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**ORGANIZATIONAL  
SUSTAINABILITY  
OF MICRO, SMALL  
AND MEDIUM-SIZED  
ENTERPRISES AND  
TECHNOLOGIES**

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**Abstract:** The article aims to “present perspectives on the use of technologies for sustainabilityorganizationalstructureofmicro-small and medium-sized companies and their impact on economic and social developments”. It was developed from analyzes in the literature and research in organizations applying the Integrated Sustainability Management model, based on the theory of entrepreneurship and the use of technologies. The problem “is there an association between the application of the Integrated Sustainability Management model and technologies in the organizational sustainability of micro, small and medium-sized companies in the sample and in economic and social development? The hypothesis “the application of Integrated Sustainability Management, combined with technologies, favors the organizational sustainability of micro, small and medium-sized companies and economic and social development”. Organizations in the sustainability debate seek to identify ways in which they can develop new forms of production and management. The World Business Council for Sustainable Development, from the Vision 2050 project, is in agreement that a world on the path to sustainability will require changes in structures, such as governance and economics. Sustainable organizations must seek efficiency in economic terms, respecting the resource capacity of the environment and ensuring social justice. As a method, bibliographic and field research in the universe of 1758 micro, small and medium industrial companies in Maranhão and 14,183 of micro and small industrial and service companies in São Luis, with exploratory data analysis of the variables,theoretical, evidences advances in the literature in the area of organizational sustainability, management technologies and the dimensions and components of technological capacity for debates in the academic community and empirical research

in organizations. in the contributionssocial and managerial aspects, the application of the Integrated Sustainability Management model, combined with technologies, open up perspectives for favoring organizational sustainability in micro, small and medium-sized companies, impacting sustainable managerial and social development. Among the results and conclusions, it was evidenced that the application of the components, dimensions and variables of the Integrated Sustainability Management model, based on entrepreneurship and technologies, favors the perpetuity of organizational sustainability, with a positive impact on economic and social development.

**Keywords:** Integrated Sustainability Management. Economic and Social Development. Organizational Sustainability. Entrepreneurship. Technology.

## INTRODUCTION

The article entitled “organizational sustainability of micro, small and medium-sized companies - MSMEs and technologies, which aimed to present perspectives on the use of technologies for the organizational sustainability of micro small and medium-sized companies - MSMEs and their reflections on economic and social developments”, was developed by the from analyzes in the literature and empirical research on the application of the Integrated Sustainability Management model - GSI and technologies in MSMEs.

It investigated in its object of study, the MSMEs in its object of study, the problem “there is an association between the application of the Integrated Sustainability Management model and technologies in the organizational sustainability of micro, small and medium-sized companies in the sample and in the economic and social”, despite being relevant to the economy of the countries. Debates in academia and in the business world have

aroused interest in questions such as: why, in any economy in the world, do some companies remain perennial and sustainable, generating economic and social development, while others decline, do not develop, persist in failure and die, generating a great negative impact on the economic and social aspects where they operate.

Considering these assumptions, investigating the practical application in micro, small and medium-sized companies of a State of the application of the Integrated Sustainability Management - GSI model, allied with the technologies, points to finding answers in the face of the perspectives of its effectiveness in organizational sustainability, with positive impact on economic and social development.

The GSI model, in its three dimensions, five components and twelve variables (Polary-Pereira 2012, 2019), based on the Theory of Entrepreneurship and combined with the dimensions and components of technological capability), creates perspectives of favoring organizational sustainability in MSMEs, which strengthens the development of a region and/ or country, improving the social indicators.

The understanding of the term technology in this study, converge with Dosi's (2006) definition, which is the set of pieces of knowledge – both “practical” (concrete problems and devices) and “theoretical” of know-how, methods, procedures and successful and unsuccessful experiences. Technological competence refers to the company's abilities to carry out innovative activities in products and processes, not only in people's minds (skills, experience, formal qualifications), but also in its organizational system, routines and procedures (Bell and Pavitt)., 1995; Figueiredo, 2003). The search for efficiency in economic terms, respecting the resource capacity of the environment and ensuring social justice that promotes inclusion, must be characteristics of

sustainable organizations (Barbieri, 2007).

The study, which continues with the literature review and the theoretical model, was developed considering the academic aspects, which sought in the literature the theoretical foundation that supports the relevance of organizational sustainability in MSMEs and technologies, and research in industrial MSMEs and provision of sample services, application by entrepreneurs and managers of the Integrated Sustainability Management - GSI model and technologies. Continue with the methodology, analysis of results and conclusions.

## **LITERATURE REVIEW AND THEORETICAL MODEL**

The analyzes in the literature were based on the object of study, on the research problem and research question raised, and on the objectives, focused on organizational sustainability, the dimensions and components of technological capacity and management technologies, such as Integrated Sustainability Management - GSI, based on the Theory of Entrepreneurship, as a professional management alternative for Micro, Small and Medium Enterprises - MSMEs (Polary-Pereira, 2019), and which impacts organizational sustainability. Entrepreneurship, in the Schumpeterian view, is defined as a process of “creative destruction” (Schumpeter, 1934).

This study of organizational sustainability and technologies applicable to MSMEs, developed in the academic and research areas of MSMEs, highlights that, in the academic view, one of the reasons for a good training is improve the way organizations are managed. Organizations well managed by managers who apply sustainable management, develop consistency, growth and prosperity, and when poorly managed, decline and often die (Polary-Pereira, 2021). In the application of management focused on organizational

sustainability, he suggests considering the analysis of the phases and processes of an organization described by Polay-Pereira (2012).

The term “sustainability”, as described by Polary-Pereira (2021), there is still ambiguity of understanding in its different academic dimensions, and was born from the bottom line tripod (sustainability tripod), by the British consultant John Elkington from 1980, in which there must exist balance between the economic, environmental and social vertices. This article is focused on the sustainability of the organizational dimension.

