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Research Article

Socioeconomic determinants of the individual micro-entrepreneur (IME)

Mateus Cerqueira Anício Morais[a*], Magnus Luiz Emmendoerfer[b], José Ricardo Vitória[c], and Wesley de Almeida Mendes[d]

[a] *Department of Administration, Federal University of Juiz de Fora, UFJF, Governador Valadares, MG, Brazil*
[b] *Departament of Administration and Accounting, Universidade Federal de Viçosa, UFV, Viçosa/MG, Brazil*
[c] *Minas Gerais Federal Institute, IFMG, Ouro Preto, MG, Brazil*
[d] *Public Administration, Government and Society Studies Center (N+APGS), Universidade Federal de Viçosa, UFV, Viçosa, MG, Brazil*

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***Corresponding author:**
Mateus Cerqueira Anício Morais
mateuscamorais@gmail.com

Abstract

Objective: identifying the possible relationships between socioeconomic variables and the manifestation of the Individual Micro-Entrepreneur (IME). **Methodology/approach**: from the survey of characteristics of the IME, in databases in the Brazilian scope, under a quantitative approach, multiple regression analysis was applied, including social and economic variables of municipalities in Minas Gerais. **Main results**: there are significant effects of the variables education, income, and basic sanitation on the proportion of IME at the municipal level. Their values show that better socioeconomic conditions are inversely related to the IME. **Theoretical/methodological contributions**: this study contributes to the discussion on entrepreneurship policies and the types of businesses to be promoted by governments. It identifies its explanatory variables in developing countries. **Relevance/originality**: this study (a) strengthens the scientific construction based on the results of the institution of the legal framework of the IME in Brazil; and (b) it delves into issues related to the effect of socioeconomic variables on IME, covering entrepreneurship "for survival" and as a "lifestyle" – themes that are still little explored by the academic literature, especially when it involves developing countries. **Social/management contributions**: in practical terms, to present the social and economic realities of entrepreneurs benefiting from the IME legal apparatus provides grounds for reflecting and analyzing the expected effects of this public policy.

Keywords: Individual Micro-Entrepreneur (IME). Socioeconomic conditions. Public policy. Informality.

Resumo

Objetivo: identificar as possíveis relações entre as variáveis socioeconômicas e a manifestação do Microempreendedor Individual (MEI). **Metodologia/abordagem**: a partir do levantamento de características do MEI, em bases de dados no âmbito brasileiro, sob uma abordagem quantitativa, aplicou-se a análise de regressão múltipla, incluindo variáveis sociais e econômicas de municípios de Minas Gerais. **Principais resultados**: há efeitos significativos das variáveis educação, renda e saneamento básico sobre a proporção de MEI no âmbito municipal. Seus valores oferecem indícios de que melhores condições socioeconômicas estão inversamente relacionadas ao MEI. **Contribuições teóricas/metodológicas**: este estudo contribui para a discussão sobre as políticas de empreendedorismo e os tipos de negócios a serem fomentados pelos governos; e para a identificação de suas variáveis explicativas, em países em desenvolvimento. **Relevância/originalidade**: este estudo (a) fortalece a construção científica pautada nos resultados da instituição do marco legal do MEI no Brasil; e, (b) se aprofunda em questões relativas ao efeito das variáveis socioeconômicas no MEI, abarcando o empreendedorismo "por sobrevivência" e como "estilo de vida" – temas ainda pouco explorados pela literatura acadêmica, principalmente quando envolve países em desenvolvimento. **Contribuições sociais/para a gestão**: em termos práticos, a apresentação das realidades sociais e econômicas dos empreendedores beneficiados pelo aparato legal do MEI oferece fundamentos para reflexões e análises sobre os efeitos esperados com a política pública em questão.

Palavras-chave: Microempreendedor Individual (MEI). Condições socioeconômicas. Política pública. Informalidade.

INTRODUCTION

In the literature, entrepreneurship has been associated with socially desirable economic returns due to its influence on employment and income, as well as on elements related to structural changes in production (Aviram et al., 2019; Lundström & Stevenson, 2006). This can be observed in introducing public policy agendas and adopting practices to advance entrepreneurship worldwide (Audretsch et al., 2007). These studies are concentrated in developed countries, mainly in the so-called "first world" (Jarvis & He, 2020).

In this context, identifying entrepreneurship's determinants is a significant challenge in the academic literature. The studies strive to verify significant economic, cultural, and institutional factors to explain the different levels of entrepreneurial activity among countries, regions, and localities (Aparicio et al., 2016; Castaño et al., 2015; Freytag & Thurik, 2007; Morais et al., 2022).

It is noteworthy that most research focuses on high-growth entrepreneurship, that is, high-growth firms responsible for accelerated economic returns; consequently, these firms are relevant for applying public resources (Lee et al., 2021; Shane, 2009). This perspective has prevailed among international public policy recommendations in specialized papers (Aviram et al., 2019).

