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## Article

# Exploring factors affecting product innovation practice among micro and small scale enterprises: the case study of Debre Berhan Town, Ethiopia

Cogent Business & Management

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*Suggested Citation:* Kebede, Abebe Getaneh; Fikire, Abebaw Hailu (2023) : Exploring factors affecting product innovation practice among micro and small scale enterprises: the case study of Debre Berhan Town, Ethiopia, Cogent Business & Management, ISSN 2331-1975, Taylor & Francis, Abingdon, Vol. 10, Iss. 2, pp. 1-19, <https://doi.org/10.1080/23311975.2023.2246746>

This Version is available at:

<https://hdl.handle.net/10419/294582>

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To cite this article: Abebe Getaneh Kebede & Abebaw Hailu Fikire (2023) Exploring factors affecting product innovation practice among micro and small scale enterprises: the case study of Debre Berhan Town, Ethiopia, Cogent Business & Management, 10:2, 2246746, DOI: [10.1080/23311975.2023.2246746](https://doi.org/10.1080/23311975.2023.2246746)

To link to this article: <https://doi.org/10.1080/23311975.2023.2246746>



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Received: 30 November 2022  
Accepted: 07 August 2023

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Reviewing editor:  
Sandra Alves, Higher Institute of Accounting and Administration, University of Aveiro, Portugal

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## MANAGEMENT | RESEARCH ARTICLE

# Exploring factors affecting product innovation practice among micro and small scale enterprises: the case study of Debre Berhan Town, Ethiopia

Abebe Getaneh Kebede<sup>1\*</sup> and Abebaw Hailu Fikire<sup>2</sup>

**Abstract:** Innovation is considered a pivotal activity in firms and business units since they are facing an increasingly competitive atmosphere in the domestic and international markets. Thus, the study's main objective is to examine the factors determining product innovation practice among micro- and small-scale Enterprises in Debre Berhan town, Amhara Region, Ethiopia. For this purpose, the study used primary data. The data were collected from 294 owners/managers of Micro and small-scale enterprises through structured questionnaires. The binary logistics model examined the factors affecting product innovation practice. The study revealed that access to finance, access to training, access to technology, availability of incentive schemes, gender of the owner/manager of the enterprises, and networking with external knowledge, respectively, affected the enterprises' product innovation practice positively and significantly at a 5% level of significance. This study suggests that the government should support micro and small enterprises to access technology and training. Besides, the government and other stakeholders ought to enable Micro and small-scale enterprises to create networks with external knowledge; provide incentives for innovative Micro and small-scale enterprises; provide capacity-building training on enhancing creative self-efficacy for female enterprise owners/managers.

**Subjects:** Economics; Business, Management and Accounting; Industry & Industrial Studies



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### ABOUT THE AUTHOR

Abebe Getaneh is a lecturer at Debre Berhan University, Ethiopia. He has studied BA in management at Debre Berhan University and MA in public management at Jimma University. His current areas of interest is human resource management, entrepreneurship, and organizational behavior.

### PUBLIC INTEREST STATEMENT

Product innovation practice among micro and small-scale enterprises is critical to increasing the growth and competitiveness of the firm in our country. Thus, this study intends to explore factors affecting product innovation practice among Micro and Small-Scale Enterprises in Debre Berhan town, Ethiopia. The study revealed that access to finance, access to training, access to technology, gender, availability of incentive schemes, and networking with external knowledge affected product innovation practice of the enterprises.

**Keywords:** product innovation; access to finance; gender; incentive; technology; training; micro and small scale enterprises; binary logistics model; quantitative research approach; Debre Berhan; Ethiopia

## 1. Introduction

Innovation is considered to be the driving force of competitiveness and growth of firms and countries. It is arguably the most important tool that a company can use in order to be competitive in the global race for progress (Filippetti & Archibugi, 2010; Talegeta, 2014; Tohidi & Jabbari, 2011). Innovation is widely acknowledged as a key driver of economic growth (Andergassen et al., 2009, Bae & Yoo, 2015; Santacreu, 2015), as well as reduced inequality within and between countries, and improvements in health and longevity (Maradana et al., 2017). Innovative behavior is a value-creation process aided by developing original ideas, concepts, and applications (Scott & Bruce, 1995 as cited in Huang et al., 2021). In the context of micro- and small-scale businesses in developing nations, innovation typically refers to the adoption of a previously established method, process, or product that is new to the company but not necessarily to the globe, area, country, or industry (Meressa, 2020).

Innovation is a crucial component of a successful business. A general viewpoint holds that achieving economic and social prosperity depends on a creative economy. Innovation has been included in multinational and governmental strategic development programs. Innovation is crucial for most organizations (Zastempowski & Przybylska, 2016). Innovation is the secret to the prosperity of businesses and entire economies in the modern world (Božić & Rajh, 2016; Havierníková & Kordoš, 2019; Talegeta, 2014). Innovative behavior includes concept generation, development, and application in order to enhance an organization's performance (Koneremann, 2012). It is thought to be the "key to success" for survival and flourishing in a market-based economy (Tohidi & Jabbari, 2012). Firm innovation is also important for the country overall, contributing to a nation's long-run economic performance (Bradley et al., 2013; Nazarov & Obydenkova, 2020).