This article is focused on the sustainability of the organizational dimension. Sustainable organizations must seek efficiency in economic terms respecting the resource capacity of the environment, ensuring social justice by promoting inclusion (Barbieri, 2007). The achievement of organizational sustainability is favored when organizations reach the perennial stage through the application of sustainable management models, combined with technologies and the dimensions and components of technological capacity, favoring sustainable economic and social development.

Organizational sustainability involves the use of new communication and information technologies - NTICs, application to MSEs (Milach, Meirino and Barros, 2017), in which in corporate sustainability, companies must participate in sustainable development. The contributions of Kuzma, Doliveira and Silva (2017) that organizations involved in sustainability seek to identify ways in which they can develop new forms of production and resource management, requiring individual or group skills for organizational sustainability.

Technological capability at the organizational level is the set of resources that can be tangible, coded or intangible, tacit, codifiable and non-codable; incorporated in several dimensions of the organization:

management and production techniques, organizational routines, organizational structures, values and norms (Penrose, 1959, Nelson and Winter, 2005, Teece and Pisano, 1994, Figueiredo, 2004). For Lall (1992), Bell and Pavitt, (1995) and Figueiredo (2003), technological capacity is stored, accumulated, in at least 04 components.

The understanding by managers and entrepreneurs of the use of technologies, including management such as the Integrated Sustainability Management - GSI model, of the components of technological capacity and their possibilities of application in MSMEs, opens paths of possibilities and limitations that may impact sustainability organizational structure and the economic and social development of the country.

As a management technology, Polary-Pereira (2012) researched in the industrial universe of Maranhão, the Integrated Sustainability Management - GSI, defined as “an alternative model of Professional Management for the Administration that requires from the manager professional personal awareness to manage with Entrepreneurial Orientation”. (OE) and Integrative Vision (VI), in view of its variables, components and dimensions, to favor the management, success and perpetuity of the company”. The GSI is an expansion of the term management, compared with the way that Drucker (2002) characterized it. The GSI model was based on the Theory of Entrepreneurship, on the Management approaches (McClelland, developed in the 1970s), after the Organizational and Management Theories, from the perspective of company strategies, and strategic management modes (Lumpkin and Dess, 1996); and Economics (Schumpeter, 1934), introduced in the Social Sciences by economic theory, founded the GSI model. It is focused on organizational sustainability, and covers 03 dimensions, 05 components and 12 variables,

as described in table 1.

In research on industrial companies, Polary (2012; 2019, p. 20; 33) highlights the importance of analyzing the phases of creation, maintenance, perennial maintenance and growth to reach the perennial phase and the four processes: success, planned retirement, failure and mortality, as shown in Table 2 below:

The importance of entrepreneurial action for business success is highlighted. The teaching of entrepreneurship, which began in the United States in 1947 at the Harvard Business School (Katz, 2003), advanced in its approaches to academic and business performance, being relevant to the economies of the countries. The entrepreneur is the one who detects an opportunity and creates a business, taking calculated risks (Dornelas, 2008).

In an analysis of the panorama of Brazilian and global entrepreneurship, Brazil, in the period from 2008 to 2019, advanced in the Rate of Entrepreneurs in Initial Stage - TEA. In 2008, it occupied the 13th position in the world ranking (Greco, 2008, 2010). From 2014 to 2015, it went from 13th to 8th place out of 31 countries with efficiency-driven economies, with a TEA of 17.2% in 2014 and 21.0% in 2015, the highest of the group, surpassing the BRIC countries, USA and Germany.

With regard to levels of development, the highest rates of TEA are concentrated in the group of countries driven by factors and the lowest in countries by innovation. In a study by GEM in partnership with the World Economic Forum in 2015, it was found that “the existence of a negative correlation between the level of development of countries (factors, efficiency and innovation) and the rates of initial entrepreneurship (TEA)”. These data and this finding suggest a better analysis by managers of the variables that integrate this process, when making their investment decisions in

the countries, since it can interfere in the medium and long term in the Established Entrepreneurship Rate - TEE. According to GEM data (2019), TEA (nascent and new) surpassed TEE and reached its highest mark (23.3%). However, TEE dropped (16.2%), returning to the values obtained in 2016 (16.

## METHODOLOGY

It corresponds to the approach methods and procedures (Marconi; Lakatos, 2007). In this study, the methodology was: research in the literature, data extracted from secondary sources in the universe of MSMEs. The line of research was “Management Technology”, on organizational studies of the Brazilian reality of the doctoral program in Administration at FGV/EBAPE, and the Research Group “Administration, Management and State - AGE” CNPq (Polary-Pereira, 2015), area of Applied Social Sciences and lines of Administration and Management, Management of MSEs and Entrepreneurship

In the field, data collected from the universe of industrial MSMEs in Maranhão in 170 municipalities (FIEMA, 2006), with 1,758 industrial MSMEs and a stratified sample, with 142 MSMEs in 14 municipalities (Tables 1 and 2), and a comparative analysis of the participation in the GDP of these municipalities, as shown in Table 3.

In 2016 in Micro Companies - IMs and Small Businesses - industrial and service EPPs in São Luís of the universe and sample by accessibility with 38 IMs and EPPs (Tables 3 and 4).

In 2021 in the Micro and Small Enterprises - industrial and service MSEs of São Luís of the universe and sample with 60 MSEs, according to tables 4 and 5.

**Collection, statistical treatment and data analysis:** the technique was the questionnaire, applied to respondents, with scores adapted from measurement scales of Malhotra (2006)



MODEL	DIMENSIONS	COMPONENTS	VARIABLES
GSI	Technological Administrative	Management	Management Competencies and Abilities - Professional Management (GSI), based on Entrepreneurship
			Feasibility studies: technical, economic and financial
		Technology	Technological Contribution (machinery and equipment; systems and work methods)
			Industrial efficiency level
	Institutional Politician	policies	Public Policies of the Federal, State and Municipal Government
			Legal, tax and labor aspects
		Strategies	Local Strategies and Partnerships Institutional Policy, Industrial Segment and Civil Society
			Industrial Development Plan - PDI-2020
	Social Economic	Economic and Social Indicators	Qualified industrial labor
			Investment attractions: internal, external and local government
			Preservation of the industry's local environment
			business location

Table 1 - The GSI Conceptual Model, its Dimensions, Components and Variables

Source: Polary-Pereira (2012).