However, other approaches, such as those by Morris, Neumeyer, and Kuratko (2015) and Morris, Neumeyer, Jang, and Kuratko (2018), point to the importance of public fostering of entrepreneurship's other manifestations to structure an entrepreneurial ecosystem. This should happen both in high-growth companies, which generate vigor and competitiveness in the economy, and in subsistence enterprises, which provide a minimum income for the dignified survival of their owners.

Thus, it can be observed that the entrepreneurship discussion involves the perception of an individual entrepreneur's decision and an economic notion of the State. However, if entrepreneurship influences the economy, the contrary is also true, especially for developing countries (Morais et al., 2022). As Almeida, Valadares, and Sediyama (2017) point out, the Brazilian economy, especially in times of crisis, sets a different scenario for the entrepreneur. Opportunity entrepreneurship - the exploitation of neglected markets - is substituted by necessity entrepreneurship, which occurs when individuals need better income, are unemployed, have low professional qualifications, or suffer from other elements that hinder entering the labor market.

In this perspective, the Brazilian government has historically presented several public policies to foster entrepreneurship, which are not restricted to only one form of entrepreneurial activity (Borges et al., 2018; Fernandes, 2019). This article focuses on the Complementary Law (LC) No. 128 (Brazil, 2008), which instituted the Individual Micro-entrepreneur (IME), improving the General Law of the Micro and Small Business - LC 126/2006 (Borges et al., 2018).

The new classification covers entrepreneurs with gross annual revenues up to sixty thousand reais (eighty-one thousand reais, as of 2018), with a maximum of one minimum wage employee. LC 128/2008 considerably reduced bureaucratic and tax costs, establishing a new tax and social security contribution standard for eligible Brazilian entrepreneurs. The creation of the IME instituted a simplified process for obtaining a free CNPJ (registration number), exemption from federal taxes (IR, PIS, COFINS, IPI, and CSLL), and a new contribution model with a 5% fixed rate on the minimum wage to gain access to social security benefits.

Since the creation of this legislation, the research has focused on entrepreneurship that used this legal framework, with functionalist (Morais & Emmendoerfer, 2018) and critical (Wissmann, 2021) approaches. However, there is avid space to scientifically explore its main determinants (Corseuil et al., 2014; Lima et al., 2016; Moreira, 2013; Oliveira, 2013; Vasconcelos, 2016).

In this sense, understanding that there is a relationship between entrepreneurship and the economy, academic research is still scarce on entrepreneurship and public policies in Brazil (Morais et al., 2022), especially after implementing the IME policy. The literature lacks focused analysis and evaluation of this policy, considering its relationship with possible social and economic determinants.

Thus, this paper aims to fill this theoretical gap, identifying possible relationships between social and economic variables with the manifestation of the Individual Micro-entrepreneur (IME). For the present research, social and economic elements that affect the process of micro-entrepreneurship in Brazil are understood as determinants of entrepreneurship.

ENTREPRENEURSHIP FORMS, DETERMINANTS, AND INDIVIDUAL MICRO-ENTREPRENEURSHIP

In the present research, the entrepreneurial management model is adopted, defined as the action of starting a business or promoting its expansion (Cunningham & Lischeron, 1991; Kuratko, 2019). In the context of individual micro-entrepreneurship, business formalization registers its existence, which is a criterion of entrepreneurial activity for this study.

There are efforts in the specialized literature to differentiate and classify the existing types of entrepreneurship (Gedeon, 2010; Greco et al., 2020). One internationally recognized type is the Global Entrepreneurship Monitor report, which uses entrepreneurial motivation as a parameter. The ventures are typified, becoming valuable classification inputs for research on entrepreneurship (Morais et al., 2022). There are two groups established in the report: (i) Necessity Entrepreneurship: when a company is founded because of the entrepreneur's need for subsistence; (ii) Opportunity Entrepreneurship: when the venture arises from an opportunity identified in the market (Reynolds et al., 1999).

Necessity entrepreneurship tends to be more present in less stable economies with high unemployment (Block & Wagner, 2010). Generally, it has low growth potential and is a way for individuals to escape financial crises.

Thus, less developed countries generally tend to present higher levels of necessity entrepreneurship, while opportunity entrepreneurship manifests itself more in developed countries (Greco et al., 2020).

Morris et al. (2015) distinguished four types of entrepreneurship from several criteria, such as size, production volume, capital, level of growth, and other characteristics. Thus,

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four typologies were determined: (i) Survival businesses: which promote basic subsistence for the entrepreneur and their family and usually do not have facilities and have few assets; (ii) Lifestyle businesses: formed by ventures that provide a stable return for their owners, who modestly reinvest in their business to maintain local market competitiveness; (iii) Managed Growth businesses: composed of firms that have a viable business model and seek stable long-term growth, occasionally producing new products and expanding their markets and facilities; (iv) High (aggressive) growth firms - known as "gazelles", which are technology-based firms, highly innovative, and grow exponentially (Morris et al., 2015).

Regarding these classifications, Morris et al. (2015) point out that each is important for creating a healthy entrepreneurial ecosystem and meeting specific societal needs.

