Research article

The effect of top managers’ human capital on SME productivity: the mediating role of innovation

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ARTICLE INFO

Keywords:
Top managers’ human capital
SME productivity
Tanzania
Mediating role of innovation

ABSTRACT

Using a sample of 309 Small and Medium-sized Enterprises (SMEs) from Tanzania and applying partial least square structural equation modeling, the study analyses the different effects of managers' general and specific human capital on SME innovation and productivity. The results demonstrate that top managers with higher education qualification place greater importance on non-technological innovation in comparison with their less educated peers. They further show that managers with more years of experience in the sector place higher importance on technological innovation than their less experienced counterparts. In addition, the results show that SMEs with managers who have higher education qualification achieve higher productivity than their less educated peers, with marketing innovation partially complementarily mediating this relationship. The effect of top managers' experience in the sector on SME productivity is shown to be insignificant. This paper uncovers the mediating role of marketing innovation on the relationship between top managers’ human capital and SME productivity in Tanzania. Previous research did not consider the role of innovation as a means to translate top manager's human capital into firm productivity. These results help to provide some practical suggestions for managers, entrepreneurs and policy makers. This is a cross-sectional study which might not have captured all the effects of top managers' human capital fully.

1. Introduction

Human capital of an enterprise refers to the knowledge, skills, abilities and other characteristics of its managers and employees developed through education and personal experiences that can be used to produce products and services and to come up with new ideas and innovations (Armstrong and Shimizu, 2007; Backman et al., 2016; Becker, 1994; Debrah et al., 2018; Pennings et al., 1998). The literature considers two categories of human capital, namely general human capital and specific human capital (Dimov and Shepherd, 2005; Harris and Helfat, 1997; Pennings et al., 1998; Preisendorfer and Voss, 1990). While general human capital refers to the overall education and practical experience of the managers and employees, specific human capital comprises knowledge, skills and abilities with scope of application limited to a single industry or enterprise (Dimov and Shepherd, 2005; Gimeno et al., 1997). Nelson and Phelps (1966) observe that general human capital enhances employees' ability to process and integrate information, leading to better decision making, motivation and discipline. On the other hand, specific human capital has been found to be a significant determinant of innovation (Bianchi, 2001; Nuruzzaman et al., 2019). Moreover, while human capital of both managers and employees is important for implementing innovation, Shamsuzzoha and Tanaka (2021), Sonabe (2016) and Koo (2019) show that human capital of top managers is the most crucial factor in realising multidimensional innovations and enterprise's long term success.

Existing literature reveal three types of relations among human capital, innovation and organisational performance. 1) the positive relation between top managers' human capital and innovation (Azeem and Baker, 2020; Jegede et al., 2016; Njiraini et al., 2018; Vixathep and Phonvisay, 2019), 2) the positive relation between innovation and firm productivity (Cin et al., 2017; Exposito and Sanchis-Llopis, 2018; Nyeadi et al., 2018; Vixathep and Phonvisay, 2019) and 3) the positive relation between human capital and firm productivity (Aggrey et al., 2010; Blundell et al., 1999; Okumu and Maweje, 2019; Onkelinx et al., 2016; Rukumnuaykit and Pholphirul, 2015; Tan et al., 2016). To the best of the author's knowledge, however, the three relations have not been examined simultaneously, especially in an African (developing country) context. This gap in the literature motivates the current study.

The current study aims to discover how human capital of top managers influence the productivity of SMEs – directly and/or indirectly via...
innovation. To perform the empirical analysis, the study utilises a unique dataset taken from the World Bank's Tanzania Firm-Level Skills Survey 2015. The findings of the paper can help both policy makers and managers optimise investment in and utilisation of the country’s human resource for improving productivity of SMEs.

The paper proceeds as follows. The next Section reviews the relevant literature on the relations among human capital, innovation and firm productivity and develops relevant hypotheses. Section three describes the methods and the data employed. Section four presents the results of the analysis. Section five discusses the findings. Section six provides the conclusion and implications of the findings.

2. Review of the related literature and hypotheses development

The literature on human capital in organisations focuses on the way employees and managers accumulate knowledge and skills and how such stock of knowledge and skills enable organisations to improve performance. Human capital has been found to be positively related to a number of key organisational outcomes, including innovation (Hayton, 2005; Jegede et al., 2016; G. Liu, Pang and Kong, 2017), export performance (G. Liu et al., 2017; Onkelinx et al., 2016), business survival and growth (Backman et al., 2016), labour productivity (Aggrey et al., 2010; Blundell et al., 1999; Okumu and Mawejje, 2019; Onkelinx et al., 2016; Rukumnyaykit and Pholphirul, 2015; Tan et al., 2016) and profitability (Cho and Pucik, 2005). The current study, however, focuses on the relations among human capital, innovation and SME productivity.