Number	PHASES	DEFINITIONS
01	CREATION	It is the legal formalization of MPMGE, via articles of association and/or incorporation document, in which the company is created to operate and meet a market demand.
02	MAINTENANCE	It is to carry out the mission of creating the business, and keep it running until it leaves the "loss" phase (recovery of the capital invested in the creation phase), and from there, to remain in the market with the generation of own resources and operating profitably.
03	PERENNIAL MAINTENANCE	The company remains stable, with business success, but without structural and physical growth. Staying alive with success in business, and consciously avoiding expansion.
04	GROWTH	It is to grow the business in its structural and physical aspects, with the increase in the number of employees, greater market share and customer expansion, increase in financial gains, among others.
05	PERENITY	It is to remain alive in the market, long-lasting and succeeding generations, with constant feedbacks of feedback from the creation, maintenance and perennial maintenance phases, with the capacity to maintain structural growth, the market, the clientele, and acquire financial stability, prioritizing the development of management technologies and the workforce that guarantees professional maturity and can fulfill its political, economic and social role, in view of its mission.
Number	LAW SUIT	DEFINITIONS
01	SUCCESS	MPMGE presents good administrative, operational and financial results, generating capacity for its continuity, providing the necessary conditions for the company to reach the other phases and achieve longevity with longevity, thus fulfilling its political, economic and social mission in the environment in which it operates.
02	PLANNED DISCHARGE	Termination of the MSME's activities in the market in which it operates, carried out in a planned manner by the owner, after complying with its legal, tax and labor obligations. It is a professional decision not to want to continue in the business, regardless of the reason.
03	FAILURE	It is the bad result of MPGME, and its inability to continue operating in the market in a viable way to administrative, technical, operational and financial issues, with the relationship with employees, customers and results in the form of financial profit being compromised.
04	MORTALITY	Insolvency of MPGME, ceasing the normal functioning of its administrative, technical and operational activities, for not achieving economic and financial success. It ceases to exist functionally with an active organization, reflecting negatively on the economic and social development of the environment in which it operates.

Table 2 - Cycle of Phases and Processes of MPMGEs

Source: Polary-Pereira (2012, 2019)



Figure 1 -Entrepreneurship rates<sup>1</sup> (in %) by stage of the enterprise TEA, TEE, TTE - Brazil - 2002:2019

Source:GEM (2019)

<sup>1</sup> Percentage of population aged 18 to 64 years.

Number	Counties	micro	Little	Average	TOTAL
		The amount	The amount	-	
01	Alcantara	01	-	-	01
02	Bacabal	36	09	01	46
03	Balsas	59	21	02	82
04	Caxias	17	20	02	39
05	Cajapió	04	-	-	04
06	Imperatriz	192	97	04	293
07	Lagoa da pedra	16	03	-	19
08	Paço do Lumiar	04	01	01	06
09	Raposa	02	-	-	02
10	Rosário	08	08	02	18
11	Sao Joao dos Patos	11	-	-	11
12	Sao Jose de Ribamar	21	09	-	30
13	São Luís	739	380	46	1165
14	Timon	32	10	-	42
	Total	1142	558	58	1758

Table 1 – Population for stratification, according to municipalities by industry size.

Source: FIEMA (2006), adapted Polary-Pereira (2012)

Number	Cities	size			TOTAL
		micro	Little	Average	
		The amount	The amount	The amount	
01	Alcantara	01	-	-	01
02	Bacabal	03	02	-	05
03	Balsas	06	02	-	08
04	Caxias	02	02	-	04
05	Cajapió	01	-	-	01
06	Imperatriz	16	08	02	26
07	Lagoa da pedra	03	02	-	05
08	Paço do Lumiar	02	01	01	04
09	Raposa	01	-	-	01

10	Rosário	02	01	-	03
11	São José dos Patos	01	-	-	01
12	Sao Jose de Ribamar	02	01	-	03
13	São Luís	51	22	05	78
14	Timon	02	-	-	02
	Total	93	41	08	142

Table 2 - Significant samples stratified industries, according to cities by size.

Source: FIEMA (2006) adapted Polary-Pereira (2012)

Number	CITIES	GDP at current price	%
1	Alcantara	BRL 65,418,000.00	0.17%
2	Bacabal	BRL 505,600,000.00	1.27%
3	Balsas	BRL 1,120,221,000.00	2.82%
4	Cajapió	BRL 22,781,000.00	0.06%
5	Caxias	BRL 825,527,000.00	2.08%
6	Imperatriz	BRL 2,000,735,000.00	5.03%
7	Lagoa da pedra	BRL 152,435,000.00	0.38%
8	Paço do Lumiar	BRL 291,564,000.00	0.73%
9	Raposa	BRL 100,920,000.00	0.25%
10	Rosário	BRL 134,819,000.00	0.34%
11	Sao Joao dos Patos	BRL 89,164,000.00	0.22%
12	Sao Jose de Ribamar	BRL 473,407,000.00	1.19%
13	São Luís	BRL 15,337,347,000.00	38.58%
14	Timon	BRL 715,427,000.00	1.81%
	TOTAL GDP (municipalities participating in the survey)	BRL 21,835,365,000.00	54.93%
	TOTAL GDP (municipalities not participating in the survey)	BRL 17,918,346,000.00	45.07%
	GDP Maranhão	BRL 39,753,711,000.00	100%

Table 3 - GDP 14 municipalities in Maranhão from the sample of 142 MPMEs surveyed in the Industrial Sector-MA

Source: Gross Domestic Product of Maranhão municipalities – 2009 (IBGE - 2012).