Thus, the typology proposed by Morris et al. (2015) was chosen for this research because it expands the traditional dichotomous discussion of entrepreneurship types (necessity or opportunity) to four. Of those four, three may come close to the goals of the IME: entrepreneuring to survive is similar to necessity entrepreneurship, a means of leaving a crisis or formalizing. However, entrepreneurship as a "lifestyle" and "managed growth" are important to offer basic services to society, guaranteeing stable jobs in the long term. In this way, "Gazelle" firms are the most profitable and have accelerated growth, and they have been the focus of public policies for economic development (Morris et al., 2015; Shane, 2009).

Considering Vale's (2014) results and financial characteristics and its financial characteristics (annual income of up to R$ 81,000 and a maximum of one minimum wage employee), it is understood that the IME fits between the typologies "survival" and "lifestyle". The presented analysis supports this assertion since it is possible to deduce entrepreneurs' motivations and their market framework, given the characteristics of the businesses in the IME category and the economic and social conditions surrounding their owners.

Verheul et al. (2002) note entrepreneurship's eclectic and interdisciplinary nature, which encompasses geographic, financial, administrative, sociological, political issues, and other aspects. The authors point out that there are multifactorial determinants of the entrepreneurship level in society.

In the same way, the Organization for Economic Cooperation and Development (OCDE, 1998) attests that there is no single set of causes to determine the increase or decline in the number of entrepreneurs in society. However, several technological, economic, institutional, and cultural factors may influence individuals' entrepreneurial activity.

In the context of formulating public policies to encourage entrepreneurship, the studies cited here, such as the one by Aviram et al. (2019), point to the relevance of understanding the factors that can influence entrepreneurial activity.

Pinho and Thompson (2016) propose an analysis model using a few dimensions as entrepreneurship influencers: Cultural and social norms; Entrepreneurship education and training; and Government programs in entrepreneurship, which create an opportunity to start a new business and generate individual capacity for new businesses. In their research, the authors analyzed Portugal and Angola, and among several findings, they observed that increasing education positively influences the probability of entrepreneurship growth in Portugal. However, in Angola, education had no relevance to the increase of entrepreneurship.

Lundström and Stevenson (2006) point out that the aspects that affect entrepreneurship in society are still being built. In general, the authors present five dimensions that seem to influence entrepreneurship levels, namely: (i) Structural, macroeconomic, and demographic dimensions; (ii) Cultural dimensions; (iii) Personal (human) dimensions; (iv) Small and Medium Enterprises (SMEs) Density and Entrepreneurial Dynamics dimension; and (v) Public Policies dimension.

In the same vein, the work of Verheul et al. (2002) seeks to build an eclectic entrepreneurship theory, conducting a synthesis regarding the main entrepreneurship determinants. Thus, this phenomenon has multiple determinants in addition to the various forms of entrepreneurship. For this reason, to explain entrepreneurship, the authors present aggregate categories of variables, such as (1) opportunity factors - determinants that provide opportunities to undertake in an economy, such as the increase in income and the creation of new technologies; (2) resource skills and (3) preferences and characteristics - determinants related to financial and non-financial resources, beneficial to the creation of new ventures, in addition to the very skills and characteristics of individuals in a society; and (4) costs and benefits - variables that influence attractiveness to open a business, the de-bureaucratization policies (such as Complementary Law No. 128).

The explanatory variables related to entrepreneurship's social and economic conditions are often distributed among its various categories. The financial situation of the locality, education, health, and security (not only physical but the guarantee of essential services necessary for survival) are determinants of (and crucial to) entrepreneurship. As such, these factors can encourage or discourage an individual from leaving regular employment to become an entrepreneur; and interfere with an unemployed person's decision to be motivated or discouraged to seek regular employment rather than to become an entrepreneur (Lundström & Stevenson, 2006; Verheul et al., 2002).

Health is an important social dimension for public agents. For Verheul et al. (2002), when the State does not offer basic health services, leading the individual to bear its costs, entrepreneurship is discouraged, considering that, in regular work, the health service is offered by the employer.

The primary measurement of the economy, the "Gross Domestic Product" (GDP), is included in many academic works to understand the relationship between economic strength and entrepreneurial activity (Prieger et al., 2016; Smith & Chimucheka, 2014; Urbano & Aparicio, 2016). The literature demonstrates a U-shaped relationship between GDP growth and entrepreneurship, which is explained by the various manifestations of this phenomenon (Lundström & Stevenson, 2006).

Ventures motivated by necessity tend to relate inversely to economic conditions, while those inspired by opportunity show a positive relationship (Lundström & Stevenson, 2006).

Regarding this phenomenon, Morais et al. (2022) explain that entrepreneurs motivated by necessity, i.e., by the urgency to obtain income, tend to open new companies more in periods of

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low economic growth, while the opposite is true in times of economic growth. According to the authors, business growth during GDP acceleration, which results in the "U" shape, occurs due to the increase of entrepreneurship by opportunity in these periods, i.e., businesses opened due to opportunities identified in the markets.