The past two decades have proven the pivotal role of innovation in sustainable economic development. However, innovative activities depend on the availability of a few critical factors, such as relevant information, technologies, and human skills, which are less accessible in low-income countries, thereby leading to increased development gaps. Due to escalating competition and the rapid distribution of knowledge, many firms' future success depends on their capacity for innovation (Talegeta, 2014). The global market has forced nations, including post-Communist states, into competition for creating and assimilating knowledge and technology to propel their prosperity (Porter, 1990). Østergaard et al. (2011) found that diversity in terms of gender and educational attainment enhances innovation performance. According to Galia et al. (2015), gender diversity on a board of directors fosters innovation. Innovation and export performance are likely related. Innovative businesses may look to tap into foreign markets, indicating that innovation and exports are related. Empirical research has revealed this case (Lefebvre et al., 1998). According to Rogers (2004), Micro and small-scale enterprises may rely more heavily than large companies do on external knowledge networks as an input to innovation.

De Saá-Pérez, et al. (2012) stated that integrating theoretical approaches of human resource management and knowledge management to focus on how training can be critical to articulate the organizational knowledge assets necessary to innovate. They conclude that exercise per se has a negative effect on the innovative capacity of SMEs. Only when training interacts with the knowledge assets of the firm, does its effect become positive and highly significant. Vocational training within training programs plays a certain role in innovation.

Ajiferuke and Olatokun (2009) stated that technologies are effective tools for raising the innovation performance of MSEs. Elements that promote innovation performance as well as those that impede it can be studied to understand (Božić & Rajh, 2016). However, in the context of developing nations, like Ethiopia, little research has been done on the effect of access technology adoption,

networking with other businesses, and exporting on the practices of micro and small enterprises. Moreover, Filculescu (2016) claims that while variation exists across countries and regions, female-led firms demonstrate more innovative behavior than male-led firms. VanderBrug (2013) suggests that female entrepreneurs in developed nations are equally or more prone to introduce innovative products and services to the market than male entrepreneurs. More women on board have been evidenced to allow female directors to make substantial contributions to innovation and strategic tasks (Torchia et al., 2011). Female CEOs and board members demonstrate stronger business and equity practices (Glass & Cook, 2018). Studies suggest that organizational innovation is encouraged by gender diversity, and there is evidence that when women do not feel outnumbered, their contribution to management and innovative strategy becomes more significant (Busaibe et al., 2017; Torchia et al., 2011). There are a number of evidence showing that gender has a significant effect on enterprises' innovation in large firms in developed countries (Liedholm & Mead, 1993; McPherson, 1996; Torchia et al., 2011; VanderBrug, 2013). However, the effect of the gender of Micro- and Small-Scale Enterprises and product innovation practices has not been empirically established in developing countries and in Ethiopia in particular so far.

In some countries (including Ethiopia), the level of product innovation is notably below expectations for the development level (Global Innovation Index, 2020). Similarly, most of the MSEs have stagnant growth and transitions due to their poor innovation performance in Debre Berhan town, (Debre Berhan Technic and Enterprise Report, 2022). The majority of recent research, theory development, and policy creation aimed at promoting innovation have been on innovation in more developed economies (Voeten et al., 2018). Empirical studies on determinants of product innovation practice by micro and small enterprises in Africa are relatively scarce (Abdu & Jibir, 2018). This is also true in Ethiopia as well. Addressing these gaps, this study aimed to fill the mentioned gaps and aimed to explore the determining factors of micro and small-scale enterprises' product innovation practice in the study area.

The rest of this study is organized as follows; the second section outlines related literature, the third section describes the study's methods and the fourth section presents the results and discussion. Finally, the fifth section conclusion and recommendations.

## 2. Literature review

### 2.1. Definitions of key terms and phrases

#### 2.1.1. Innovation

Innovation is the implementation of a new or significantly enhanced product (good or service), a process, a new marketing technique, or a new organizational method in business practices, in the organization of the workplace, or in external interactions (Oced, 2005). New technology and/or knowledge, which must be distinct from anything previously developed, have historically been the main drivers of innovation (Kotey & Sorensen, 2014). Most people agree that innovation is a crucial driver of economic progress, particularly in the corporate sphere (Talegeta, 2014). One of the most crucial components of the current regional economics and business development concerns is the adoption of innovations and innovation policies and plans (Havierniková & Kordoš, 2019). The steady expansion of domestic businesses is a major determinant of economic growth in the majority of nations. A company needs to discover a market opportunity to offer its goods or services and provide the proper value to the customer in order to develop. However, a company's permanent growth must be backed by other activities, including innovation, in order for short-term earnings to be a certainty (Na et al., 2019).

Hassan et al. (2013) described four important areas of innovation that firms need to focus upon to be considered market competitive. These include product innovation, first, the introduction of a good or service that is either entirely new or substantially improved in terms of its properties or intended applications; second, process innovation, which is the use of a fresh or significantly

developing way of production and delivery for the development and supply of services; The third is organizational innovation, which is the implementation of a new organizational method in the firm's business practices, workplace organization, or external relations. The fourth is marketing innovation, which is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion, and pricing (Oced, 2005). However, this study mainly focused on product innovation. Product innovation is driven by amplifying improvements in the design of product benefits, which customers will seek in terms of product characteristics, features, and functions. It is also where companies continuously design new and advanced products and services and significantly improve current ones (Afriyie et al., 2019 cited in El Chaarani et al., 2022).

### 2.1.2. *Micro and small scale enterprises*

The term "Micro and Small Scale Enterprises" is not one that is generally accepted. It varies greatly between places and is influenced by both their current socioeconomic situations and where their economy is in the development process. According to the Ethiopian Federal Micro and Small Enterprises Agency (2011), micro-scale enterprises are those that employ five people, including the owner, whose total resources under industry do not exceed Birr 100,000 and total resources estimated for administration do not exceed Birr 50,000, respectively. Small businesses are defined as those that have six to thirty employees or total assets of birr 100,000 to birr 1.5 million or less for the industry sector and 50,000 to 500,000 not more than for the services sector (Abagissa, 2021).