Number	City	Size of Companies		TOTAL
		Micro-enterprise-MI	Small Business - EPP	
		The amount	The amount	
01	São Luís	15.112	929	15,112

Table 3 – Universe of active MIs and EPPs for stratification in São Luís-MA by size.

Source: JUCEMA (2016), adapted from Polary-Pereira et al. (2016)

Number	City	Size of Companies		TOTAL
		Micro-enterprise-MI	Small Business - EPP	
		The amount	The amount	
01	São Luís	22	16	38

Table 4 - Sample by accessibility active MIs and EPPs for stratification in São Luís-MA

Source: JUCEMA (2016), adapted from Polary-Pereira et al. (2016)



and Ulrich, Smallwood and Sweetman (2009). The data collected in 2012 received statistical treatment, with exploratory data analysis with averages and percentages of the variables, components and dimensions of the GSI model; Levene test of homogeneity of variances” and “analysis of variance – ANOVA”; correlation test; and regression and multiple correlation test; and in 2016 and 2021, exploratory analysis with averages and percentages of variables, components and dimensions of the GSI model and management technologies.

**Limitations:** delimitation of the study in the universe in a country with a vast territorial dimension, and Maranhão with 217 municipalities (IBGE, 2009), was soon limited to MPMES of the Industrial Sector-MA, w in the industrial and service MPEs of São Luís, and little literature and specific empirical work that would allow for an in-depth study of the theory (Popper, 1975). Aware of the limitations, the method was considered adequate to support the research and consistently evaluate the results.

## ANALYSIS OF RESULTS

DAmong the results of the research in the MPMES of the industrial sample, and which also researched the large company - GE, it was verified in these MPMGEs, that “Management for Integrated Sustainability-GSI, based on the Theory of Entrepreneurship, favors management, success and continuity of companies” (Table 6), and organizational sustainability, positively impacting the industrial development of Maranhão”

These results suggest the application of the GSI Model in other organizations, intervening with the predominant variables that favored the management, success and perpetuity of this sector, aiming to obtain new empirical results. Such results are consistent with other studies and previous research (Ilda, 1984; Adizes 1990; De Geus, 1999; Arruda et al., 2007; Silva et al.,

2009; Bernhoeft and Martinez, 2011).

The “Levene Test of Homogeneity of Variances” and “Analysis of Variance – ANOVA” of the 12 variables of the GSI model (Polary-Pereira, 2012, p. 170) included the results of the ANOVA test, the conclusions point out that there is no difference between the averages in 11 (eleven) variables of the model, which were:

Management skills and abilities of the partners who direct and others who manage or advise the business - Professional Management (GSI), based on Entrepreneurship; Technological Support (machines and equipment: systems and working methods); Industrial efficiency level; Public Policies of the Federal, State and Municipal Government; Legal, tax and labor aspects; Partnerships: Political-Institutional, Industrial Sector and Civil Society; The Industrial Development Plan – PDI 2020; Qualified industrial workforce; Investment attractions (internal/external and Government of MA) for the Industrial Sector; Preservation of the Industry’s local environment; Conduct feasibility studies: technical, economic and financial; and Business Location.

In the variable local strategies: Government of MA, City Hall, Partnerships, others, the conclusions point out that there are differences between the averages. The tests were performed using a significance level of 5% (0.05%), that is, with a 95% probability of getting the test validity right (confidence level).

According to the correlation test between “the variables that most positively influence and that most negatively affect the management, success and sustainability of industrial MPMGEs in Maranhão” (Polary-Pereira, 2012, p. 340), “substantial positive correlation between the location variables predominated” (Polary-Pereira, 2012, p. 340). of the business that has a positive influence and the location of the business that interferes

Number	BRANCH	POSTAGE		TOTAL	%	% ACCUM.
		MIC	SMALL			
		amount	amount			
1	Industry	739	380	1,119	6.90%	6.90%
two	Service Provision	14,183	929	15,112	93.10%	100.00%
TOTAL		14,922	1,309	16,231	100.00%	100.00%

Table 4 - Universe of industrial and service MSEs in São Luís by size, industry and quantitative percentage.

Source: FIEMA (2006) and JUCEMA (2016), adapted Polary-Pereira e Castro (2021)

Number	BRANCH	POSTAGE		TOTAL	%	% ACCUM.
		MIC	SMALL			
		amount	amount			
1	Industry	4	4	8	13.33%	13.33%
two	Service Provision	29	23	52	86.67%	100.00%
TOTAL		33	27	60	100.00%	100.00%
GENERAL TOTAL OF MSEs..... 60						

Table 5 - Sample of industrial and service MSEs in São Luís by size, activity sector and quantitative percentage.

Source: FIEMA (2006) and JUCEMA (2016), with adaptations by Polary-Pereira e Castro (2021)

CON-CEPT	DIMENSIONS	AVE-RAGE	%	COMPO-NENTS	AVE-RAGE	%	VARIABLES	AVE-RAGE	%
GSI	Technological Administrative	8.8	37.3	Management	8.8	18.8	Competencies and managerial skills of the partners who direct and others who manage or advise the business, based on Entrepreneurship .....	8.9	9.5
							Conduct feasibility studies: technical, economic and financial	8.7	9.3
				Technology	8.7	18.5	Technological Contribution (machinery and equipment; systems and working methods) .....	8.8	9.4
							Industrial efficiency level...	8.6	9.1
	Institutional Politician	6.7	28.4	policies	6.8	14.5	Public Policies of the Federal, State and Municipal Government ..	5.8	6.2
							Legal, tax and labor aspects .....	7.7	8.3
				Strategies	6.5	13.9	Local Strategies and Partnerships Institutional Policy, Industrial Segment and Civil Society.....	6.1	6.6
							Industrial Development Plan - PDI-2020 .....	6.8	7.3
	Social Economic	8.1	34.3	Economic and Social Indicators	8.1	34.3	Qualified industrial labor .....	8.6	9.1
							Investment attractions: internal, external and local government	6.6	7.0
							Preservation of the industry's local environment.	8.5	9.1
							Business location .....	8.6	9.1

Table 6 - The GSI Model: averages and percentages of Dimensions, Components and Variables that positively influence the Management, Success and Permanence of industrial MPMGEs-MA.

