The CYRUS Global Business Perspectives (CGBP), Volume V8, p39-56:2023
DOI: https://doi.org/10.52212/CGBP2023-V8i1m3 ISSN: 2573-5691

Structural characteristics, sustainable organizations and their perspectives[1]

Ilmar Polary Pereira[a][2]
[a] *Doctorate in Business Administration from FGV/EBAPE RJ/Brazilian Institutions: State University of Maranhão (UEMA) and Maranhense Academy of Administration Science (AMCA) and Research Group Leader: Administration, Management and State-AGE CNPq. E-mail: i.polary@hotmail.com, Orcid: http://orcid.org/0000-0001-9206-5124*

ABSTRACT
The objective was to analyze the dimensions, components of technological capacity and management technologies, as innovative perspectives of organizational sustainability. It investigated in micro, small and medium-sized companies "which technical and managerial characteristics are suitable for innovation and sustainability?" Specifically, what is the relationship between technological capabilities and management technologies allied to entrepreneurship, with organizational sustainability and sustainable development?" In the method, research in the literature and field in the universe of 1,758 micro, small and medium industrial, and 15,112 micro and small industrial and service companies, with a stratified random sample and accessibility. The analysis presented here suggests that predictable dimensions, competencies and technological capabilities, combined with appropriate management technologies, are prominent factors in evaluating innovative and sustainable organizational structures that lead to economic and social development.

Keywords: Micro, Small and Medium Enterprises Management for Integrated Sustainability, Entrepreneurship.

INTRODUCTION
Perennial and sustainable organizational structures arouse the interest of researchers and entrepreneurs in order to understand which factors favored organizational sustainability, in spite of environmental, economic, social and ethical responsibilities. For Triviños (2009), academic research is part of the investigation problem and research questions. Thus, investigating in organizations "which technical and managerial characteristics are adequate for innovation and sustainability?" What is the relationship between technological capabilities and management technologies, such as Integrated Sustainability Management - GSI (Polary-Pereira, 2012, 2019), in the sustainability of micro, small and medium-sized companies. Emerges as a perspective to

[1] Manuscript received on 06/13/2023. Revisions received 09/30/2023. Final version accepted on 10/21/2023.

[2] The author(s) of this manuscript certify that the paper is an outcome of our independent and original work. We have duly acknowledged all the sources from which the ideas and extracts have been taken and we are responsible for any errors that may be discovered. The authors also thank the editor of CYRUS Global Business Perspectives (CGBP), and anonymous reviewers for their careful reading of the manuscript and their insightful comments and suggestions.

assess which characteristics are predominant in organizations that remain perennial and sustainable in the market.

The study was developed in academic approaches, with analysis in the literature of procedures and techniques (Marconi & Lakatos, 2007), and theoretical models to support the relevance of the theme, and in the practical application of the dimensions and components of technological capacity and technologies of management in MPMEs of the samples, with the statistical methods of empirical models used. In this study, the lines of the research group Administration, Management and State – AGE, CNPq (Polary-Pereira, 2015), and the hypothetical deductive method – for the construction of systemic concepts (Quivy & Campenhould, 1995) were considered.

In field research in 170 municipalities in Maranhao (FIEMA, 2006), there is a universe of 1,758 industrial MPMEs, with a stratified sample of 142 MPMEs in 14 municipalities (Tables 1 and 2), and comparative analysis of the participation in the PIB of these municipalities (Frame 1).

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

Nº	Municipal districts	Micro	Small	Average	TOTAL
		Quantity	Quantity	-	
01	Alcântara	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	Lago da Pedra	16	03	-	19
08	Paço do Lumiar	04	01	01	06
09	Raposa	02	-	-	02
10	Rosário	08	08	02	18
11	São João dos Patos	11	-	-	11
12	São José de Ribamar	21	09	-	30
13	São Luís	739	380	46	1165
14	Timon	32	10	-	42
	Total	1142	558	58	1758

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

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

Nº	Municipal districts	Porte			TOTAL
		Micro	Small	Average	
		Quantity	Quantity	Quantity	
01	Alcântara	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	Lago da pedra	03	02	-	05
08	Paço do lumiar	02	01	01	04
09	Raposa	01	-	-	01
10	Rosário	02	01	-	03
11	São João dos patos	01	-	-	01
12	São José de Ribamar	02	01	-	03