The following sub-sections summarise the key empirical studies on the relations among human capital, innovation and productivity. The sub-sections also propose relevant hypotheses.

2.1. Human capital and SME innovativeness

An enterprise’s human capital can be utilised to foster innovation manifested through new or enhanced products, services or processes (Ayalew et al., 2020; Danquah and Amankah-Amoah, 2017; McDowell et al., 2018; Onkelinx et al., 2016). Thus, in order for innovation to take place, firms need workers with appropriate knowledge, skills, abilities and experiences (Ismail, 2018).

While studies that examine the relation between human capital and firm innovativeness in developed economies generally find positive association between the two (Bornay-Barrachina et al., 2012; Hayton, 2005), studies that examine this relationship in African (developing country) contexts reveal mixed outcomes. Using data from 179 micro, small and medium-sized enterprises (MSMEs) in Laos, Vixathep and Phonvisay (2019) examined the relationship among human capital, productivity and internationalisation. They show that higher human capital combined with innovation tended to enhance productivity among Lao MSMEs. Furthermore, employing World Bank Enterprise Survey data, Nyedi et al. (2016) also found that both process and product innovation had strong positive relationship with firm productivity in Ghana. The current study, therefore, expects that both technological and non-technological innovative SMEs will be more likely to have higher productivity than SMEs who lack innovation. The following hypothesis is developed:

H2. Firm innovativeness is significantly related to SME productivity

2.3. Human capital and SME productivity

Human capital is widely recognised in the literature as a key source of competitive advantage for firms (Ahmad et al., 2020). Higher quality human capital enhances firms’ competitiveness by increasing firms’ technological absorptive capacity, enabling the firms to achieve higher quality and cost efficient production (Habib et al., 2019). As regards to the direct relation between human capital and firm performance, overall, empirical studies provide support for the superiority of human capital in influencing productivity in different kinds of organisations. Onkelinx et al. (2016) used data from 1922 SMEs in Belgium between 1998 to 2005 to study the relationship between investment in employees’ human capital, productivity and internationalisation. They show that firm-level investment in employees’ human capital leads to higher productivity. In a study of the relationship between human capital and productivity in Thailand, Rukumnyaykit & Pholphirul (2015) used World Bank's Productivity and Investment Climate Survey data collected from 1043 manufacturing establishments during 2007. The study found significant and positive impact on labour productivity from hiring workers who have higher education as well as providing them with in-service training. Similarly, in a review of empirical studies on causal effect of human capital on individual, employer and economy earnings, Blundell et al. (1999) found higher average levels of labour productivity were closely related to the greater skills and knowledge of the work-forces.

Consistent with a large section of the literature on the relationship between human capital and business outcomes, studies conducted in African countries also generally highlight the superiority of human capital among firm resources. Aggrey et al. (2010) used data collected during 2002–2003 by the World Bank as part of the Investment Climate Survey to investigate relative importance of human capital variables in explaining labour productivity in East African manufacturing firms. The results indicated that proportion of skilled workers, average education,
training and education of manager were positively associated with labour productivity. Similar findings were found by Tan et al. (2016) who used data collected by the World Bank in 2015 in Tanzania as part of Enterprise Skills Survey to analyse skill use, skill deficits and performance of Tanzanian firms. They found that firms with higher shares of tertiary-educated workers and who trained their workers were more productive. Furthermore, using World Bank's Enterprise Survey data of 6, 597 manufacturing firms carried out between 2011 and 2017 from 25 African countries, Okumu and Maweje (2019) demonstrated that higher employee education attainment was positively associated with labour productivity.

From the studies reviewed, the current study expects that firms with top managers possessing higher quality human capital will be more likely to be productive than their human capital constrained counterparts. The following hypothesis is developed to test the phenomena:

**H3.** Top managers' human capital is significantly related to SME productivity

### 2.4. Human capital, innovation and SME productivity

The three relations analysed above may imply that the positive relation between human capital and firm productivity could be partially mediated by an enterprise's innovation actions (C.-H. Liu, Chang and Fang, 2019; McDowell et al., 2018). However, to the best of author's knowledge, this relation has never been tested in an African (developing country) context. The following additional hypothesis is, therefore, developed.