Source: Polary-Pereira (2012).

negatively”, and moderate positive correlation in the variables “Skilled industrial labor and unskilled industrial labor”, and “management skills and abilities of the partners who manage and others who manage or advise the business – Professional Management (GSI) and “management skills and abilities of the partners who manage and others who manage or advise the business – Non-Professional Management (GNP), based on non-Entrepreneurship”.

Based on the regression and multiple correlation results of the 06 GSI variables that most positively influence management, success and permanence (Independent), and the 06 most important for success in the perennial phase (Dependent) in industrial MPMGEs (Polary-Pereira, 2012 , p. 344), the variable “To carry out feasibility studies: technical, economic and financial” presented multiple correlation coefficients ( $R_{xy}$ ) = 0.6170 and 0.5680 (substantial positive correlation), and = 0.1276 (low positive correlation) and in the of determination, it means that 38.07% , 31.45% and 1.63% of the variation of Y can be explained by the model, so it is the one that most explains the variation of Y (Dependent), followed by: “level of industrial efficiency” with the coefficient of multiple correlation ( $R_{xy}$ ) = 0.5215 (substantial positive correlation), “Skilled industrial labor” = a 0.4996 (moderate positive correlation), and “Business location = 0.3796 (moderate positive correlation). In the coefficients of determination, it means, respectively, that 27.19%, 20.22%, 14.41% and 8.02 of the variation of Y can be explained by the model.

These results suggest the effectiveness of the GSI model in the continuity of the MPMGEs of the show, being a favorable factor for organizational sustainability. In the analysis by size, Micro Company - MI, Small Company - PE and Medium Company - ME, the results of the regression and multiple correlation tests were: Micro Company - MI: by the results of

the Multiple Regression and Correlation of the 06 variables that most influence positively in the Management, Success and Perpetuity of IMs (Independent - Table 5) and of the 06 most important for the success of IMs in the perpetuity phase (Dependent - Table 6) of the GSI Model, it was found that the variable “To carry out feasibility studies: technique , economic and financial” (Table 7), showed a substantial positive correlation, according to the regression equation  $Y = a + b_1x_1 + b_2x_2 + \dots + b_6x_6$ . Regression  $F = 12.2673$ .  $p < 0.0001$ . Multiple coefficient of determination ( $R^2_{xy}$ ) = 0.4612 and multiple correlation coefficient ( $R_{xy}$ ) = 0.679.

**Conclusion:** F is significant for  $p < 0.0001$ , at least one of the Independent variables (Peditors) influences the Dependent variable; The coefficient of determination means that 46.12% of the variation of Y can be explained by the model, the rest (53.88%) are unexplained and are due to other factors or chance; The variable that has the lowest p-value is the variable Conducting feasibility studies: technical, economic and financial, therefore it is the one that best explains the variation in Y (Table 7).

Small Business - PE: it was verified by the results of the Regression and Multiple Correlation of the 06 variables that most positively influence the Management, Success and Permanence of the PEs (Independent - table 7) and of the 06 most important for success in the perennial phase (Dependent - table 8)”, that the variable “Qualified industrial labor” (Table 8) showed substantial positive correlation, according to the regression equation  $Y = a + b_1x_1 + b_2x_2 + \dots + b_6x_6$ . Regression  $F = 4.0576$ .  $p = 0.0038$ . Multiple coefficient of determination ( $R^2_{xy}$ ) = 0.4173 and multiple correlation coefficient ( $R_{xy}$ ) = 0.6460.

**Conclusion:** F is significant for  $p < 0.0001$ , at least one of the Independent variables

Variables	no	%	Average	Minimum	Maximum	PD
1. Competencies and managerial skills of the partners who direct and others who manage or advise the business - Professional Management (GSI), based on Entrepreneurship .....	92	98.92	8.99	1	10	1.5442
2. Technological contribution (machinery and equipment; systems and work methods) .....	90	96.77	8.86	1	10	1.5107
3. Conduct a feasibility study: technical, economic and financial .....	88	94.62	8.83	3	10	1.5773
4. Qualified industrial labor .....	92	98.92	8.63	1	10	2.1315
5. Industrial efficiency level .....	92	98.92	8.62	4	10	1.4207
6. Preservation of the Industry's local environment....	90	96.77	8.58	1	10	2.1093

Table 5 – The 06 (six) variables of the GSI Model that most positively influence the Management, Success and Perpetuity of industrial IMs in Maranhão.

Source: Polary-Pereira (2012)

Variables	no	%	Average	Minimum	Maximum	PD
1. Reinvest in Microenterprises to better serve their workforce, customers and fulfill their economic and social role to successfully remain in the market from the manager's point of view .....	90	96.77	9.38	6	10	0.9189
2. Prioritize the qualification of industrial labor and maintain the levels of efficiency and productivity required by the sector .....	93	100.00	9.25	1	10	1.4192
3. Prioritize the technical-professional development of partners who manage and others who manage or advise the company .....	93	100.00	9.22	3	10	1.3092
4. Preservation of the industry's local environment.	92	98.92	8.88	3	10	1.5956
5. Use the Industrial Development Plan – PDI 2020.	84	90.32	7.24	1	10	2.8523
6. Public policies of the Federal, State and Municipal Governments, investment attractions and partnerships between IMs with the Government and the private sector ....	91	97.85	6.77	1	10	3.0553

Table 6 - The 06 (six) most important variables for the success of industrial IMs in Maranhão in the perennial phase