13	São Luís	51	22	05	78
14	Timon	02	-	-	02
	Total	93	41	08	142

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

Frame 1 - PIB 14 municipalities in Maranhao from the sample of 142 MPMEs researched in the Industrial Sector-MA

Nº	MUNICIPALITIES	PIB at current price	**%**
1	Alcântara	R$65.418.000,00	0,17%
2	Bacabal	R$505.600.000,00	1,27%
3	Balsas	R$1.120.221.000,00	2,82%
4	Cajapio	R$22.781.000,00	0,06%
5	Caxias	R$825.527.000,00	2,08%
6	Imperatriz	R$2.000.735.000,00	5,03%
7	Lago da Pedra	R$152.435.000,00	0,38%
8	Paço do Lumiar	R$291.564.000,00	0,73%
9	Raposa	R$100.920.000,00	0,25%
10	Rosário	R$134.819.000,00	0,34%
11	São João dos Patos	R$89.164.000,00	0,22%
12	São José de Ribamar	R$473.407.000,00	1,19%
13	São Luís	R$ 15.337.347.000,00	38,58%
14	Timon	R$715.427.000,00	1,81%
	TOTAL PIB (municipalities participating in the research)	R$ 21.835.365.000,00	54,93%
	TOTAL PIB (municipalities not participating in the research)	R$ 17.918.346.000,00	45,07%
	PIB Maranhao	R$ 39.753.711.000,00	100%

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

In 2016, in the universe of Micro and Small Businesses, industrial and service providers in São Luis, and sample by accessibility (Tables 3 and 4).

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

Nº	Municipal district	Size of Companies		TOTAL
		Micro enterprise -MI	Small business -EPP	
		Quantity	Quantity	
01	São Luís	14.183	929	15.112

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

Table 4 – Accessibility sample active MIs and EPPs for stratification in São Luís-MA

Nº	Municipal district	Size of Companies		TOTAL
		Micro enterprise -MI	Small business -EPP	
		Quantity	Quantity	
01	São Luís	22	16	38

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

In 2021 in the Micro and Small Industrial and Service Provider Companies of São Luis, according to the universe and sample in Frames 2 and 3.

Frame 2 - Universe of industrial and service MPEs in São Luis by size, branch of activities and quantitative percentage

N°	BRANCH	SIZE				
		MICRO	SMALL	TOTAL	%	% ACUM.
		Quant.	Quant.	Quant.	Quant.	Quant.
1	Industry	739	380	1.119	6,90%	6.90%
2	Service Provision	14.183	929	15.112	93,10%	100,00%
TOTAL		14.922	1.309	16.231	100,00%	100,00%

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

Frame 3 - Sample of industrial and service MPEs in São Luis by size, activity sector and quantitative percentage.

N°	BRANCH	SIZE				
		MICRO	SMALL	TOTAL	%	% ACUM.
		Quant.	Quant.	Quant.	Quant.	Quant.
1	Industry	4	4	8	13,33%	13,33%
2	Service Provision	29	23	52	86,67%	100,00%
TOTAL		33	27	60	100,00%	100,00%
TOTAL GERAL DE MPEs..... 60						

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

In data collection, the questionnaire and measurement scales by Malhotra (2006) and Ulrich, Smallwood and Sweetman (2009) served as the basis. Data received statistical treatment: exploratory analysis, variable correlation test, regression test and multiple correlation. The objective was to analyze the dimensions, components of technological capacity and management technologies, as innovative perspectives of organizational sustainability.

LITERATURE REVIEW

The analysis in the literature was based on MPMEs, on the research problem, and on the objective, focusing on the dimensions and components of technological capacity, innovation, organizational sustainability and management technologies, such as Management for Integrated Sustainability - GSI, based on the Theory of Entrepreneurship, as an alternative for professional management to become innovative and sustainable (Polary-Pereira, 2012, 2019).

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

Sustainable organizations must seek efficiency in economic terms, respecting the capacity of the environment's resources, ensuring social justice by promoting inclusion Barbieri (2007). Innovative organization, as described by PINTEC (2017), implements new management techniques or significant changes in the organization.

Technology, in this study, converges with the definition of Dosi (2006), which is the set of pieces of knowledge – both “practical” (problems and concrete devices), and “theoretical” of know-how, methods, procedures, experiences of success and failure as well as physical devices

and equipment. Innovation is a pioneering activity, based mainly on the internal competences of a company to develop and induce a new product in the market (Kim, 2005). Technological competence refers to the company's abilities to carry out innovative activities in products, processes and production organization, organizational systems, equipment and project engineering stored not only in people's minds (skills, experience, formal qualifications), but, also, in its organizational system, routines and procedures (Bell & Pavitt, 1995; Figueiredo, 2003).