Education-related variables are used in some research as a proxy for "Culture" to understand the effects of cultural variables on different levels of entrepreneurship. For example, Castaño et al. (2015) demonstrate education's impact on the level of opportunity entrepreneurship in several countries, attesting that it is more significant in European countries than Latin American ones.

In the present research, we include variables related to health and basic sanitation, which have been little explored in the literature. However, based on previous studies, it is possible to hypothesize that the absence of these elements in society would be related to low economic development, which favors informality and necessity entrepreneurship (Castaño et al., 2015; Greco et al., 2020; Kenyon & Kapaz, 2005).

In the Brazilian context, the Brazilian Micro and Small Business Support Service (SEBRAE) has produced periodic reports on the profile of the Individual Micro-entrepreneur (IME) (Sebrae, 2016; 2017a; 2017b). Based on these works, this section presents relevant information to understand Brazilian IMEs, highlighting their main geographic, social, and economic characteristics. The regulation of Individual Micro-entrepreneurs began in 2009 and showed an average growth of 831,237 new registrations per year until 2016 (Sebrae, 2017a). In December 2017, there were 7,729,234 IME registrations in Brazil (Portal do Empreendedor, 2017).

These numbers show society's positive response to this public policy, which aims to formalize old and new businesses. On the other hand, academic analyses prove that Law 128's impacts go beyond its intentions since it may be used as a tool to outsource the staff of established businesses or to downsize companies (Corseuil et al., 2014).

In regional terms, many IMEs are concentrated in the South and Southeast regions and the state of Bahia in the Northeast. São Paulo has the most individual microentrepreneurs (1,711,010); Rio de Janeiro is in second place (816,607); Minas Gerais is third (729,746), placing the Southeast region as the most entrepreneurial in this type (Sebrae, 2017a).

The Sebrae report (2017a) on IME also shows that the Individual Micro-entrepreneur is more concentrated in large urban centers, such as capital cities. Their geographical distribution may indicate that this entrepreneurship model is linked to greater economic dynamism because these businesses are in regions with this characteristic (Aparicio et al., 2016; Lundström & Stevenson, 2006; Verheul et al., 2002).

Demographically, in 2016, individual micro-entrepreneurs were primarily male (52.4%), and thus 47.6% were female. Statistics also showed that 43% of IMEs were white, 42% brown, 11% black, 2% oriental, and 1% indigenous. These numbers followed the racial proportions of the general Brazilian population indicated in the 2010 census (Brazilian Institute of Geography and Statistics [IBGE], 2011).

The sectors with the most individual micro-entrepreneurs in the economy are commerce and services. The most frequent activities are retail, food, and beauty services, all of which have a low potential for accelerated growth. This characteristic distinguishes this entrepreneurship modality from the types commonly contemplated by public policies at the international level and scientific mainstream interests, which tend to study and promote technology-based enterprises (Morris et al., 2015). Furthermore, the argument that IME policy has reached businesses similar to the "survival" or "lifestyle" categories presented by Morris et al. (2015) is supported.

It is worth mentioning the socioeconomic profile of individual micro-entrepreneurs that can be partially observed by identifying the educational and income level of the entrepreneurs under analysis. According to the report on IMEs' profiles (Sebrae, 2017a), most individual entrepreneurs have completed high school (32%) or completed higher education (20%), indicating that more than half of the IMEs have at least 12 years of schooling. This is a favorable indicator regarding literacy and mastery of essential management techniques. Moreover, only 1% of the studied IMEs have no education, as indicated by the report.

Concerning the economic condition of IMEs, Sebrae (2017b) points out that the family income, considering all household income, was around R$ 3,926 in 2016, equivalent to a little over four minimum wages (R$ 937.00 in that year). According to Sebrae (2017a), 57% of individual microentrepreneurs have a per capita household income above R$ 908.01. For the most part, IMEs fall mainly between "upper middle class," (per capita family income between R$ 908.01 and R$ 1444.01) and "upper class" (per capita family income above R$ 3,515.01).

According to Sebrae (2017a), the proportion of micro-entrepreneurs in the social classes "poor" (9%) (per capita family income between R$ 115.0 and R$ 230) and "extremely poor" (2%) (per capita family income below R$ 115.0) is relatively low. This context may result from two factors: (i) individuals who opened their companies may have improved their economic condition over the years, rising socially; (ii) self-employed entrepreneurs from less privileged classes have opted for informality. These are questions to be answered by future research.

The information described in this section shows that the Individual Micro-entrepreneur is more prevalent in regions with greater economic dynamism and large urban agglomerations. Moreover, it is observed that this entrepreneurship model tends to be more present among groups with higher incomes and more than 12 years of formal education.

The analysis of the IME profile indicates a positive relationship between this phenomenon and better living conditions, which is the central issue of this research. It is worth understanding whether these elements are confirmed from a "macro" analysis under municipal indicators.

METHODOLOGICAL PROCEDURES

This article aims to identify the possible relationship between social and economic conditions and the Individual Micro-entrepreneur (IME) expressed in the Brazilian municipal sphere. For this purpose, we chose to perform a quantitative approach using linear regression analysis, which consists of a statistical model applied to predict the behavior of a quantitative dependent

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variable based on its relationship with one or more explanatory variables (Pestana & Gageiro, 2008).