Source: Polary-Pereira (2012)

Variables	Coefficient	t	P
independent (Peditors)	partial of regression		
Constant (Intercept)	1.4039(a)	-	-
Management skills and abilities of the partners who direct and others who manage or advise the business - Professional Management (GSI), based on Entrepreneurship	0.0234(b1)	0.2571	0.7977
Technological Support (machinery and equipment; systems and working methods)	0.2817(b2)	2.9741	0.0038
<b>Conduct feasibility studies: technical, economic and financial</b>	<b>0.3615(b3)</b>	<b>3.6469</b>	<b>0.0004</b>
Qualified industrial labor	-0.0444(b4)	-0.7225	0.4719
Industrial efficiency level	0.2301(b5)	2.3558	0.0207
Preservation of the industry's local environment	0.0414(b6)	0.5946	0.5536

Table 7 - Multiple linear regression between the variables that most positively influence Management, Success and Perpetuity (Independent) and Prioritize the qualification of industrial labor and maintain the levels of efficiency and productivity required by the sector (Dependent) in industrial IMs in Maranhão.

Source: Polary-Pereira (2012).

(Peditors) influences the Dependent variable; the coefficient of determination means that 41.73% of the variation of Y can be explained by the model, the rest (58.27%) are unexplained and are due to other factors or chance; the variable that has the smallest p value is the variable Qualified industrial labor, therefore it is the one that best explains the variation in Y.

Medium company ME: it was verified by the results of the Regression and Multiple Correlation of the 06 variables that most positively influence the Management, Success and Perenniality of MEs (independent -table 9) and the 06 most important for success in the perennial phase (Dependent - table 10)”, that: the variable “Management skills and abilities of partners - Professional Management (GSI), based on Entrepreneurship” presented multiple correlation coefficients ( $R_{xy}$ ) = 0.8625, 0.8511 and 0.8063 (very strong positive correlation) and in the coefficients of determination, it means that 74.39%, 72.43% and 65.00% of the variation of Y can be explained by the model, therefore it is the one that most explains the variation of Y (Dependent) (Table 9).

**Conclusion:** F is significant for  $p < 0.0001$ , at least one of the Independent variables (Peditors) influences the Dependent variable; the coefficient of determination means that 72.43% of the variation of Y can be explained by the model, the rest (27.57%) are unexplained and are due to other factors or chance; the variable with the smallest p-value is the variable **Management skills and abilities of the partners who direct and others who manage or advise the business** -Professional Management (GSI), based on Entrepreneurship, being the which further explains the variation of Y.

The results of this research show, through the tests, the correlation of all the variables of the GSI Model (Table 1), applied in micro, small and medium-sized companies - MSMEs of the samples, which demonstrated the effectiveness

of the model, in the view of the managers, as management, success and sustainability of MSMEs. These results are in agreement with previous studies and research by Ilda (1984) and Souza (2009), and suggests the continuity of application of the Integrated Sustainability Management Model - GSI, based on the Theory of Entrepreneurship in organizations, since the continuity of a business segment, combined with technologies, favors the organizational sustainability of a business segment and economic and social development.

Presearch on the Technologies of Contemporary Administration in Microenterprises - MIs and Small Businesses - EPPs in the industrial and service sectors in São Luís do Maranhão (Polary-Pereira et al., 2016), it was found: regarding the relevance of the variables from the GSI model, the highest average in the IMs was Preservation of the environment (8.18); and in the EPPs it was Location of the business (8.68).

As for the variables of technologies of the GSI model present in IMs and EPPs that most contribute to the perpetuity, “Products and services” predominated, with averages of 8.75 and 8.36; and as for the “importance of managers having “knowledge and experience in the area in which they operate and seeking their development” to work in IMs and EPPs”, the results showed averages of 8.27 in IMs, and 9.06 in EPPs. And as for the time of existence in the market, 64% of IMs are in the range of 1 to 4 years; 9% between 5 to 8 years old; 18% between 9 to 12; and 9% over 12 years old; in EPPs, 25% up to 4 years; 19% between 5 and 8 years old; 6% between 9 and 12 years old; and 50% are over 12 years old. It can be seen that in IMs, only 9% are over 12 years old, that is, with a higher perennial rate. EPPs, on the other hand, have a higher perennial rate with 50% over 12 years old.

In another survey of 60 Micro and Small Enterprises - industrial and service MSEs

Variables	no	%	Average	Minimum	Maximum	Standard deviation
1. Competencies and managerial skills of the partners who direct and others who manage or advise the business - Professional Management (GSI), based on Entrepreneurship .....	41	100.00	8.95	7	10	1.0476
2. Technological contribution (machinery and equipment; systems and work methods) .....	41	100.00	8.80	7	10	0.9992
3. Qualified workforce .....	41	100.00	8.61	5	10	1.4980
4. Industrial efficiency level .....	40	97.56	8.58	6	10	1.1068
5. Small Business Business Location .....	41	100.00	8.56	4	10	1.4841
6. Preservation of the Industry's local environment....	41	100.00	8.44	1	19	2.7023

Table 7 – The 06 variables of the GSI model that most positively influence the Management, Success and Perenniality of industrial PEs in Maranhão.

Source: Polary-Pereira (2012)

Variables	no	%	Average	Minimum	Maximum	PD
1. Prioritize the qualification of industrial labor and maintain the sector's level of efficiency and productivity....	41	100.00	9.20	5	10	1.1878
2. Reinvest in PEs to better serve the workforce, the clientele and fulfill their economic and social role to successfully remain in the market.....	41	100.00	9.10	4	10	1.2001
3. Prioritize the technical-professional development of the partners who manage and of others who manage or advise the business to the PEs .....	41	100.00	9.07	6	10	1.2528
4. Preservation of the environment .....	41	100.00	8.56	4	10	1.5008
5. Use the Development Plan. Industrial - PDI 2020	40	97.56	8.20	4	10	1.7127
6. Public Policies of the Federal, State and Municipal Governments, investment attractions and partnership with Small Businesses with the Government and private initiative	41	100.00	7.51	two	10	2.0140

Table 8 – The 06 most important variables for the success of industrial PEs in Maranhão in the perennial phase.