Technological capacity at the organizational level is the set of resources that can be tangible, codified or intangible, tacit, codable and non-codable; incorporated into different dimensions of the organization: management and production techniques, organizational routines, organizational structures, values and norms (Penrose, 1959; Nelson & Winter, 2005; Teece & Pisano, 1994; Figueiredo, 2004). For Lall (1992), Bell & Pavitt, (1995) and Figueiredo (2003), technological capacity is stored, accumulated, in at least 04 components.

Administration as a Social Science has advanced in three relevant aspects: "Intellectual Capital; Knowledge management; and Digital Focus of Administration - use of digital tools by managers to deal with organizational learning challenges to improve organizational efficiency (Polary-Pereira, 2020, p. 6)".

The creative industry focuses on business development strategy. In this sense, several countries, governments and institutions, as described by Pinto, Talarico and Sanches (2017), have been betting on creative innovation as a strategy to gain business competitiveness. In Brazil, among the 13 creative segments and their sectoral affinities in four major areas, technology stands out (P&D, Biotechnology and TIC).

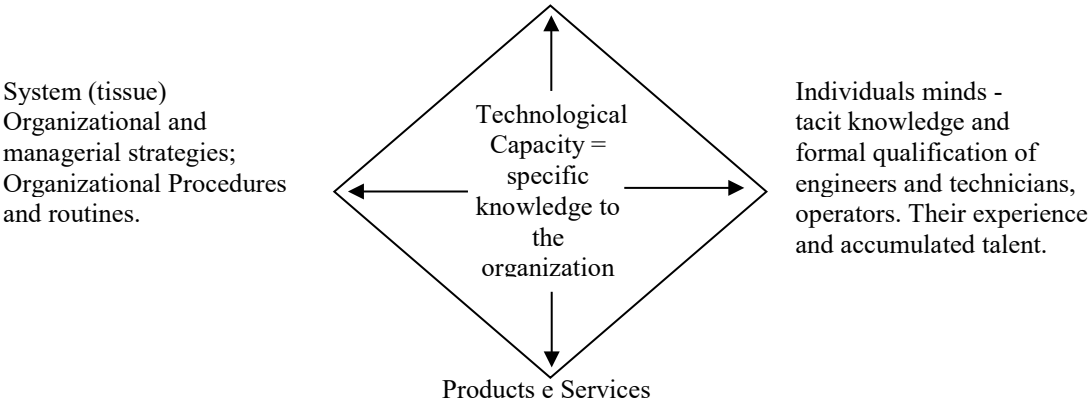
The World Business Council for Sustainable Development - WBCSD, of the Vision 2050 project, agrees that a world on the way to sustainability will require changes in structures, such as governance and economics. For Kuzma, Oliveira and Silva (2017, p. 431), organizations in the sustainability debate "constantly seek to identify ways in which they can develop new forms of production and management".

THEORETICAL MODEL

The theoretical model is based on the components of technological capacity, on organizational sustainability, on management technologies, focusing on the model of Management for Integrated Sustainability - GSI and on the theory of entrepreneurship in economic and managerial approaches.

Technological capacity at the organizational level is stored, accumulated, in at least 04 components of the technological trajectory of companies in developing economies (Figure 1).

Figure 1: Visualization of the technological trajectory of companies in the developing economy. Physical system, database, software, machines and equipment



Source: Lall (1992), Bell & Pavitt (1995), Figueiredo (2003).

Organizational sustainability permeates the use of New Communication and Information Technologies - NICTs, application to MPEs (Milach, Meirino & Barros, 2017), in which corporate sustainability, companies must participate in sustainable development.

The Vision 2050 project of the World Business Council for Sustainable Development (WBCSD) is also considered, which focuses on a world on the way to sustainability with fundamental changes in governance and economic structures. In this sense, the contributions of Kuzma, Oliveira 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.

As a management technology, the Integrated Sustainability Management model - GSI is an alternative of Professional Management for Administration, which requires the manager to have professional personal awareness to manage with Entrepreneurial Orientation - OE and Integrative Vision -VI, in view of its variables, components and dimensions, to favor the company's management, success and perpetuity (Polary-Pereira, 2012, 2019). The GSI is based on the Theory of Entrepreneurship in the Managerial and Economic approaches.