**H4.** Innovation mediates the relationship between human capital and SME productivity

Figure 1 summarises the three relations analysed in the current study.

### 3. Methods

#### 3.1. Data

The study utilises a unique dataset taken from the World Bank's Tanzania Firm-Level Skills Survey conducted in 2015. The study chose to focus on SMEs because SMEs play an important role in economic development of most countries irrespective of income (Calice et al., 2012; OECD, 2017). SMEs, defined by URT (2003) as enterprises with between 5 and 99 employees, represent more than 99 percent of registered firms and contribute approximately 27 percent of GDP and 23.4 percent to total employment in Tanzania mainland (MIT & FSDT, 2012; URT, 2016).

After elimination of observations with missing values the dataset used for the analysis covers 309 SMEs from eight industry categories as follows: food (32), textiles (31), metals and machinery (41), construction (29), wood and furniture (55), IT services (36), hotels and restaurants (51) and transport (34). The sample covers five regions of Arusha (28), Dar es Salaam (163), Mbeya (38), Mwanza (39) and Zanzibar (41). Table 1 describes the sample SMEs distribution by industry and region.

World Bank's Tanzania Firm-Level Skills Survey 2015 collected data on different characteristics of the enterprises including manager education, manager experience in the sector, innovation introductions, as well as performance indicators of the firms which are relevant for the current study.

### 3.2. Measurements

This study focuses on firm productivity among SMEs in Tanzania. In this study, firm productivity is proxied by labour productivity measured in terms of establishment's average sales per full-time employee which is calculated as annual sales of the establishment divided by number of full-time employees during the year. Battilana, Sengul, Pache and Model (2014) observe that average sales per employee measure is well suited for examining productivity differences across organisations. Sales per employee is considered to represent the extent to which a firm's employees are efficiently creating output (Datta et al., 2005). The sales per employee indicator has frequently been used to compare firms' performance (e.g. Datta et al., 2005; Okumu and Maweje, 2019; Shaw et al., 2013).

Human capital of the top manager is the independent variable of the current study. Consistent with Shamsuzzoha and Tanaka (2021) and Sonabe (2016), the current study focuses on top managers' human capital measured in terms of education attainment and experience in the sector. Since neither general nor specific human capital is directly observable, the study follows previous literature which have employed years of education as a proxy for the general human capital and years of experience working in the sector as proxy for specific human capital.

Education attainment of the top manager is measured using responses to the following question: How many years of education does the top manager have? Top manager's experience in the sector is measured using

### Table 1. Description of the sample by sector and region.

| Industry                        | Frequency | Percentage |
|---------------------------------|-----------|------------|
| Food                            | 32        | 10.36      |
| Textiles                        | 31        | 10.03      |
| Metals and machinery            | 41        | 13.27      |
| Construction                    | 29        | 9.39       |
| Wood and furniture              | 55        | 17.80      |
| IT services                     | 36        | 11.65      |
| Hotels and restaurants          | 51        | 16.50      |
| Transport                       | 34        | 11.00      |
| Total                           | 309       | 100        |
| **Region**                      |           |            |
| Arusha                          | 28        | 9.06       |
| Dar es Salaam                   | 163       | 52.75      |
| Mbeya                           | 38        | 12.30      |
| Mwanza                          | 39        | 12.62      |
| Zanzibar                        | 41        | 13.27      |
| Total                           | 309       | 100        |

**Figure 1.** Model of the relation among top managers' human capital, innovation and SME productivity.
responses to the following question: How many years of experience working in this sector does the top manager have? This way of measuring top managers’ human capital has been used in previous studies (Safu et al., 2008; Shamsuzzoha and Tanaka, 2021; Smith et al., 2005).

The study uses the following five binary innovation output measures: (1) having introduced new or significantly improved products or services (product innovation), (2) having introduced new or significantly improved methods of manufacturing products or offering services (manufacturing or service-offering innovation), (3) having introduced new or significantly improved logistics, delivery or distribution method or any new or significantly improved supporting activity (logistics innovation), (4) having introduced new or significantly improved organisational structures or management practices (organisational innovation) or (5) having introduced new or significantly improved marketing methods (marketing innovation). Similar way of measuring innovation outputs has been used in previous studies (Aldieri et al., 2021; Busom and Vélez-Ospina, 2017; Qi, Zou, X.M, & Zeng, 2020).