Since this is a model composed of more than one exogenous variable, a multiple regression analysis was developed. It primarily requires the variables included in the model to be scalable and their relationship linear and additive (Pestana & Gageiro, 2008). The regression function was estimated by Ordinary Least Squares (OLS), which provides a function estimated from the sum of squared error variances (Hair et al., 2009).

This model (multiple linear regression) is widely used in entrepreneurship-related research that often aims to identify the determinants of this phenomenon (Aparicio et al., 2016; Castaño et al., 2015; Giacomin et al., 2011; Jiménez et al., 2015; Melo et al., 2015), or measure the impacts of different types of entrepreneurship on economic variables (Barros et al., 2008; Fontenele, 2010), as well as the relationships between entrepreneurship and social and individual variables (Block & Wagner, 2010; Julião, 2014).

Cross-sectional data were collected from the 853 municipalities in the state of Minas Gerais in 2013, considering the theory and the research proposal. This year is justified by the data unavailability of the following years for all analysis variables.

The estimated function can be represented as follows:

$$MEI = \alpha + \beta_i Educ_i + \beta_i Saúde_i + \beta_i Sane_i + \beta_i Renda_i + \varepsilon$$

Where:

- i = 1, 2, 3, 4, ..., n;
- α = intercept, being the average value of Y when X equals zero;
- β = Coefficient of the explanatory variable relationship;
- MEI = Dependent variable concerning the Individual Micro-entrepreneur (IME);
- Educ = Variables related to education, indicated by the theory;
- Saúde = Variables related to health, indicated by the theory;
- Sane = Variables related to sanitation, indicated by the theory;
- Renda = Variables related to income, indicated by the theory;
- ε = Residual random variable, describes the effects of the endogenous variable not explained by the endogenous variables.

The delimitation for Minas Gerais was due to the possibility of covering a satisfactory sample from the state with the highest number of municipalities and the third-largest number of Individual Micro-entrepreneurs (IME) in Brazil (Sebrae 2017a; 2017b). According to Emmendoerfer and Soares (2014), this Brazilian federative body's representativeness is also expressive because its territorial dimensions are akin to France, Sweden, Spain, and Japan. Furthermore, its economy is equivalent to countries such as Israel, Ireland, Chile, and the Czech Republic. Therefore, for this study, the state of Minas Gerais was considered conducive to understanding the relationship between this phenomenon (entrepreneurship) and the socioeconomic conditions of municipalities.

Variables were sought in national databases until 2017, with data available at the time of the research, in 2019. The databases consulted were accessed on the websites of the Federation of Industries of the State of Rio de Janeiro (FIRJAN), the Brazilian Institute of Geography and Statistics (IBGE), the Ministry of Labor and Employment (MTE, since 2021, Ministry of Labor and Social Security - MTPS), the Unified Health System (SUS), and the Anísio Teixeira National Institute of Educational Studies and Research (INEP) of the Ministry of Education (MEC).

These variables are related to the economy, health, education, and housing dimensions, which may influence individual entrepreneurship. The variables present in the model (Table 1) were selected by using the filter of available data from 2013 on official databases (involving the largest number of municipalities and greater credibility of its exposure), as well as those already indicated in the literature, for their relevance (Lundström & Stevenson, 2006; Verheul et al., 2002).

Table 1

Description of variables and source of research data

Variables		Description	Sources
Income	propMEI	Proportion of IME's over the number of employed people.	FIRJAN
	Pibpcap	Municipal GDP per capita (thousand).	IBGE
	Proptrabfund	Ratio between the number of workers with Elementary Education and the total number of jobs, registered in the Ministry of Labor and Social Security.	RAIS/CAGED – MTE
	Proptrabmed	Ratio between the number of workers with high school education and the total number of jobs, registered in the Ministry of Labor and Social Security.	RAIS/CAGED – MTE
	Proptrabsup	Ratio between the number of workers with higher education and the total number of jobs, registered in the Ministry of Labor and Social Security.	RAIS/CAGED – MTE
Sanitation	Proplixo	Proportion of families served by the Family Health Strategy (formerly PSF), with public service of selective collection.	DATASUS/ SUS
	Propesgo	Proportion of families served by the Family Health Strategy (formerly PSF), with sewage service for collecting feces and urine.	DATASUS/ SUS
	Propagua	Proportion of families served by the Family Health Strategy (formerly PSF), with water treatment (filtering of the water received).	DATASUS/ SUS
	Propenerg	Proportion of families served by the Family Health Strategy (formerly PSF), with electric energy service.	DATASUS/ SUS
Health	Propimun	Proportion of vaccine doses applied in families served by the Family Health Strategy (formerly PSF).	DATASUS/ SUS
	Propobt	Proportion of deaths, registered by place of residence - that could have been avoided with the provision of basic care - for the population between 5 and 74 years old, in families served by the Family Health Strategy (formerly PSF).	DATASUS/ SUS
Education	Alfund	Ratio between the number of students enrolled in Elementary School and the number of classes available, multiplied by 100.	EDUCACENSO /INEP/MEC
	Almed	Ratio between the number of students enrolled in high school and the number of classes available, multiplied by 100.	EDUCACENSO /INEP/MEC
	Distfund	Ratio of the number of students enrolled in Primary School, older than the regular grade, to the total number enrolled in Primary School, multiplied by 100.	EDUCACENSO /INEP/MEC
	Distmed	Ratio of the number of students enrolled in high school who are above the regular age for their grade to the total number enrolled in high school, multiplied by 100.	EDUCACENSO /INEP/MEC

Note: Elaborated by the authors (2022).