The GSI model, in its academic and practical performance, was applied to MPMEs in the industrial sample of Maranhao, considering its three dimensions, five components and twelve variables, analyzing the interference of the variable in its component; the interference of the component in its dimension; and the interference of the dimension in the GSI model, in which the results are written in the empirical section. In research by Polary-Pereira and Costa (2023), Polary-Pereira adapted the GSI model (2012), as shown in table 4, for application in both industrial and commercial organizations and service providers. It also analyzed the phases and processes (Frames 4 and 5).

Frame 4 - The Integrated Sustainability Management model – GSI

MODEL	DIMENSIONS	COMPONENTS	VARIABLES
GSI	Technological Administrative	Administration	Management Competencies and Abilities. Entrepreneurial Vision.
			Feasibility studies: technical, economic and financial.
		Technology	Technological Support (machines and equipment; systems and working methods).
			Level of industrial, commercial and service efficiency.
	Institutional Politician	Policies	Public Policies of Governments: Federal, State and Municipal
			Legal, tax and labor aspects. Ethic.
		Strategies	Strategies and Partnerships: Institutional Policy, Industrial Segment, Commercial, Services and Civil Society.
			Plano de Desenvolvimento: Industrial, Comercial e Serviços.
	Economic Social	Economic and Social Indicators	Qualified labor.
			Investment attractions: internal, external and local government.
			Preservation of the environment by the organization.
			Business location.

Source: Polary-Pereira (2023), adapted from Polary-Pereira (2012)

Frame 5 - Cycle of Phases Processes of MPMGEs

Nº	PHASES	DEFINITIONS
01	CREATION	It is the legal formalization of MPMGE, via a social contract and / or constitution document, in which the company is created to operate and meet a market demand.
02	MAINTENANCE	It is to fulfill the mission of creating the business, and keep working until leaving the phase of "loss" (recovery of capital invested in the creation phase), and from there, to remain in the market with the generation of own resources and operating at a profit.
03	PERENE MAINTENANCE	The company remains stable, successful in business, but without structural and physical growth. Staying alive successfully in business, and consciously avoiding expansion.
04	GROWTH	It is to grow the business in its structural and physical aspects, with the increase of the number of employees, greater market share and expansion of the clientele, increase of financial gains, among others.
05	PERENITY	It is to remain alive in the market, long-lived and succeeding generations, with constant feedbacks 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 of the workforce that guarantees professional maturity and can fulfill its political, economic and social function in the face of its mission.
Nº	**PROCESSES**	**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 remaining phases and achieve longevity, thus fulfilling its political, economic and social mission in the environment in which it operates.
02	LOW PLANNED	Closing of the activities of the MPMGE in the market, in which it operates, carried out in a manner planned by the owner, after complying with its legal, fiscal 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 poor result of MPMGE, and its inability to continue operating in the market in a viable way to administrative, technical, operational and financial matters, being compromised the relation with the employees, clients and the results of financial profit.
04	MORTALITY	Insolvency of MPMGE, ceasing the normal operation 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.

Source: Polary-Pereira (2012, 2019)

The teaching of entrepreneurship that began in the United States in 1947 at the Harvard Business School (Katz, 2003), advanced in its approaches to academic and business performance, being of great importance for the economy of 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, 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 among the 31 countries with economies driven by efficiency, with TEA of 17.2% in 2014 and 21.0% in 2015, the highest in the group, surpassing the BRIC countries, USA and Germany.

In the combination of indicators from the Global Entrepreneurship Monitor - GEM (2016), they classify countries into three groups: driven by factors – predominance of activities with a strong dependence on labor and natural resources; efficiency – advancing industrialization and gains in scale, predominance of capital-intensive organizations, such as Brazil; and innovation – knowledge-intensive ventures, expansion and modernization of services (Frame 6).