3.3. Characteristics of the sample

Table 2 presents the characteristics of the sample used in this study, including number of full-time employees, total annual sales, average sales per full-time employee, top manager’s years of education, top manager’s years of experience in the sector and establishments’ innovation outputs. Specifically, the sample SMEs had an average of 16 employees. Furthermore, the sample SMEs had average annual sales of 1,370,000,000 shillings and average sales per full-time employee of 60,000,000 shillings. Regarding the top manager human capital variables, the top managers of the establishments in the sample had an average of 12 years of formal schooling and maximum of 26 years. They had an average of 15 years of experience in the sector with a maximum of 53 years. Moreover, 54 percent of the sample SMEs had introduced new or significantly improved products or services in the last 3 years, 62 percent had introduced new or significantly improved manufacturing or service offering methods, 50 percent had introduced new or significantly improved logistics or other supporting activity, 47 percent had introduced new or significantly improved organisational structure or management practices and 39 percent of establishments in the sample had introduced new or significantly improved marketing methods.

3.4. Correlation analysis

Table 3 displays the variables correlations. Manager experience is shown to be significantly positively correlated with all the innovation types except marketing innovation. Further, manager education is shown to be significantly positively correlated with all the innovation types except product innovation as well as manufacturing or service offering innovation. Moreover, while manager education is significantly correlated with firm productivity, the correlation between manager experience and SME productivity is insignificant. The correlations of all variables used in the study are below the recommended cutoffs of 0.8, indicating the absence of multicollinearity problem (Berry et al., 1985).

3.5. Structural model

There are generally two statistical approaches for Structural equation modelling (SEM) namely covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM) (Hair et al., 2017). In recent years, PLS-SEM has been widely employed in the fields of strategic management, innovation management, marketing and other business fields (Liu et al., 2020; Nawaz Khan et al., 2019; Quaye and Mensah, 2019). The advantages of using PLS-SEM in social sciences research includes its ability to handle small sample size and its ability to test hypotheses in complex path models (Hair et al., 2017; Nitizl et al., 2016). Based on the above, PLS-SEM is chosen as an appropriate statistical method for the current study.

Using SmartPLS® version 3.0 software, mediated relationship is primarily indicated by the significant indirect effect, and the direct effect provides further evidence of the effect (Hair et al., 2017). Two types of mediation can occur. Full mediation occurs when there is statistically significant indirect effect, but the direct effect is not significant. Partial mediation occurs when the direct effect on the dependent variable as well as an indirect effect through the mediator are both significant (Bates and Khasawneh, 2005; Hair et al., 2017). Partial mediation can further be divided into complementary and competitive partial mediation. Complementary partial mediation occurs when the indirect effects and the direct effects are both significant and point in the same direction; competitive partial mediation occurs when the indirect effects and the direct effects are both significant and point in opposite directions (Hair et al., 2017; Nitizl et al., 2016).

The analysis was conducted in two main steps: (1) used SmartPLS's PLS Algorithm to calculate the path coefficients, and (2) used SmartPLS's bootstrapping procedure to evaluate the significance of the path coefficients and assess the mediating effects through the evaluation of specific indirect effects. Bootstrapping with sample setting of 5000, as recommended by (Hair et al., 2017), was done in calculating coefficients, direct effects and indirect effects.

4. Results

Figure 2 presents the path coefficients and R². Seventeen direct relationships were examined as follows: 1) manager education - > firm productivity, (2) manager education - > logistics innovation, (3) manager education - > manufacturing or service offering innovation, (4) manager education - > marketing innovation, (5) manager education - > organisational innovation, (6) manager education - > products or service innovation, (7) manager experience - > productivity, (8) manager experience - > logistics innovation, (9) manager experience - > Table 2. Characteristics of the sample.