Source: Polary-Pereira (2012)

Variables independent (Peditors)	Coefficient partial of regression	T	P
Constant (Intercept)	1.9189(a)	-	-
Management skills and abilities of the managing partners and others who manage or advise the business, allied to Professional Management (GSI) and Entrepreneurship.	0.2420(b1)	1.4464	0.1571
Technological contribution (machines and equipment; systems and working methods)	-0.2618(b2)	-1.3601	0.1827
Qualified industrial labor	0.3233(b3)	2.7789	0.0088
Industrial efficiency level	0.3970(b4)	2.1712	0.0369
Small Business Business Location.	0.0773(b5)	0.6751	0.5042



Preservation of the industry's local environment	0.0550(b6)	0.7674	0.4481
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Table 8 - Multiple linear regression between the variables that most positively influence Management, Success and Perpetuity (Independent) and Reinvest in PEs to better serve their workforce, clientele and fulfill their economic and social function to remain successfully in the market (Dependent) in industrial PEs-MA.

Source: Polary-Pereira (2012)

Variables	no	%	Average	Minimum	Maximum	PD
1. Location of the Medium Enterprises (MEs) business	7	87.50	8.86	7	10	1.2150
2. Industrial efficiency level .....	7	87.50	8.86	7	10	1.3452
3. Technological contribution (machinery and equipment; systems and work methods) .....	8	100.00	8.69	5	10	1.6243
4. Preservation of the local environment of Industry .....	7	87.50	8.57	7	10	1.5119
5. Legal, tax and labor aspects .....	8	100.00	8.38	5	10	1.5980
6. Competencies and managerial skills of the partners who direct and others who manage or advise the business - Professional Management (GSI), based on Entrepreneurship .....	7	87.50	8.29	4	10	2.1381

Table 9 - The 06 variables of the GSI model that most positively influence the Management, Success and Perenniality of industrial MEs in Maranhão

Source: Polary-Pereira (2012)

Variables	no	%	Average	Minimum	Maximum	PD
1. Prioritize the technical-professional development of the partners who manage and of others who manage or advise the business in Medium Enterprises (MEs).....	8	100.00	9.25	6	10	1.3887
2. Reinvest in MEs, to better serve the workforce, the clientele and fulfill their economic and social function to successfully remain in the market .....	7	87.50	9.14	8	10	0.8997
3. Prioritize the qualification of industrial labor and maintain the sector's level of efficiency and productivity ....	8	100.00	9.13	7	10	0.9910
4. Preservation of the environment .....	8	100.00	8.50	5	10	1.8516
5. Public Policies of the Federal, State and Municipal Governments, investment attractions and partnership between the company and the Government and the private sector .....	8	100.00	8.38	6	10	1.3025
6. Use the Development Plan. Industrial - PDI 2020 ..	8	100.00	7.75	4	10	2.4349

Table 10 – The 06 (six) most important variables for the success of industrial MEs in the State of Maranhão in the perennial phase, in the view of managers.

Source: Polary-Pereira (2012)

Variables independent (Peditors)	Coefficient partial of regression	t	P
Constant (Intercept)	27.8320(a)	-	-
Industrial efficiency level.	-2.4226(b1)	-0.4366	0.7379
Location of the Medium Enterprises (MEs) business	-2.4409(b2)	-0.3560	0.7823
Technological contribution (machines and equipment; systems and working methods)	-5.8110(b3)	-0.4386	0.7368
Preservation of the industry's local environment	2.2362(b4)	0.4142	0.7500
Legal, tax and labor aspects.	5.7244(b5)	0.42334	0.7450
<b>Management skills and abilities of the partners who direct and others who manage or advise the business - Professional Management (GSI), based on Entrepreneurship</b>	0.9685(b6)	0.7047	0.6092

Table 9 -Multiple linear regression between the variables that most positively influence Management, Success and Perpetuity (Independent) and Reinvest in the MEs to better serve its workforce, the clientele and fulfill its economic and social function to successfully remain in the market (Dependent) in the industrial MEs of Maranhão, in the view of the managers.

Source: Polary-Pereira (2012)

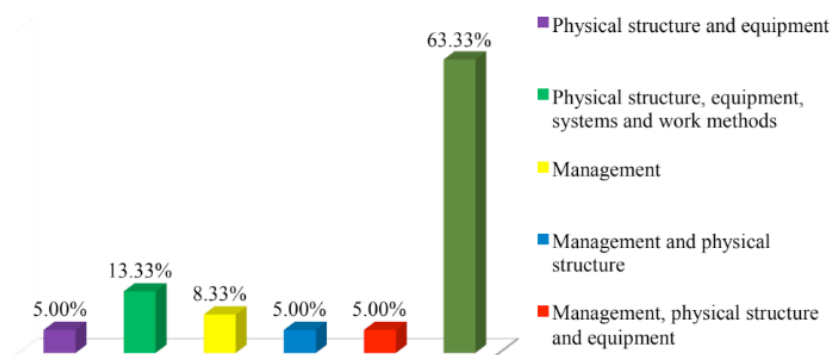


Figure 2- What are the innovations and technologies of industrial and service-providing MSEs aimed at?