Frame 6 - Visualization of the technological trajectory of companies in the developing economy

Continent	Countries driven by factors (6)	Countries driven by efficiency (32)	Countries driven by innovation (27)
Africa	Burkina Faso. Cameroon	**South Africa**, Egypt, Morocco	
Asia & Oceania	Kazakhstan [2]. **India.** Iran[2]	Saudi Arabia[3], **China,** Indonesia, Jordan, Lebanon[3], Malaysia[3], Thailand Turkey[3]	Australia, Qatar, Korea, United Arab Emirates, Hong Kong, Israel, Taiwan
Latin America and Caribbean		Argentina[3], **Brazil,** Chile[3], Colombia, Ecuador, Guatemala, **Mexico[3],** Panama[3], Peru, Uruguay[3]	
Europe	**Russia[2]**	Bulgaria, Croatia[3], Slovakia[3], Georgia, Hungary[3], Latvia[3], Macedonia, Poland[3]	**Germany**, Austria, Cyprus, Slovenia, Spain, Estonia, France, Finland Greece, Netherlands, Ireland Italy, Luxembourg, Portugal, United Kingdom, Sweden, Switzerland
North America		Belize, El Salvador, Jamaica	Canada, **The United States,** Puerto Rico

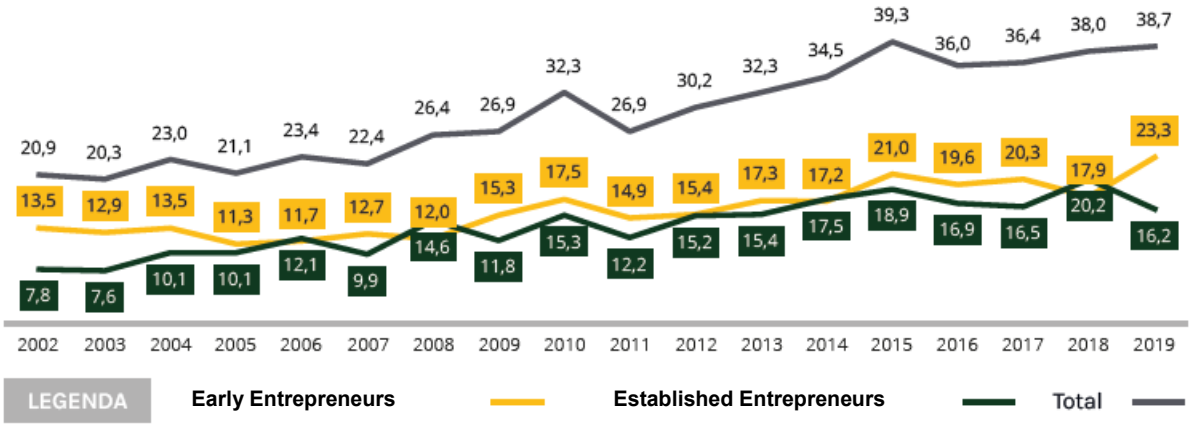
Source: GEM 2016
[1] This classification is based on the Global Competitiveness Report - Publication of the World Economic Forum that identifies three phases of economic development, considering GDP per capita and the share of exports related to primary goods.
[2] Transitioning to efficiency-driven economies.
[3] Transitioning to innovation-driven economies.

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 driven by innovation. In a study by the GEM in partnership with the World Economic. Forum in 2015, it was found the "existence

of a negative correlation between the level of development of countries (factors, efficiency and innovation) and the rates of initial entrepreneurship (TEA)". This finding suggests a better analysis by managers of the variables that make up this process, when making investment decisions in countries, since it can interfere in the medium and long term in the Established Entrepreneurship Rate - TEE.

According to GEM (2019), TEA (springs and new ones) surpassed TEE and reached its highest mark (23.3%). However, the TEE decreased (16.2%), returning to the values obtained in 2016 (16.9%) and 2017 (16.5%), and in 2018, it was 20.2% (Figure 2).

Figure 2 - Entrepreneurship rates[1] (in %) by stage of the enterprise TEA, TEE, TTE - Brazil - 2002:2019



Source: GEM (2019)

[1] Percentage of population aged 18 to 64 years

EMPIRICAL FINDINGS

In the analysis of the results of applying the GSI model in the Micro Companies - MIs in the sample (Polary-Pereira, 2012, p. 183), it was found that the Technological Administrative, Social Economic and Institutional Political dimensions had the highest averages (8.9, 8.0 and 6.3), followed by management components *8.9) and technology (8.7); economic and social indicators (8.0); and policies and strategies (6.4 and 6.1).

By analyzing the 12 variables of the GSI model, among the 06 predominant ones, "Partners' skills and managerial skills – Professional Management - GSI, based on Entrepreneurship", was the one that most positively influenced Management, Success and Perpetuity in MIs, (8 ,9 - Table 5); and among the 06 most important for the success of MIs in the perpetuity phase, "Reinvest in Microenterprises to better serve their workforce, customers and fulfill their economic and social function to remain successful in the market", was the predominant (9.20 - Table 6).