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It is worth mentioning that the variables were relativized to enable their equalization in the regression. An exploratory data analysis was then performed, identifying its position, distribution measures, and normality, highlighting and removing the outliers with considerable distances.

In addition to the assumptions inherent in a multiple linear regression model, such as homoscedasticity, absence of autocorrelation, and multicollinearity (Hair et al., 2009), the validity of the model was obtained with the F-Test, which tests the hypothesis (H0) of the nullity of the coefficients and the parameter of the independent variables included in the model (Triola, 2014).

From this procedure, the significance of the coefficients of each explanatory variable is tested (T-test). The explanatory capacity of the model is given by the variation of the dependent variable explained by the exogenous variables. Homoscedasticity was tested by analyzing value dispersion of the standardized residuals; and residual auto-correlation by the Dubin-Watson Test (Triola, 2014). This study used the Stata® 14 software to perform these statistical techniques.

RESULTS AND DISCUSSIONS

After carrying out the previously described methodological procedures, it was possible to obtain results demonstrating the existing relationship between the IME and the social conditions of the municipalities of Minas Gerais. Table 2 presents the descriptive statistics, resulting from the exploratory analysis of the research data.

Table 2

Descriptive statistics

Variables	*n*	Average	Standard Deviation	Minimum	Maximum
propMEI	596	0.113	0.095	0.013	1.989
Pibpcap	596	12.480	7.140	0.954	80.729
Proplixo	584	0.749	0.186	0.188	1.000
propesgo	584	0.631	0.286	0.000	1.000
propagua	584	0.826	0.156	0.830	1.000
propenerg	584	0.982	0.020	0.420	1.011
propimun	584	1.034	0.316	0.000	2.891
Propobt	584	0.004	0.001	0.015	0.016
proptrabfund	573	0.128	0.044	0.085	0.297
proptrabmed	573	0.358	0.086	0.031	0.610
proptrabsup	573	0.131	0.049	0.284	4.100
Alfun	596	20.87	3.092	12.30	28.500
Almed	595	29.70	4.659	4.100	41.400
Disfund	596	17.40	5.850	7.400	39.100

Note: Elaborated by the authors (2021).

Some cases were excluded, due to outliers identified in the BoxPlot, with high discrepancy from the data distribution in general. It was decided not to exclude all of them (like moderate distances) to keep as many cases as possible, which could be acceptable until almost symmetric or mesokurtic distributions were found (Pestana & Gageiro, 2008). Variable relativization can also be evidenced (Table 2), ensuring that variables can be comparable and included in the model. It is noteworthy that the IME proportion exceeds one hundred percent because some municipalities have more registered microentrepreneurs than the employed population.

The model generated showed a significant F-Test (Table 3), which was validated, indicating that at least one of the explanatory variables has a significant relationship with the dependent variable in the regression. However, its explanatory power is not satisfactory since its R^2 is 0.138, indicating that only 13.8% of the variation in the microentrepreneur's proportion in the municipalities of Minas Gerais can be explained by changes in this model's variables. This is due to entrepreneurship's multiple determinants, as mentioned in the theoretical framework, a circumstance that did not make this research unfeasible.

The Durbin-Watson autocorrelation test analyzes the independence between the residual random variables. Since the test value was 1.944, lying between 1.36 and 2.64, we accepted the hypothesis that the covariance between the residuals was null; that is, there was no autocorrelation. Two variables were then excluded from the model - the "number of students approved in elementary school" and "the number of students approved in high school" (*aprovfund*, *aprovmed*), accused of multicollinearity, which would violate one of the assumptions of the linear regression analysis (independence among the explanatory variables).

Tabela 3

Effects of social and economic variables on IME

Variable	propMEI
Pibpcap	-0.356 (0.000)***
Proplixo	0.061 (0.333)
Propesgo	0.040 (0.447)
Propagua	0.071 (0.090)*
Propenerg	-0.011 (0.806)
Propimun	-0.007 (0.883)
Propobt	0.012 (0.809)
Proptrabfund	0.018 (0.671)
Proptrabmed	-0.026 (0.539)
Proptrabsup	-0.011 (0.792)
Alfund	0.118 (0.023)**
Almed	-0.008 (0.851)
Distfund	0.143 (0.004)***
Distmed	-0.038 (0.445)
Const.	0.083 (0.476)
R^2 = 0.138	*Teste F = 0.000*
R^2 **ajusted** = 0.116	
Durbin-Watson = 1.944	*Excluded: aprovfund; aprovmed*

Notes : * = significant at 10%.
** = significant at 5%.
*** = significant at 1%.
In parentheses is robust standard errors.
Elaborated by the authors (2022).