## 2.2. *Theoretical literatures*

### 2.2.1. *Resource based view*

In determining the factors that affect micro and small enterprises scale innovation performance, the researcher adopted the resource-based view (RBV) theory. This theory suggests that firm's resources and capabilities are key determinants of its performance, including its ability to innovate. In the case of micro and small enterprises, limited resources may constrain their ability to invest in research and development or hire specialized personnel for innovation purposes (Alegre et al., 2013).

Hence, the main reason for firms' innovation performance is actually coming from inside the firms. The RBV theory is of particular relevance in the micro and small business context, as it contends that long-term survival is dependent upon the firm's unique offerings (El-Chaarani & El-Abiad, 2018; Zucchella & Siano, 2014).

### 2.2.2. *Social capital theory*

This theory highlights the importance of inter-firm relationships and networks in enabling innovation. Micro and small enterprises' access to such networks can provide them with new ideas and knowledge, access to funding and markets, and opportunities for collaboration (Akdere, 2005). This theory suggests that social networks and relationships are important resources for firms to acquire information, resources, and support (Nahapiet & Ghoshal, 1998). Micro and small enterprises may benefit from forming partnerships or collaborations with other firms, industry associations, or government agencies to access various resources and expertise for innovation purposes.

### 2.2.3. *Absorptive capacity theory*

This theory suggests that firms' ability to acquire, assimilate, and apply external knowledge is critical to their innovation performance. In the context of micro and small enterprises, their limited absorptive capacity can be a significant barrier to accessing external knowledge and incorporating it into their innovation practices (Cohen & Levinthal, 1990).

#### 2.2.4. *Innovation system theory*

This theory emphasizes the need to view innovation practices as embedded within wider socio-economic systems. In the context of micro and small enterprises, it can be argued that factors such as government policies, market conditions, and the institutional environment can influence the firms' innovation practices (Lundvall & Lundvall, 2010).

#### 2.2.5. *Human capital theory*

This theory suggests that the skills and knowledge of a firm's workforce are crucial to its innovation practices. In the context of micro and small enterprises, the limited education and training of their workforce can constrain their ability to engage in innovative practices (Schultz, 1961). Human capital is the set of expertise and on the job training and acquired knowledge that managers develop over time (Becker, 1964 cited in Ali et al., 2021).

### 2.3. **Determinants of product innovation**

The various policies and strategies adopted by the government have failed to bring the expected growth impacts on the MSE sector. The initiatives by the government and other development agencies have also turned out to be short-term interventions with no provisions or mechanisms for sustainability and scaling up. As a result, most of the MSEs in the country operate in a constrained environment, which limits their contribution to national income, employment, and export performance. They are unable to utilise their innovative potential, due to a number of internal and external factors which put restrictions on their activities (Assefa et al., 2014). These factors are discussed below.

#### 2.3.1. *Access to finance and product innovation*

One of the defining factors of a company's innovation is its access to financing (Njiraini et al., 2018; Szczepańska-Woszczyzna, 2014; Talegeta, 2014). Micro and small businesses' ability to innovate can be significantly hampered by a firm's limited funding for research and development as well as access issues to external financing. Access to financing is now a pressing concern for businesses that pursue innovation (D'Este et al., 2014). Savignac (2008) also mentions how financial limitations affect creativity. Financial limitations are a common barrier to innovation activity, despite all the steps taken to provide access to financing and address this issue. Their presence significantly reduces the likelihood of innovation activity. On the basis of the empirical evidence presented, the researcher can expect access to be directly and positively related to product innovation.

#### 2.3.2. *Networking and product innovation*

Networking has a critical role in fostering company innovation. Particularly, compared to large companies, micro and small businesses may rely more significantly on external knowledge networks (Rogers, 2004). Love and Roper (1999) find that "network intensity" has a positive influence on the number of innovations in a sample of 576 U.K. manufacturing firms. MacPherson (1997), in a study of U.S. scientific instrument companies in New York State, also finds support for external linkages raising innovation (the results also indicate that internal R&D effort combined with external linkages appear to yield the best results). Karlsson and Olsson (1998), in a study of the adoption of new innovations by Swedish machinery, electrical and instrument industries, do not find that MSEs rely more on the regional environment than large firms. Innovation activities would take place more easily in clusters and networks (van Dijk et al., 2002). Effective network that comprises lateral and vertical linkages raises capacity for each node in the network by increasing exposure to ideas and opportunities. They also reduce the transaction of developing and adopting innovations (Ernst, 2004). A voluminous empirical literature supports the role of clusters and networks on innovation in Africa (Chipika & Wilson, 2006; Oyelaran-Oyeyinka, 2006). MSEs may rely more significantly than large enterprises do on external knowledge networks as an input to innovation. For instance, a study by Love and Roper (1999) finds that "network intensity" had a favourable impact on the quantity of innovations in a sample of 576 manufacturing companies in the United Kingdom. In a study of American manufacturers of scientific instruments in New York

State, MacPherson (1997) also discovered evidence in favor of external links fostering innovation (the results also indicate that external linkages appear to yield the best results).