Table 5 – The six variables of the GSI Model that most positively influence the Management, Success and Perpetuity of industrial IMs in Maranhao

Variables	n	%	Average	Minimum	Maximum	DP
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 support (machines 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

Source: Polary-Pereira (2012)

Table 6 – The 06 (six) most important variables for the success of industrial MIs in Maranhao in the perennial phase

Variables	n	%	Average	Minimum	Maximum	DP
1. Reinvest in Micro-enterprises to better serve their workforce, clientele and fulfill their economic and social function to successfully remain in the market, in the view of managers	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 the 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 and the Government and the private sector	91	97.85	6.77	1	10	3.0553

Source: Polary-Pereira (2012)

In the analysis of the results of applying the GSI model in the sample's Small Companies - PEs (Polary-Pereira, 2012, p. 2022), it was found that the Technological Administrative, Social Economic and Institutional Political dimensions had the highest averages (8.7, 8.1 and 7.3), followed by management and technology components (8.7); economic and social indicators (8.1); and policies and strategies (7.6 and 7.0).

By analyzing the 12 variables of the GSI model, among the 06 predominant ones, "Competencies and managerial skills of the partners - Professional Management - GSI, based on Entrepreneurship", was the one that most positively influenced Management, Success and Perpetuity in PEs, (8 .95 - Table 7); and among the 06 most important for the success of PEs in the perpetuity phase, “Prioritize the qualification of industrial labor and maintain the level of efficiency and productivity of the sector”, was the predominant one (9.20 - Table 8).

Table 7 – The six variables of the GSI model that most positively influence the Management, Success and Permanence of industrial PEs in Maranhao

Variables	n	%	Average	Minimum	Maximum	Standard deviation
1. Competencies and managerial skills of the partners who manage 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 support (machines and equipment; systems and work methods) ……..….	41	100.00	8.80	7	10	0.9992
3. Qualified labor	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

Source: Polary-Pereira (2012)

Table 8 – The six most important variables for the success of industrial PEs in Maranhao in the perennial phase

Variables	n	%	Average	Minimum	Maximum	DP
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 function 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 others who manage or advise the PEs' business.....	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 Industrial Development Plan - 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	2	10	2.0140

Source: Polary-Pereira (2012)

In the analysis of the results of applying the GSI model to the Medium Enterprises - MEs in the sample (Polary-Pereira, 2012, p. 258), the Technological Administrative, Social Economic and Institutional Political dimensions of the GSI model had the highest averages (8.5, 8.1 and 7.4), followed by technology and management components (88, 82); economic and social indicators (8.1); and policies (7,1).

By analyzing the 12 variables of the GSI model, among the 06 predominant ones, “Location of the business” is the one that most positively influences the Management, Success and Perpetuity of MEs, (8.86 - Table 9); and among the 06 most important for the success of MEs in the perpetuity phase, “Prioritizing the technical-professional development of the partners who manage and others who manage or advise the business”, was the predominant one, with an average (9.25 - Table 10).

Table 9 - The six variables of the GSI model that most positively influence the Management, Success and Perpetuity of industrial MEs in Maranhao

Variables	n	%	Average	Minimum	Maximum	DP
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 support (machines and equipment; systems and work methods)	8	100.00	8.69	5	10	1.6243
4. Preservation of the Industry's local environment….....	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

Source: Polary-Pereira (2012)

Table 10 – The six most important variables for the success of industrial MEs in the State of Maranhao in the perennial phase, in the view of managers

Variables	n	%	Average	Minimum	Maximum	DP
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 Industrial Development Plan - PDI 2020 ……	8	100.00	7.75	4	10	2.4349

Source: Polary-Pereira (2012)

Based on the results of the Regression and Multiple Correlation of the 06 variables that most positively influence the Management, Success and Perpetuity of MIs (Independent - Table 5) and the 06 most important for the success of MIs in the perpetuity phase (Dependents - Table 6) of the Model GSI found that the variable "Performing feasibility studies: technical, economic and financial" (Frame 4) showed a substantial positive correlation, according to the regression equation $Y= a + b1x1 + b2x2 + ... + b6x6$. F of Regression = 12.2673. $p < 0.0001$. Multiple determination coefficient (R2xy) = 0.4612 and multiple correlation coefficient (Rxy) = 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 in 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 **Carrying out feasibility studies: technical, economic and financial**, therefore it is the one that best explains the variation in Y (Frame 7).