In the proposed model, there are four significant coefficients related to: *Pibpcap*, an economic variable - "GDP per capita"; *Propagua* a basic sanitation variable - "proportion of families served by the PSF that has filtered water"; and two significant coefficients concerning education educação (*Alfund* e *Distfund*). Thus, the health and labor variables are not significant in the model.

GDP per capita was the most significant variable, with the highest explanatory weight on IME. According to the results, for each unit of variation in per capita income in a municipality, the proportion of individual microentrepreneurs among the employed population decreases by 0.365. This indicates an inverse relationship between these variables; that is,

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municipalities with higher income tend to present lower proportions of IME.

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This result may indicate that wealthier municipalities tend to offer employment opportunities that rival the potential benefits of undertaking low financial return activities. Conversely, cities with lower per capita income may create fewer formal job opportunities with competitive wages, making entrepreneurship's "cost/benefit" favorable to increasing IME. Given the academic literature, the result brings IME closer to the characteristics of entrepreneurship by necessity, as it is more present in regions with lower per capita incomes (Ács et al., 2014; Castaño et al., 2015).

However, such evidence does not appear in the previously discussed results presented by Sebrae (2017a). That report states that most microentrepreneurs belong to social classes with better income conditions. Two hypotheses can explain such incongruence. First, the "macro" relationship between cities' socioeconomic conditions and IME does not necessarily represent the characteristics of this population when analyzed individually. This would imply that, even though the IME group is located in a municipality with low economic power, it would not suffer directly from the poor municipal socioeconomic conditions. Second, the activities linked to the IME may guarantee an adequate income level for entrepreneurial families.

Such interpretations align with the perspective that IME formalization can be a path for entrepreneurial activities motivated by necessity. This path could be promising since it has generally provided better socioeconomic conditions for entrepreneurs, to the detriment of the low municipal performance. This would imply that the IME, as a public policy (Borges et al., 2018) of formalization and incentive to low-impact entrepreneurship, would present beneficial results for its target audience.

The significant coefficients related to education were the ones that stood out the most, in terms of quantity, compared to the other sets of variables. According to Fontes and Pero (2011) and Morais and Emmendoerfer (2018), education is a relevant indicator of income among microentrepreneurs, as it tends to affect business returns and management positively.

In the model generated, the effect of elementary school on IME stands out: the increase in the number of students per class, distortions in their completion, and other problems in the child's education and family conditions tend to positively affect the number of IME (Portella et al., 2017). Such problems include dropout and abandonment (when the student gives up on continuing his studies and decides to return later); constant failure (for not understanding the subject or not having resources at home that enable revision and out-of-class study), late enrollment (when parents or guardians decide to enroll the student after the correct enrollment period); as well as the teacher's workload - too many students per class, which restricts the teacher's attention to a few and can hinder learning and, by extension, facilitate school dropout.

In municipalities with high age/grade distortion rates and large numbers of students per class in elementary school, there may be individuals with low professional qualifications and great difficulty in entering the formal labor market (Morais et al., 2022; Santos, & Gimenez, 2015; Vale, 2014). This would explain the relationship between education quality variables and the increase in the IME proportion in society.

Faced with few chances of employment or satisfactory remuneration, entrepreneurship may emerge as a plausible option to ensure better living conditions in the long term. The model's capture of this relationship implies that the public policy regulating the IME is reaching an audience that seeks entrepreneurship as a means of survival or a lifestyle (Morris et al., 2015).

This result converges with the Sebrae report (2017a), which stated that the number of IME workers with complete high school education without technical or higher education corresponds to 73% of the total number of registered IMEs in Brazil.

Finally, we consider the variable "*Propagua*" (basic sanitation indicator) significant, which presents the proportion of families served by the Family Health Strategy with water treatment and filtration. According to the model results, an increase of one unit in the explanatory variable tends to increase the proportion of IME by 0.071 units. This variable has a low amplitude in the cities analyzed, and the results show that few microentrepreneurs suffer from great social vulnerability.

In general, the results show that there may be differences between the social and economic conditions of the analyzed microentrepreneurs and the cities where they come from, in line with the preliminary findings of Morais and Emmendoerfer (2018). Although most Brazilian IMEs present higher income and education levels, the model generated for the municipalities indicates a possible inverse relationship between the proportion of individual microentrepreneurs and the social conditions.

In addition, the most frequent sectors and economic activities among IME demonstrate, in line with the literature on the subject, that this Brazilian worker is close to necessity entrepreneurship (Morais et al., 2022), or it is for "survival" and "lifestyle" (Morris et al., 2015). This is reinforced by the correlation of this entrepreneurship with important instruments to escape economic crises and to promote jobs and basic goods and services for society.