| Variable                                      | Obs | Mean | Std. Dev. | Min | Max |
|-----------------------------------------------|-----|------|-----------|-----|-----|
| 1. Number of full-time employees              | 309 | 16.32| 15.46     | 5   | 95  |
| 2. Total annual sales (TZS)                   | 309 | 1370000000 | 37900000000 | 16800000 | 51300000000 |
| 3. Average sales per full-time employee       | 309 | 60000000 | 90700000 | 2100000 | 6840000000 |
| 4. Top manager’s years of education           | 309 | 12.32| 3.57      | 4   | 26  |
| 5. Top manager’s years of experience in the sector | 309 | 15.42| 9.62      | 1   | 53  |
| 6. Establishment introduced new or significantly improved products or services in the last 3 years | 309 | 0.543689 | 0.498896 | 0   | 1   |
| 7. Establishment introduced new manufacturing or service offering methods in the last 3 years | 309 | 0.624596 | 0.485013 | 0   | 1   |
| 8. Establishment introduced new or significantly improved logistics, delivery or distribution method or any new or significantly improved supporting activity in the last 3 years | 309 | 0.495146 | 0.500797 | 0   | 1   |
| 9. Establishment introduced new or significantly improved organisational structure or management practices in the last 3 years | 309 | 0.466019 | 0.499653 | 0   | 1   |
| 10. Establishment introduced new or significantly improved marketing methods in the last 3 years | 309 | 0.390000 | 0.490000 | 0   | 1   |
manufacturing or service offering innovation, (10) manager experience - > marketing innovation, (11) manager experience - > organisational innovation, (12) manager experience - > product or service innovation, (13) logistics innovation - > productivity, (14) manufacturing or service offering innovation - > productivity, (15) marketing innovation - > productivity, (16) organisational innovation - > productivity and (17) product or service innovation - > productivity. Overall, the indirect effects of manager education and manager experience on firm productivity had $R^2$ of 0.119, i.e. 11.9%.

Further, as shown in Table 4, only 7 of the 17 direct relationships were found to be viable ($p < 0.05$). Specifically, manager education is shown to have significant positive direct effect on firm productivity, marketing innovation as well as organisational innovation. The results further show that marketing innovation has a significant positive direct effect on firm productivity. Furthermore, manager experience is shown to have significant positive effect on logistics innovation, manufacturing or service offering innovation as well as product innovation. The remaining models of direct effects are found to be insignificant.

The following ten mediation models were tested: (1) manager experience - > organisational innovation - > productivity, (2) manager education - > organisational innovation - > productivity, (3) manager experience - > product or service innovation - > productivity, (4) manager experience - > logistics innovation - > productivity, (5) manager education - > manufacturing or service offering innovation - > productivity, (6) manager education - > product or service innovation - > productivity, (7) manager education - > logistics innovation - > productivity, (8) manager experience - > manufacturing or service offering innovation - > productivity, (9) manager experience - > marketing innovation - > productivity, and (10) manager education - > marketing innovation - > productivity.
SME productivity are significant. The remaining mediation models are found to be insignificant as well as product or service innovation, neither its direct nor indirect effects logistics innovation, manufacturing or service offering innovation. Furthermore, while manager experience in the sector taken directly affects marketing innovation as well as organizational innovation positively. In turn, manager education taken directly affects marketing innovation on the relationship between manager education and SME productivity. The first hypothesis aimed at examining the effect of top managers’ human capital on SME innovation. The results show a significant positive direct effect of top managers’ education on non-technological (marketing and organisational) innovation while its effect on technological (logistics, product, manufacturing or service offering) innovation was found to be insignificant. The results further show a significant positive direct effect of manager experience on technological innovation while its effect on non-technological innovation was found to be insignificant. These results imply that SME managers with higher education attainment in Tanzania place more emphasis on non-technological innovation than they place on technological innovation. On the other hand, managers with long experience in the sector place more emphasis on technological innovation than they place on non-technological innovation.

The second hypothesis aimed at examining the effects of SME innovation on productivity. Results show a significant positive association between marketing innovation and SME productivity. The association between the other types of innovation (logistics, product or service offering, organisational and product innovations) and SME productivity are shown to be insignificant. These findings are consistent with Karabulut (2015) who posits that marketing innovation is easier and cheaper to implement compared to technological innovation and may help firms rejuvenate their position in a market, penetrate markets and increase sales revenues. Bagheri, Mitchelmore, Bamiatzi and Nikolopoulos (2019) contend that marketing innovation is more relevant than other

5. Discussion

This paper examined the mediation effect of innovation on the relationship between top managers’ human capital and SME productivity. The first hypothesis aimed at examining the effect of top managers’ human capital on SME innovation. The results show a significant positive direct effect of top managers’ education on non-technological (marketing and organisational) innovation while its effect on technological (logistics, product, manufacturing or service offering) innovation was found to be insignificant. The results further show a significant positive direct effect of manager experience on technological innovation while its effect on non-technological innovation was found to be insignificant. These results imply that SME managers with higher education attainment in Tanzania place more emphasis on non-technological innovation than they place on technological innovation. On the other hand, managers with long experience in the sector place more emphasis on technological innovation than they place on non-technological innovation.