### 2.3.3. *Gender and product innovation*

An abundance of female employees does not appear to be significantly associated with innovation. Some of the findings from earlier research are in agreement with this assertion. According to Kushnirovich et al. (2013), culture has a bigger influence on innovation than gender does. However, it conflicts with the findings of Horbach and Jacob (2018), and Østergaard et al. (2011). In the 1980s, Hisrich and Brush (1984) suggested that firms founded by women are more likely to focus on modifying existing products or services than innovation of new ones. Extant research in psychology and behavior suggests that women are more risk averse compared to men (Byrnes et al., 1999; Jianakoplos & Bernasek, 1998). Since innovation represents a culmination of risky processes with no guarantee of positive results, female-led companies tend not to pursue innovation opportunities (Ding et al., 2006; Marvel et al., 2015). There are many possible explanations for this. In most parts of the world, women in business face more challenges in obtaining resources and capital than men (Reutzel et al., 2018). This can lower their inclination toward innovative pursuits.

Women managers face additional challenges due to the dominant masculine nature of management culture (Watts, 2009). Furthermore, women experience disadvantages in accumulating wealth and have expressed that they face lower distributive justice and unfavourable environment (Deere & Doss, 2006; Reutzel et al., 2018). This perception, whether true or not in a particular society, is likely to discourage their motivation for taking on additional financial risk through innovative ventures. In contrast, an opposing body of research suggests that women are more likely to participate in innovation. Female directors enhance the effectiveness of internal governance (Adams & Ferreira, 2009). Higher levels of monitoring from female leaders in business push managers to improve process efficiency and innovate (Aghion et al., 2013).

### 2.3.4. *Access to technology and product innovation*

Technology has the ability to enhance SMEs' core businesses at every stage of the business process, according to Ladokun et al. (2013). Additionally, the usage of ICT in SMEs can result in efficient managerial decision-making, communication and collaboration, customer access, and data and knowledge management (Sajuyigbe & Alabi, 2012). It aids in offering an efficient method of organizational productivity and service delivery, according to Ladokun et al. (2013). Additionally, technology has a beneficial impact on MSEs' productivity, profitability, market value, and market share, according to Ashrafi and Murtaza (2008).

### 2.3.5. *Availability of incentive schemes and product innovation of MSEs*

Government innovation support mechanisms are required for promoting enterprises innovation practice (Guan & Yam, 2015; Thomson & Jensen, 2013). Olefirenko and Shevliuga (2017), in explaining successful commercialization, identified financial, organizational, and regulatory support as a triangle of support and emphasized that a significant role of the state is required. State organizational support, such as knowledge and technology development, and regulatory support involving legislation to create the legal framework for developing and expanding innovation activities in the market, have become accepted as obligatory responsibilities of the state (Olefirenko & Shevliuga, 2017; Pradhan et al., 2018). Government incentives can influence both the demand and supply sides of innovation (Lindholm-Dahlstrand et al., 2019). Marx (2014) explained that the technical part or the supply side commercializing innovation is the system's capacity, including the ability of agents to absorb scientific or technological information and the ability to source complementary assets and support capabilities to develop a variety of innovative and business ideas to be put on the market for selection. The debate over the efficacy of government incentives thus focuses primarily on direct incentives to firms in the form of grants, tax breaks, concessional credit and other direct schemes to help firms increase their innovation



capabilities, cover a portion of their R&D costs and reduce organizational, market, and financial risks (Mayer, 2018; Yigitcanlar et al., 2019).

### 2.3.6. Access to training and product innovation of MSEs

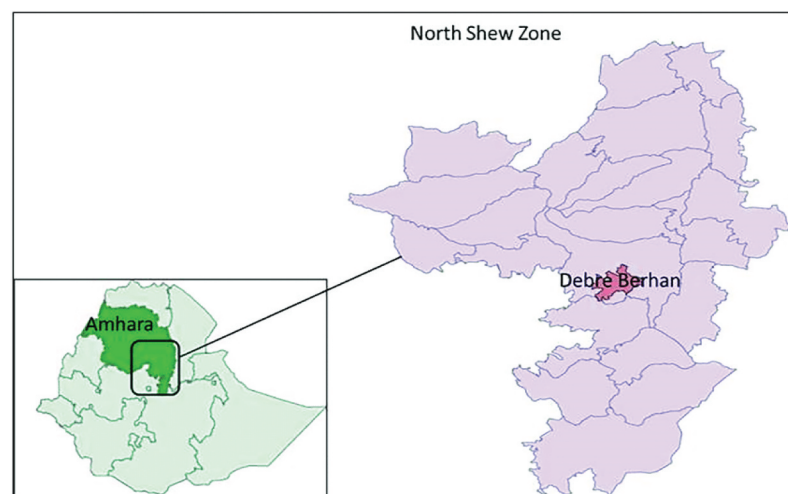
Formal training within businesses has a very strong and significant effects on all four different measures of innovation (Kim et al., 2019). In the field of training, Guisado-González et al. (2016) analyse connection between labour productivity and variables, such as radical innovation, incremental innovation, production technology embodied in new machinery and equipment, utilization of productive capacity and training. They find that investments in training increase the skills of workers and produce improvements in innovative performance. The results indicate that radical innovation and training have a positive and significant impact on labour productivity. Ketata et al. (2015) also analyse to see what the specific driving forces would increase the degree of sustainable innovation within a firm's innovation activities. Various studies have shown the positive relationship between the quality of human capital and the innovative performance of firms (Cohen & Levinthal, 1990; McGuirk et al., 2015; Santos-Rodrigues et al., 2010; Van Uden et al., 2014). The knowledge, skills, talent, and experience possessed by an enterprise's staff directly impact on the process of learning and innovation. As innovation is a knowledge-based activity, the human capital endowments of MSEs significantly contribute to their learning and innovative activities. Gómez et al. (2018) provide evidence of pivotal role from vocational training centres within local innovation processes implemented by firms. For many local firms, vocational training centres represent the main sources of knowledge in their innovation processes. They believe vocational training centres have a longer history than other knowledge infrastructures such as universities and research centres. It is also true that vocational training in companies is more effective than that of regional scale. For example, Brunet Icart and Rodríguez-Soler (2017) find that the contributions of training centres to the innovation system are still low, especially with regard to their relations with companies.