Source: Polary-Pereira e Castro (2021)

Variables	Average	Minimum	Maximum	PD
Professional profile and performance of managers in the application of innovation	8.58	1	10	1,816
Professional profile and performance of managers in the application of technologies...	8.76	3	10	1.4656
Professional profile and performance of managers in the application of professional management .....	8.80	3	10	1.5160

Table 11 - Professional Profile and Managers' performance regarding the application of innovation, technologies and professional management for the sustainability of MPEs

Source: Polary-Pereira e Castro (2021)

Variables	Average	Minimum	Maximum	PD
Professional profile and performance of employees in the application of innovation.	8.18	1	10	2.1745
Professional profile and performance of employees in the application of technologies .....	8.50	1	10	1.8272
Professional profile and performance of employees in the application of professional management .....	8.53	1	10	1.8454

Table 12 - Professional Profile and the performance of employees regarding the application of innovation, technologies and professional management for the sustainability of MPEs

Source: Polary-Pereira e Castro (2021)

in São Luís on technological innovation, sustainability and management technologies, among them the GSI model (Polary-Pereira e Castro, 2021), among the results, it was found that technological innovations are predominantly focused on “physical structure and equipment” (63.33%), followed by: “physical structure, equipment, systems and working methods” (13.33%); management (8.33%); and “management and physical structure”, “management, physical structure and equipment”, and “management, physical structure, equipment, systems and work methods”, all with 5.00%, as shown in Figure 2.

In analyzing the data in Figure 2 of the MPEs surveyed, it was found that: all types of innovation and/or technology are important for the sustainability of these companies, whether in terms of management or technological support. In the analysis of the 12 variables of the GSI Model that most contribute to the MPEs of the sample to become innovative and sustainable, among the 6 predominant, “Level of efficiency and effectiveness of results”, on a scale from 1 to 10, was the one that most contributes positively (9.13%), followed by the variables “business location” (9.05%), “Managers’ managerial skills and competences. Professional Management (the GSI), based on entrepreneurship” (8.85), “qualified industrial workforce” (8.73), “preservation of the industry’s local environment” (8.71), and “feasibility studies: technical, economic and financial (8.83).

As for the “professional profile and the performance of managers” and “employees” in the application of the tripod “innovation, technologies and professional management” for the sustainability of MSEs, in importance from 1 to 10, the results showed high importance (Tables 11 and 12).

Among other findings described by the research subjects, they suggest that innovation and technologies generate perspectives of

positive impact on the sustainability of MPEs and on economic and social development, as well as encouraging the professional development of the workforce to master the technologies and innovations that make organizations sustainable.

These results corroborate previous research on the application of the GSI model, which favors organizational perpetuity and sustainability, with a positive impact on economic and social development.

## CONCLUSIONS

In the analysis of the literature of definitions of sustainability, technologies, including those of management, it is observed a certain clarity and uniformity of the authors of conceptual understanding in their varied conceptions. However, when transferring the theoretical vision to the context of organizational practice in micro, small and medium-sized companies - MPMEs, it suggests continuity of empirical studies and field research, which generate new perspectives for MPMEs to achieve organizational sustainability, make them sustainable and generate great economic and social impact.

In the analysis of the results of the field research in industrial MPMEs in 2012, among the relevant conclusions stood out: the Management of Micro, Small and Medium Enterprises - MPMEs, when it operates by applying the Integrated Sustainability Management model - GSI, favors its perpetuity; the continuity of the industrial MPMEs in the sample has a positive impact on the Industrial Development of the State of Maranhão (Polary-Pereira, 2012). The continuity of this business segment with industrial development for the State generates perspectives of innovation and organizational sustainability.

It was verified that the GSI model, with a systemic approach, included in the research variables of “Management and Technology” of

the technological Administrative Dimension, of “Policies and Strategies” of the Institutional Political Dimension, and of “Economic and Social Indicators” of the Economic and Social Dimension. Social, aimed at a professional performance of the manager and that favors the perpetuity of companies and organizational sustainability. These variables and dimensions converge with previous studies and research by Schumpeter (1934); Quivy and Campenhout (1995); Lumpkin and Dess (1996, 2001); Drucker (2002); Kim (2005); Castanhar (2007); Tachizawa (2004); Queiroz et al. (2008); and Lemes Junior and Pisa (2010).

In the analysis of research data on industrial and service MPEs in 2016, it is possible to conclude that the most important technologies for perpetuity are the company's methods and procedures, the knowledge of individuals, especially those accumulated in these companies related to their area of activity and the products and services offered, based on the accumulated technological capacity.

By analyzing the literature GEM Brasil 2008 to 2019 of the Rate of Entrepreneurs in Initial Stage - TEA do Brasil (nascent or new), it can be concluded that it grew in the world ranking, going from the 13th position in 2008, to the 8th place among the 31 countries driven by efficiency, with TEA of 17.2% in 2014 and 21.0% in 2015 and 23.3% in 2019. The Rate of Established Entrepreneurs - TEE, in 2019, dropped to 16.2% compared to 2014 (17.5%), 2015 (18.9%), and 2018 (20.2%). This finding becomes relevant for the management, innovation and sustainability of MPMEs.

In the analysis of the research in micro and small industrial and service-providing micro and small companies in 2021, it is concluded that the variables of the GSI model, the use of innovation, technologies predominantly focused on Management, physical structure, equipment, systems and methods of work,

have a positive impact on the sustainability of these MPEs.

These conclusions are relevant to the academy, as they responded to the problems investigated and the research questions raised in the MPMEs of the samples, and the objectives were achieved. The article draws attention not only to the technological contribution itself (machines and equipment, systems and working methods), as relevant for MPMEs to become innovative and sustainable, but suggests an awakening to management technologies, such as of the Integrated Sustainability Management - GSI model, based on the Theory of Entrepreneurship, applied in MPMEs in 2012, in MPEs in 2016 and in 2021, as one of the viable prospects for organizations to become innovative and sustainable and have a favorable impact on development and social impact of a region and/or state in the global sphere.

The expectation is that these results will contribute to future research in the field of innovation, technologies and organizational sustainability, and that they will broaden debates in academia, organizations and other social actors.

The expectation is that this study can expand the discussion on the topic of organizational sustainability and technologies, both in academia and by entrepreneurs and business managers and other actors who make decisions that affect organizational sustainability and economic and social development.

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