Table 4. Direct effects.

| Relation | Original Sample (O) | Sample Mean (M) | Std. Dev. (STDEV) | T Statistics (|O/STDEV|) | P Values |
|----------|---------------------|-----------------|-------------------|--------------------------|----------|
| 1. manager education - > firm productivity | 0.2519 | 0.2570 | 0.0443 | 5.6863 | 0.0000 |
| 2. manager education - > logistics innovation | 0.1112 | 0.1120 | 0.0576 | 1.9319 | 0.0534 |
| 3. manager education - > manufacturing or service offering innovation | 0.0946 | 0.0954 | 0.0603 | 1.5706 | 0.1163 |
| 4. manager education - > marketing innovation | 0.1856 | 0.1866 | 0.0552 | 3.3650 | 0.0008 |
| 5. manager education - > organisational innovation | 0.2189 | 0.2184 | 0.0520 | 4.2058 | 0.0000 |
| 6. manager education - > products or services innovation | 0.0554 | 0.0550 | 0.0566 | 0.9797 | 0.3273 |
| 7. manager experience - > productivity | 0.0694 | 0.0718 | 0.0484 | 1.4342 | 0.1516 |
| 8. manager experience - > logistics innovation | 0.1626 | 0.1619 | 0.0550 | 2.9570 | 0.0031 |
| 9. manager experience - > manufacturing or service offering innovation | 0.1596 | 0.1601 | 0.0519 | 3.0769 | 0.0021 |
| 10. manager experience - > marketing innovation | 0.0532 | 0.0552 | 0.0573 | 0.9293 | 0.3528 |
| 11. manager experience - > organisational innovation | 0.1056 | 0.1068 | 0.0575 | 1.8372 | 0.0662 |
| 12. manager experience - > product or service innovation | 0.1122 | 0.1121 | 0.0552 | 2.0330 | 0.0421 |
| 13. logistics innovation - > productivity | 0.0389 | 0.0366 | 0.0523 | 0.7442 | 0.4568 |
| 14. manufacturing or service offering innovation - > productivity | 0.0708 | 0.0728 | 0.0676 | 1.0466 | 0.2953 |
| 15. marketing innovation - > productivity | 0.1225 | 0.1228 | 0.0486 | 2.5204 | 0.0118 |
| 16. organisational innovation - > productivity | 0.0115 | 0.0102 | 0.0441 | 0.2616 | 0.7936 |
| 17. product or service innovation - > productivity | -0.0576 | -0.0593 | 0.0708 | 0.8134 | 0.4160 |

Table 5. Mediation effects.

| Relation | Original Sample (O) | Sample Mean (M) | Std. Dev. (STDEV) | T Statistics (|O/STDEV|) | P Values |
|----------|---------------------|-----------------|-------------------|--------------------------|----------|
| 1. manager experience - > organisational innovation - > productivity | 0.0012 | 0.0013 | 0.0054 | 0.2247 | 0.8222 |
| 2. manager education - > organisational innovation - > productivity | 0.0025 | 0.0021 | 0.0099 | 0.2549 | 0.7988 |
| 3. manager experience - > product or service innovation - > productivity | -0.0065 | -0.0068 | 0.0096 | 0.6724 | 0.5013 |
| 4. manager experience - > logistics innovation - > productivity | 0.0063 | 0.0064 | 0.0095 | 0.6665 | 0.5051 |
| 5. manager education - > manufacturing or service offering innovation - > productivity | 0.0067 | 0.0067 | 0.0086 | 0.7746 | 0.4386 |
| 6. manager experience - > product or service innovation - > productivity | -0.0032 | -0.0035 | 0.0067 | 0.4797 | 0.6315 |
| 7. manager education - > logistics innovation - > productivity | 0.0043 | 0.0039 | 0.0068 | 0.6405 | 0.5219 |
| 8. manager experience - > manufacturing or service offering innovation - > productivity | 0.0113 | 0.0118 | 0.0123 | 0.9216 | 0.3568 |
| 9. manager experience - > marketing innovation - > productivity | 0.0065 | 0.0068 | 0.0081 | 0.8091 | 0.4185 |
| 10. manager education - > marketing innovation - > productivity | 0.0227 | 0.0228 | 0.0114 | 1.9928 | 0.0463 |
innovation types for SMEs which generally face financial and human resource constraints in implementing technological innovation.