## 3. Materials and methods

### 3.1. Study area profile

Debre Berhan is a town in the central part of Ethiopia, which is located in the North Shewa Zone in the Amhara Region, about 130 km northeast of Addis Ababa, the capital city of Ethiopia. The town has a latitude and longitude of 9°41'N 39°32'E and an elevation of 2,840 meters (See figure 1).

**Figure 1. Location of Debre Berhan town.**



### 3.2. Research design and approach

As Creswell (2014) noted that the researcher should choose the research design that best suits the needs and purpose of the research in order to obtain research outcomes that have real-world practice value. In this context, any design can be selected by researchers based on the nature of the research problem and questions to address the problem. Accordingly, explanatory research design mainly was used in the study because the study aimed at identifying significant determinants of micro and small enterprises' innovation practice in the study area. Furthermore, the quantitative research approach was employed because the quantitative research method is aimed to test pre-determined hypotheses and produce generalizable results.

### 3.3. Sampling method and size

As Creswell (2014) noted that the researcher should choose the research design that best suits The 2021/22 report of Debre Berhan TVET and Enterprise Development Office, there were 1741 registered Micro and Small Enterprises in five different sectors in the town. A stratified sampling technique was employed to take sample MSEs from each sector. Then, a simple random sampling technique was used in order to take MSEs from each stratum proportionally. This study applied a simplified formula provided by Yamane (1967) cited in Kebede and Fikire (2022) to determine the required sample size at a 95% confidence level and 5% margin of error. The Yamane formula is expressed as;

$$n = \frac{N}{1 + (N * e^2)}$$

Where:  $n$  = sample size;  $N$  = the total number of registered MSEs and  $\epsilon$  = error tolerance

$$n = \frac{1741}{1 + (1741 * 0.05^2)} = 326$$

For the questionnaire survey, 326 owners of Micro and small enterprises were selected and questionnaires were distributed to owners of each MSE, but 90.18% of them response rate was used.

### 3.4. Methods of data collection

Primary sources of data, questionnaires, were used in this study. Before preparing the questionnaires' final version, experts commented on the first draft, and revision was made accordingly. Besides, pre-testing of the questionnaires was performed outside the study area in order to cross-check the clarity of its contents. This can assure the content validity of the questionnaire.

### 3.5. Methods of data analyses

The data were analysed using descriptive and inferential statistics. Descriptive statistics such as frequency and percentage; from inferential statistics, chi-square tests were performed. Furthermore, the binary logistic regression model was used if the dependent variable is a dichotomous variable, which has a "yes" or "no" outcome. In this study, the dependent variable is developing any new products or not in the last financial year, which is a dichotomous variable. Once the data were collected, they were edited, coded, and entered into the Computer Software Program for social sciences (SPSS) version 25.

### 3.6. Model specification

Binary logistic regression is a type of regression analysis where the dependent variable is a dummy variable and the independent variables are continuous, categorical, or both (Gujarati, 2004). Thus, due to the nature of the dependent variable (being dichotomous), logistic regression was developed which allows the establishment of a relationship between a binary outcome variable (the dependent variable) and a group of predictor variables. The dependent variable for the binary logistics analysis below is a binary (0, 1) variable defined on the basis of the answers to the questions which need a Yes/No response. The measuring item was, "Did your business, in the last

financial year, develop any new products or substantially changed products or introduce any new or substantially changed processes” A firm that released a series of highly valuable new products will be product innovative and labelled as 1, Otherwise 0. The model of the study is specified as follows;

$$\text{Logit}(p) = \text{Log}\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 * X_1 + \dots + *X_K$$

The parameters in the logistic regression model can be estimated by maximum likelihood. For this study, the overall logistic function equation is:

Predicted logit of product Innovativeness =  $\beta_0 + \beta_1$  Access to finance +  $\beta_2$  Gender of owner/manager +  $\beta_3$  Network +  $\beta_4$  incentive +  $\beta_5$  Access to technology +  $\beta_5$  Access to training + e

Where, e = error term

### 3.7. Measurement and definitions of variables

Product innovation is the dependent variable of the study. This measurement is adopted by Rogers (2004). Regarding the explanatory variables, measure of gender of owner/manager of MSEs from Sannino et al. (2020); access to technology from Dire (2018); MSE’s network with external knowledge from Alemayehu and Gecho (2016); availability of incentive from Indriaswari and Nita (2018); access to finance and access to training from Alene (2020) were adapted. These explanatory variables were selected based on the literature reviewed and their validity obtained from experts in the area. Moreover, a description of the model and its measurement is depicted in the following table (see Table 1).

## 4. Results and discussion

This section presents the descriptive and inferential statistics results.

### 4.1. Descriptive results

The descriptive results in frequency and percentages are described for both dependent variable and independent variables of the study below:

#### 4.1.1. Descriptive result on innovation practice of MSEs

As shown in Table 2, about 39.1% of the enterprises said yes for the question “Did you make an important improvement/change to your product/service recently?” and the remaining responded no. This implies most of the MSEs did not practice product innovation practice. This finding is in line with the result of the study of (Cisková & Ďurčecová, 2019).