Frame 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 MIs in Maranhao

Independent variables (Peditoras)	Partial regression coefficient	t	P
Constant (Intercept)	1.4039(a)	-	-
Management skills and abilities of the partners who manage and those who administer 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
To do feasibility studies: technical, economic and financial	**0.3615(b3)**	**3.6469**	**0.0004**
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

Source: Polary-Pereira (2012).

In the PEs, the results of the Regression and Multiple Correlation revealed the 06 variables that most positively influence the Management, Success and Perpetuity of the PEs (Independent - Table 7) and the 06 most important for success in the perpetuity phase (Dependent - Table 8)", that the variable "Skilled industrial labor" (Frame 8) presented a substantial positive correlation, according to the regression equation Y= a + b1x1 + b2x2 + ... + b6x6. F of Regression = 4.0576. p = 0.0038. Multiple determination coefficient (R2xy) = 0.4173 and multiple correlation coefficient (Rxy) = 0.6460.

Frame 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.

Independent variables (Peditoras)	Partial regression coefficient	T	p
Constant (Intercept)	1.9189(a)	-	-
Managerial skills and abilities of the partners who manage and those who administer or advise the business combined with Professional Management (AIS) and Entrepreneurship.	0.2420(b1)	1.4464	0.1571
Technological support (machinery 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 Companies location.	**0.0773(b5)**	**0.6751**	**0.5042**
Preservation of the industry's local environment	0.0550(b6)	0.7674	0.4481

Source: Polary-Pereira (2012)

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 41.73% of the variation in 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 lowest value of p is the variable **Skilled industrial labor**, therefore it is the one that most explains the variation of Y.

In Medium-Sized Companies - MEs, the results of Regression and Multiple Correlation revealed the 06 variables that most positively influence the Management, Success and Perpetuity of MEs (Independent - Table 9) and the 06 most important for success in the

perpetuity phase (Dependent - Table 10)", that: the variable "Skills and management skills of the partners - Professional Management (GSI), based on Entrepreneurship" presented the multiple correlation coefficients (Rxy) = 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 in Y can be explained by the model, therefore it is the one that best explains the variation in Y (Dependent) (Frame 9).

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

Independent variables (Peditoras)	Partial regression coefficient	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
Management skills and abilities of the partners who direct and others who manage or advise the business - Professional Management (GSI), based on Entrepreneurship	**0.9685(b6)**	**0.7047**	**0.6092**

Source: Polary-Pereira (2012)

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 in 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 lowest value of p is the variable **Skills and managerial skills of the partners who manage and others who manage or advise the business** - Professional Management (GSI), based on Entrepreneurship, being the one that most explains the variation of Y.

The results show, through the tests, the correlation of all the variables of the GSI Model (frame 4), applied in the Micro, Small and Medium Enterprises - MPMEs of the samples, which demonstrated the effectiveness of the model, in the view of the managers, regarding the management , success and perpetuity of MPMEs.

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

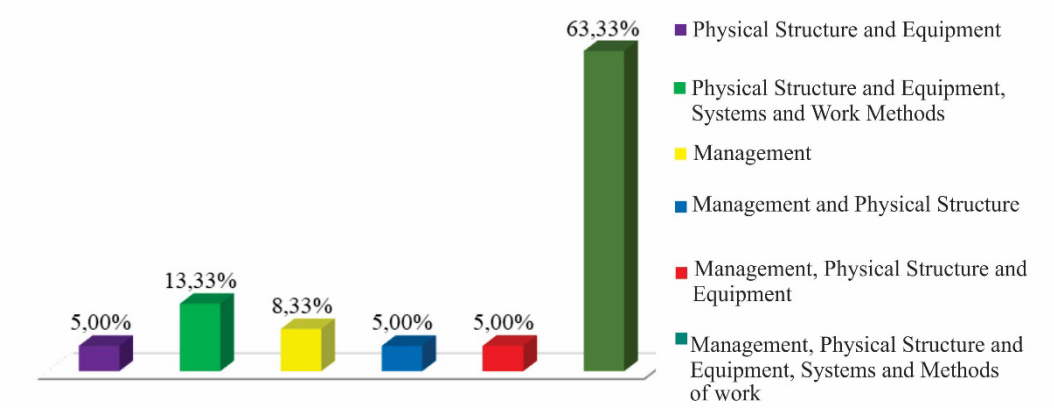
As for the GSI model technology variables present in MIs and EPPs that most contribute to perpetuity, “Products and services” predominated, with averages of 8.75 and 8.36; and regarding the “importance of managers having “knowledge and experience in the area in which they operate and seeking their development” to work in MIs and EPPs”, the results showed

averages of 8.27 in MIs, and 9.06 in EPPs.