The third hypothesis aimed at examining the effect of top managers' human capital on SME productivity. The results show that top manager's education has a significant positive association with SME productivity. The relationship between top manager's experience in the sector and productivity is, however, found to be insignificant. The current study speculates that this pattern of findings for education when viewed broadly may mask differences in analytical skills and absorptive capacities enabling educated managers to adapt more quickly and make better decisions than experienced but less educated counterparts (Nelson and Phelps, 1966).

The fourth hypothesis aimed at examining the mediation effect of innovation on the relationship between human capital and firm productivity. A complementary partial mediation effect of marketing innovation is found, implying that marketing innovation complementarily partially mediates the relationship between manager education and SME productivity. No mediation effect of other types of innovation on the relationship between manager education or experience and SME productivity are found. These findings are fully line with C.-H. Liu et al. (2019)'s and McDowell et al. (2018)'s suggestion that innovation partially mediates the relationship between human capital and firm productivity.

6. Conclusion and implications

6.1. Conclusions

This study examined the link among top managers' human capital, innovation and productivity among SMEs in Tanzania. Two categories of innovation were examined as follows. 1) technological innovation (product, manufacturing or service offering and logistics innovation) and 2) non-technological innovation (organisational and marketing innovation). Overall, manager education is found to be more important than manager experience in influencing SME productivity, with marketing innovation partially complementarily mediating the relationship between manager education and productivity. Further, manager education and manager experience were found to influence SME innovation differently. While manager education is found to positively influence SME non-technological innovation, manager experience is found to positively influence SME technological innovation. Furthermore, the findings indicate that marketing innovation is the most successful innovation mode in the studied sectors.

6.2. Theoretical contributions

The paper contributes to the discussion on the relations among human capital, innovation and organisational performance (Bach, Dalazen, da Silva, Ferraresi, & da Veiga, 2019; Bornay-Barrachina et al., 2012; Cho and Pucik, 2005; Hatch and Dyer, 2004; Lepak and Snell, 1999; Mahemba and Bruijn, 2003; Nelson and Phelps, 1966; Onkelinx et al., 2016; Saffu et al., 2008). Specifically, it contributes to the studies that seek to advance research on the human capital contribution to business success in developing country contexts. The findings of this study augment the literature on the relations among human capital, innovation and organisational performance, specifically on the examination of the link among the three relations. This study uncovers the mediating role of marketing innovation on the relationship between top managers' human capital and SME productivity in Tanzania. Existing literature is limited in this respect.

6.3. Managerial implications

This study is important in the context of a developing country like Tanzania, which seeks to improve productivity of its human resource to support economic transformation required to reach its development ambitions. It provides valuable insights for SME managers, policy makers and other relevant stakeholders in the development of SMEs.

The results indicate that only marketing innovations have positive effect on SME productivity. Thus, for SMEs in Tanzania that want to improve productivity, continuous improvement in marketing methods is an appropriate route. Further, the results show that SME managers in Tanzania have not been successful in introducing innovations beyond marketing innovation. This revelation calls for policy makers and other relevant stakeholders to consider and address the factors that limit the ability of SME managers to successfully implement technological innovations for improving SME productivity.

6.4. Limitations and further research

Like most studies, this one has certain limitations. First, it is a cross-sectional study. Further research could consider employing longitudinal data. Second, the measure of top managers’ human capital in terms of years of education or years of experience in the sector may not fully capture all aspects of managers' human capital attributes. Research is needed to ascertain how managers’ specific knowledge, skills, abilities and other characteristics interact to influence firm innovation and productivity. Third, the findings may be applicable exclusively to the represented firms in Tanzania. Research on large enterprises throughout the country is warranted to ascertain if the findings about the mediating effect of innovation on the relationship between top managers’ human capital and SMEs productivity is size-specific. Furthermore, a cross-cultural research that covers different countries is needed in order to allow the development of generalisations about the mediating role of innovation on the relation between top managers’ human capital and firm productivity. Additionally, further research could also be carried out to examine the factors that hinder value creation from technological innovation among SMEs in Tanzania.

Declarations

Author contribution statement

Vedastus L. Timothy: Conceived and designed the experiments; performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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