#### 4.1.2. Descriptive results of explanatory variables

Table 3 describes the descriptive statistics results of the factors determining product innovation practice. Among sampled respondents’ MSEs, 114 (38.8 %) had access to finance and the remaining respondents’ MSEs did not have access to finance. When we come to the gender of owner/manager of the sampled MSEs, 171 (58.2 %) were male-headed and 123 (41.8%) were female-headed. Regarding with availability of incentives, 177 respondents replied that there were no incentive packages for promoting innovation while the rest 117 responded there were incentive packages. Concerning networks with external knowledge, 169 (57.5 %) of them had networks with external knowledge and the remaining 125 (42.5 %) had no such a network. Similarly, when we come to access to entrepreneurship support programs, 188 (63.9 %) respondents responded that they did not access such kind of support program while the rest 106 (36.1%) respondents replied there is an entrepreneurship support program. Finally, the table depicts that 160 (54.4 %) had access to technology and the remaining 134 (45.6 %) had no access to technology. Thus, we can conclude that most of the respondents did not have access to finance, incentive packages for good innovation performance, a network with external knowledge, and access to technology and

**Table 1. Description of the variables and its measurement**

Variable	Variable code	Definition	Types of variables	Variables' measurement	Expected sign
Dependent variable	PRODINOV	Product innovation practice of MSEs	Dummy	1 if the enterprise is product innovative, 0 otherwise.	
Independent variables	ACF	Access to finance	Dummy	1 if MSE has sufficient access to finance, 0 otherwise.	+
	GEN	Gender of owner/manager of the MSE	Dummy	1 if gender of owner/manager of MSE is male, 0 otherwise	+
	NETWK	MSE's network with external knowledge	Dummy	1 if MSE has good network with external knowledge, 0 otherwise	+
	INCEN	Availability of incentive scheme	Dummy	1 if there is incentive for innovative MSEs, 0 otherwise	+
	TECH	Access to technology	Dummy	1 if MSE has good access to technology, 0 otherwise	+
	TRAIN	Access to training	Dummy	1 if MSE has access to training related with innovation, 0 otherwise	+

entrepreneurship support. In addition, the majority of the owner/manager of the MSEs were males. This implies women are not participating in micro and small-scale enterprises compared to males.

#### 4.2. Inferential statistics results

Inferential statistics such as Chi-square and binary logistics were performed and the results are depicted below.

##### 4.2.1. Chi-square test result

Table 4 describes the chi-square test results. As stated in the table, access to finance ( $\chi^2 = 113.586$ ;  $P < .001$ ); Gender of owner/manager ( $\chi^2 = 98.385$ ,  $P < .05$ ); Availability of incentive scheme ( $\chi^2 = 152.018$ ;  $P < .001$ ); MSE network with other businesses ( $\chi^2 = 92.145$ ;  $P < .05$ ); access to training ( $\chi^2 = 178.091$ ;  $P < .001$ ) and access to technology ( $\chi^2 = 118.262$ ;  $P < .001$ ). Thus, all the studied explana-

**Table 2. MSEs product innovation practice**

Did your business, in the last financial year, develop any new products or substantially changed products or introduce any new or substantially changed processes?	Response	Frequency (%)
	No	179(60.9)
	Yes	115(39.1)
	Total	294(100)

Source: Own survey, 2022 and SPSS output.

tory variables have statistically significant associations with product innovation practices of micro- and small-scale enterprises in the study area.

##### 4.2.2. Diagnostics test results

Before running this model the following tests were performed and the results are discussed as follows:

##### 4.2.3. Multi-collinearity test result

The aim of this test is to analyse whether the independent variables are correlated each other. This test is done by analysing the value of tolerance and variance inflation factor (VIF). Multi-

**Table 3. Descriptive results of the independent variables**

Variables	Frequency (%)	
	Access to finance	Yes
	No	180(61.2)
Gender of owner/manager	Male	171(58.2)
	Female	123(41.8)
Availability of incentive scheme	Yes	117(39.8)
	No	177(60.2)
MSE network with external knowledge	Yes	125 (42.5)
	No	169(57.5)
Access to training	Yes	106(36.1)
	No	188(63.9)
Access to technology	Yes	134(45.6)
	No	160(54.4)

Source: Own survey, 2022 and SPSS output.

**Table 4. Chi-square result**

Variable	Chi-square	P-value	df
Access to finance	113.586	.000**	1
Gender of owner/manager	98.385	.005*	1
Availability of incentive scheme	152.018	.000**	1
MSE network with external knowledge	92.145	.002*	1
Access to training	178.091	.000*	1
Access to technology	118.262	.000**	1

NB:\* refers significant at 5% and \*\* refers to significant at 1%.

Source: SPSS 25 Output.

**Table 5. Multi-collinearity test Result**

Variable	Tolerance	VIF
Access to finance	0.647	1.997
Access to training	0.899	2.217
Gender	0.451	1.762
Access to incentive	0.821	1.219
Access to technology	0.501	1.00
Product innovation	0.568	1.545

collinearity exists when tolerance value below 0.10 and Variance Inflation factor (VIF) greater than 10 in the correlation matrix are the causes for the multi-collinearity existence (Adhista, 2015; Field & Golubitsky, 2009). Tolerance is a statistics used to indicate the variability of the specified independent variable that is not explained by the other independent variables in the model.

