. While the direct effect of education and training on productivity was not statistically significant, its indirect effect through leadership and process management suggests a more nuanced relationship that should be further explored in future studies.

5.2 Practical Implications

The practical implications of this research are critical for policy makers, business leaders and human resource practitioners seeking to improve productivity within organisations.

Strengthen leadership commitment: Given that top leadership commitment has a significant impact on transformational leadership and productivity,

organisations should prioritise leadership development programmes. Executives and senior managers should be actively involved in setting strategic goals, fostering a culture of accountability, and ensuring that transformational leadership practices are embedded at all levels of management.

Improve transformational leadership: Organisations should invest in leadership training programmes that cultivate transformational leadership skills. Encouraging leaders to inspire, motivate and mentor employees can foster a more innovative and productive work environment.

Optimise process management: The strong correlation between process management and productivity suggests that organisations should streamline business processes using continuous improvement models such as Lean Six Sigma. This can help reduce inefficiencies and improve operational effectiveness.

Strategic investment in education and training: While education and training alone have no direct impact on productivity, their indirect effects highlight the importance of an integrated approach. Companies should ensure that training programmes are aligned with strategic management objectives and process management improvements. Structured training programmes should focus on developing skills that are directly applicable to job functions.

Policy considerations for workforce development: Policymakers should design workforce development policies that emphasise the alignment of leadership practices with training and process improvement. Public-private partnerships in leadership training and process improvement initiatives could lead to improved economic outcomes and workforce productivity.

6. CONCLUSION

This study provides a comprehensive examination of the relationships between top leadership commitment, transformational leadership, process management, education/training and organisational productivity. The findings highlight the central role of top leadership commitment in driving productivity, both directly and through its influence on transformational leadership, process management and education/training. While transformational leadership and education/training were found to be positively correlated with productivity, their direct effects were not statistically significant. In contrast, process management emerged as a critical factor, significantly increasing productivity and partially mediating the relationship between leadership commitment and productivity.

The theoretical contributions of the study include extending transformational leadership theory, resource-based theory and total quality management frameworks by demonstrating how leadership commitment and process management interact to improve organisational outcomes. Practically, the findings emphasise the importance of strengthening leadership commitment,

optimising process management and aligning training programmes with organisational goals. Organisations should invest in leadership development, streamline processes and adopt data-driven decision making to improve productivity.

This was a case study of TAZARA. This limits the generalisation of the study results to other industrial sectors. It is strongly recommended that the study be replicated in other railway companies and other industries. It is also recommended that future research

studies include other variables as moderators and/or mediators.

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