FINAL CONSIDERATIONS

The model was proposed to identify the relationship between social and economic variables and the manifestation of the individual microentrepreneur. As an entrepreneurship policy, it revealed peculiarities capable of subsidizing analysis and evaluation of public policies with this focus.

While most individual microentrepreneurs belong to social classes with higher income levels and with more than 12 years of study, the inverse relationship found between the "IME proportion to the employed population" and socioeconomic indicators leads us to reflect on the reasons that drive them to formalize their business and the consequences of this decision.

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In general terms, the inverse relationship between the dependent variable and cities' socioeconomic status brings the IME phenomenon closer to the general characteristics of necessity entrepreneurship. As is extensively evidenced in the literature, this type of entrepreneurship tends to be frequent in situations of low economic development. Similarly, the model's results indicate increased IME formalization in unsatisfactory socioeconomic circumstances. This may be related to the search for entrepreneurship to improve income levels in a low economic development scenario.

The contrast between the model's results and the IME population's general characteristics may indicate that the individual microentrepreneurs who benefit from the policy have ascended socially, reaching better income levels, education, and sanitation. These parameters may indicate that IME's regulation as a public policy of formalization is capturing the success of entrepreneurs for survival or lifestyle in precarious socioeconomic conditions.

Despite the reflexive potential arising from this work's methodological approach, the proposed quantitative approach and the model are not without limitations. For example, the Multiple Linear Regression model strives to operate the research in only one period, not allowing the investigation of temporal relations on the dependent variable. Moreover, it requires a linear relationship between the dependent and independent variables for better responsiveness, which is difficult in applied social sciences.

On the other hand, the results advance the literature by presenting the relationship between social conditions - in particular, GDP and the education supply - and individual micro-entrepreneurship. Moreover, they promote reflections on the general implications of this scenario concerning the motivations and possible consequences of entrepreneurship. In this sense, public agents must analyze and evaluate how public policies interact to enhance social outcomes, including from an integrative policy perspective.

Thus, this work sheds light on possible theories of the object studied based on two factors (assumptions) addressed here that may be refined by future research: (1) individuals who opened their companies improved their economic condition over the years, rising socially; (2) self-employed entrepreneurs, belonging to less favored classes, have opted for informality. Thus, future studies can reapply the proposed model, aiming to improve and mitigate its limitations, comparing data from municipalities in other Brazilian states and regions to identify IMEs' motivations. This may reveal congruencies and singularities associated with regionalities and territorial aspects, historically situated in terms of development, sustainability, and diversity.

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Conflict of interest statemen

The authors declare that there is no conflict of interest.

Authors' statement of individual contributions

Rules	Contributions			
	Morais MCA	Emmendoerfer ML	Vitória JR	Mendes WA
Conceptualization	■	■		
Methodology	■			■
Software	■			■
Validation	■	■	■	■
Formal analysis	■	■		■
Investigation	■			
Resources	■	■	■	
Data Curation	■	■		
Writing - Original Draf	■			
Writing - Review & Editing	■	■	■	
Visualization	■	■	■	
Supervision		■		
Project administration	■	■	■	
Funding acquisition		■		

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BIOGRAFIA DOS AUTORES

Mateus Cerqueira Anício Morais *is a substitute professor of Business Administration at the Federal University of Juiz de Fora (UFJF), Governador Valadares/MG campus. Doctor in Public Administration from the Universidade Federal de Viçosa (UFV). Member of the Research Group on Management and Development of Creative Territories (GDTeC). His areas of interest are Public Policy, Entrepreneurship and Innovation, Graduate Studies and Research, Knowledge Economics, and Systems Dynamics.*

E-mail: mateuscamorais@gmail.com.

Magnus Luiz Emmendoerfer *is an Associate Professor in the Graduate Program in Public Administration, Universidade Federal de Viçosa (UFV), and the Graduate Program in Tourism and Heritage, Federal University of Ouro Preto (UFOP). He has a Doctorate in Human Sciences: Sociology and Politics from UFMG. General Coordinator of UNESCO Chair in Creative Economy and Public Policies. His main areas of interest include Public Policy Governance, Qualitative Methods, Tourism, Entrepreneurship and Innovation in the Public Sector.*

E-mail: magnus@ufv.br.

José Ricardo Vitória *is a substitute professor of Administration at the Minas Gerais Federal Institute, IFMG, Ouro Preto/MG campus. He holds a Ph.D. in Public Administration from the Universidade Federal de Viçosa (UFV). Member of the Research Group on Management and Development of Creative Territories (GDTeC). His areas of interest include Public Policy, Culture, Creative Economy, Innovation, Tourism, Events and Leisure.*

E-mail: josericardovitoria@yahoo.com.

Wesley de Almeida Mendes *is a researcher at the Center for Public Administration, Government and Society Studies (N+APGS) at the Universidade Federal de Viçosa (UFV). He holds a Doctorate in Public Administration from UFV. His areas of interest include Public Administration, Quality of Public Management, and Human Development. His articles have been published in journals such as the Latin American Research Review and the International Journal of Entrepreneurship and Small Business.*

E-mail: wesleyadm@live.com.