The results in table 5 indicate that no multi-collinearity problem exists among the predictor variables given that all the VIF values are below 10 and all the tolerance values are above 0.2 for the above model so this assumption has been met

Table 6 shows another piece of information about the usefulness of the model. The Cox & Snell R Square and Nagelkerke R Square values provide an indication of the amount of variation in the dependent variable explained by the model from the minimum level 0 to a maximum of approximately). In this case, the two values are 0.623 and 0.844. The model as a whole explained 61% (Cox & Snell R Square) and 84.4% (Nagelkerke R Square) of the variance perception (Dependent Variable).

#### 4.2.4. Hosmer and Lemeshow test

The result shown in Table 7 supports the model being worthwhile. For the Hosmer and Lemeshow test, poor model fit is indicated by significance value less than 0.05. To support the study model, the value must be greater than 0.05. In this test, the chi-square value for Hosmer and Lemeshow test is 3.721 with a significance level of 0.811. This value is larger than 0.05, therefore indicating support for the model.

#### 4.2.5. Binary logistics analysis results

To examine the major factors affecting product innovation practices of micro- and small-scale enterprises, binary logistic regression was performed and the results are shown below (see Table 8).

As it is clearly seen from Table 7, access to technology was significantly affecting the product innovation practice of MSEs at a 5 % level of significance. The estimated odd ratio results for access to technology is 0.051. This implies that the MSEs which got access to technology are 5.1 times more likely to be innovative than those MSEs with no access to technology controlling for the other covariates in the model. This result is consistent with previous findings (Ladokun et al., 2013; Sajuyigbe & Alabi, 2012). Similarly, the availability of an incentive scheme positively and significantly affects the product innovation practice of MSE at the 5% level of significance as can be noted in Table 8. The estimated odd ratio of it is 0.041. This implies that the micro- and small-scale enterprises, which participate and perceived there were incentive schemes were 4.1 times more likely to practice product innovation compared to those which did not perceive there was incentive controlling for the other covariates in the model. This result is related to the previous studies (Guan & Yam, 2015; Thomson & Jensen, 2013). Olefirenko and Shevliuga (2017) also noted that government incentives can influence both the demand and supply sides of innovation.

Table 8 also depicts that access to training positively and significantly affects the product innovation practice of MSE at a 5 % level of significance. The estimated odd ratio for it is 0.063. This implies that Micro and Small Scale Enterprises which access to training were 6.3 times more likely to practice product innovation compared to those which did not access such support controlling for the other covariates in the model. This finding is consistent with the results of the

**Table 6. Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	106.725 <sup>a</sup>	.623	.844

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Source: Questionnaire and SPSS 25 result.

**Table 7. Hosmer and Lemeshow test**

Step	Chi-square	df	Sig.
1	3.721	7	.811

Source: SPSS 25 Output.

**Table 8. Results of binary logistics regression**

		<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>df</b>	<b>Sig.</b>	<b>O.R</b>
Step 1 <sup>a</sup>	Access to technology	1.645	.548	9.003	1	.003*	0.051
	Availability of Incentive scheme	1.426	.556	6.591	1	.010*	0.041
	Availability of training	1.851	.604	9.399	1	.002*	0.063
	Networking with external knowledge	1.142	.525	4.726	1	.030*	0.031
	Access to Finance	3.197	.561	32.481	1	.000**	0.244
	Gender of owner/ manager of MSE	1.605	.561	8.194	1	.004*	0.049
	Constant	-16.183	2.021	64.114	1	.000	.000

a. Variable(s) entered on step 1: Access to technology, availability of Incentive scheme, availability of entrepreneurship support program, networking with external knowledge, access to finance, gender of owner/ manager

\* refers significant at 5% and \*\* refers to significant at 1%.

Source: SPSS 25 Output.

studies of Kim et al. (2019) and Guisado-González et al. (2016). Ketata et al. (2015) also found that training increases a firm’s innovation activities.

In addition, the result of the binary logistic shows that MSEs that had networked with external knowledge positively and significantly affected product innovation practice of micro- and small-scale Enterprises the 5 % level of significance as can be noted in Table 8 above. The estimated odd ratio for this variable is 0.031. This implies that the micro- and small-scale enterprises, which had a network with external knowledge 3.1 times participated in product innovation practice controlling for the other covariates in the model. This is a similar finding to the finding of Rogers (2004). Love and Roper (1999) also found that network intensity has a positive influence on the number of innovations.

The binary logistics result in Table 8 also depicts that access to finance is positively and significantly affecting product innovation practice of MSE at a 1% level of significance. The estimated odd ratio for it is 0.244. This implies that Micro and Small Scale Enterprises that access finance were 24.4 times more likely to practice product innovation compared to those which did not access finance controlling for the other covariates in the mode. Similar findings were obtained previously (Njiraini et al., 2018; Szczepańska-Woszczyzna, 2014; Talegeta, 2014). Similarly, the regression result revealed that the gender of the owner/manager of MSEs positively and significantly affects the product innovation practice of MSEs at a 1% level of significance. The estimated odd ratio for it is 0.049. This implies that micro- and small-scale enterprises, which were female-headed were 4.9 times more likely to practice product innovation compared to those male-headed ones. The finding is in line with the results of the previous studies (Ding et al., 2006; Marvel et al., 2015). Reutzel et al. (2018) also found that female-led companies tend not to pursue innovation opportunities. He also added that women in business face more challenges in obtaining resources and capital than men. This can lower their inclination toward innovative pursuits.

## 5. Summary, conclusions, recommendations, and future research directions

### 5.1. Summary, conclusion, and recommendations

Innovation is believed to be a key element for the survival and competitive capability of firms, especially in a transitional country. This paper, as such, analyses the effect of access to technology, access to finance, access to training, availability of incentives, and gender of owner/manager of MSEs in Debre Berhan town by using a binary logistic model.

The results of the binary logistics regression model revealed that access to technology has  $P = .003$  and  $O.R = .051$ ; availability of incentive scheme has  $P = .010$  and  $O.R = .041$ ; training also has a  $P$  value of  $.002$  and  $O.R = .063$ . Similarly, networking with external knowledge has a  $P$  value of  $.03$  and  $O.R$  of  $.031$ ; access to finance has  $P = .000$  and  $O.R = .244$ , and the gender of owner/manager of the enterprise has a  $P$  value of  $.000$  and  $O.R$  of  $.049$ .

From these results, the researchers conclude that access to finance was the major factor affecting Micro and small-scale enterprises' product innovation practice in the study area positively and significantly. This is followed by access to training, access to technology, availability of incentive schemes, gender, of the owner/manager of the enterprises, and networking with external knowledge, respectively.

These results highlight the critical role of innovation in the survival and competitive capability of firms, particularly in transitional countries. The study emphasizes the need for improved access to technology, finance, and training, as well as the importance of incentivizing innovation. Furthermore, it sheds light on the importance of addressing gender disparities in entrepreneurship. Policymakers, business owners, and relevant stakeholders can utilize these insights to develop targeted strategies and interventions that promote innovation and enhance the competitiveness of micro and small-scale enterprises in similar contexts.

The findings of the studies regarding the effect of the gender of the owner/manager of the enterprise on product innovation practices in MSEs were inconsistent. For instance, on one side Horbach and Jacob (2018); Smith et al. (2018) investigated the influence of gender on product innovation practices among MSEs. Their findings indicate that female-owned/managed enterprises tend to exhibit higher levels of product innovation compared to their male counterparts. On the other side studies by Johnson and Brown (2019) and Kushnirovich et al. (2013) found that gender did not significantly affect product innovation practices in MSEs. However, the result of this study supported the significant effect of gender on product innovation practice.

The study recommends the government support micro and small enterprises so that they can access technology, training such as technical training, entrepreneurship training, and vocational training. Besides, it recommends the government and other stakeholders ought to enable Micro and small-scale enterprises to create networks with external knowledge; provide incentives for innovative Micro and small-scale enterprises; provide capacity-building training on enhancing creative self-efficacy for female enterprise owners/managers; improve access to credit service by working jointly with the banks and other credit institutions; arranging platforms that enable network among enterprises to share their experience on their innovation practices. Moreover, the researcher recommends the government and other stakeholders motivate women-headed enterprises to involve them in product innovation practice by different mechanisms such as arranging innovation expos, building business incubation centers for women entrepreneurs, and rewarding innovator enterprise owners/managers. Enterprise development office in the study area should tailor their strategies in a way that aligns with their goals while enhancing the Micro and small enterprises' product innovation capability. Furthermore, it examined the effect of gender on innovation in the study area which was not widely tested in developing counties. Thus, it contributes to innovation literature by adding generalizability.



## 5.2. Limitation and future research directions

The study was delimited to investigate factors determining product innovation practices of Micro and Small Scale Enterprises. Thus, future researchers can examine factors affecting other types of innovation such as process innovation, and market innovation. Besides, the researcher used categorical data which may represent a potential weakness in the research methodology. Hence, the researchers suggested conducting a study by employing multi-item measures. A multi-item measure can reduce the above problems. The results from a multi-item measure should be more consistent over time. Finally, the researcher also recommends further study with additional predictor variables such as the level of education of owner/manager and personality. Furthermore, the study was delimited to one city. Thus, it was better to conduct the study in a wider scope at a regional or national level.

### Acknowledgments

I would like to express my own heart felt gratitude to all participants answering the questionnaire survey at Debre Berhan town, Ethiopia.

### Funding

The author received no direct funding for this research.

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### Disclosure statement

No potential conflict of interest was reported by the author(s).

### Data availability statement

The data that assist the findings of this can be accessed upon affordable request from the corresponding author.

### Acronyms

MSE Micro and small-scale enterprises

OECD The Organization for Economic Cooperation and Development

### Correction

This article has been corrected with minor changes. These changes do not impact the academic content of the article.

### Citation information

Cite this article as: Exploring factors affecting product innovation practice among micro and small scale enterprises: the case study of Debre Berhan Town, Ethiopia, Abebe Getaneh Kebede & Abebaw Hailu Fikire, *Cogent Business & Management* (2023), 10: 2246746.

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**Appendix 1: Questionnaire**  
**Questionnaire filled by owner/managers of MSEs**

Dear respondent this questionnaire is prepared to explore factors affecting product innovation practice among micro and small scale enterprises in Debre Berhan Town, Ethiopia. The information gathered will be used fully and with due attention for academic purpose only. The researchers therefore, would like to assure you that the data collected will not be misused in any way. Therefore, your genuine, honest and prompt response is valuable input for the quality and successful completion of the paper. It is not necessary to write your name. Thank you in advance for your sincere cooperation.

Gender

Male

Female

<u>No</u>	Items	Response	
		Yes	No
1	Did your business, in the last financial year, develop any new products or substantially changed products?		
2	Do you have adequate access to finance for the operation of your business?		
	Do your enterprise have network with external knowledge?		
3	Is there incentive scheme for product innovation practices of micro and small enterprises in your locality?		
4	Do you have access to technology?		
5	Do you have access to training which helps you for product innovation?		