And as for the time of existence on the market, 64% of MIs are in the range of 1 to 4 years; 9% between 5 and 8 years; 18% between 9 and 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 appears that in MIs, 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 industrial and service MPEs on technological innovation, sustainability and management technologies, including the GSI model (Polary-Pereira e Castro, 2021), among the results, it was found that technological innovations are aimed at predominantly for "physical structure and equipment" (63.33%), followed by: "physical structure, equipment, systems and work 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% (Figure 3).

Figure 3 - What are the innovations and technologies of industrial and service-providing MPEs aimed at?



Soure: Polary-Pereira e Castro (2021)

In analyzing the data in figure 3 of the MPEs, 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 input. In the analysis of the 12 variables of the GSI Model that most contribute to the MSEs in the sample becoming innovative and sustainable, among the 6 predominant ones, "Level of efficiency and effectiveness of results", on a scale of 1 to 10, was the one that most contributes positively (9.13%), followed by the variables "location of the business" (9.05%), "managerial skills and abilities of Managers. Professional Management (the GSI), based on entrepreneurship" (8.85), "skilled industrial labor" (8.73), "preservation of the industry's local environment" (8.71), and "feasibility studies: technique, economic and financial (8.83).

As for the "professional profile and 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 great importance (Tables 11 and 12).

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

Variables	n	%	Average	DP
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

Source: Polary-Pereira and Castro (2021)

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

Variables	n	%	Average	DP
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

Source: Field research in industrial and service MPEs, by the Author

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

CONCLUSION

By analyzing the literature of the terms organization, innovation, technology and sustainability, it is observed that there have been advances in terms of conceptual understanding in its various perspectives, but when its transferability from practical application to organizational structures, it suggests continuity of empirical studies and research that generates new paths for MPMEs to become innovative and sustainable.

In the analysis of the survey results in industrial MPMEs in 2012, among the relevant conclusions, the following stand out: The Management of MPMEs, when it acts applying the model of Management for Integrated Sustainability - GSI, favors its Perpetuity; the perpetuity of industrial MPMEs has a positive impact on the Industrial Development of the State of Maranhao (Polary-Pereira, 2012). The Perpetuity of this business segment with industrial development for the State generates prospects for innovation, organizational sustainability and economic and social development.

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 operation and the products and services offered, based on the accumulated technological capacity.

As for the Rate of Entrepreneurs in Initial Stage - TEA in Brazil (starting or new), it is concluded from the analysis of the literature GEM Brazil 2008 to 2019 that it grew in the world ranking, moving 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%).

According to GEM data (2019), TEA (springs and new ones) surpassed TEE and reached its highest mark (23.3%). However, the TEE decreased (16.2%), returning to the values obtained in 2016 (16.9%) and 2017 (16.5%), and in 2018, it was 20.2% (figure 2). This finding becomes relevant for the management, innovation and sustainability of MPMEs.

The research on micro and small industrial and service MPEs companies in 2021, based on the analysis of the results, concludes that the variables of the GSI model, the use of innovation, technologies aimed predominantly at Management, physical structure, equipment, systems and work methods, have a positive impact on the sustainability of these MPEs.

These conclusions are relevant to the academy, as they responded to the investigated problems and research questions raised in the sample MPMEs, achieving the objectives. The article draws attention not only to the technological contribution itself (machines and equipment, systems and work methods), as relevant for MPMEs to become innovative and sustainable, but also suggests an awakening to management technologies, such as of the Integrated Sustainability Management - GSI model, based on the Theory of Entrepreneurship, applied to MPMEs in 2012, to MPEs in 2016 and in 2021, as one of the viable perspectives for organizations to become innovative and sustainable and have a favorable impact on development and social status 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 the debates in academia, organizations and other social actors.

REFRENCES

Barbieri, José. C. (2007). *Organizações Inovadoras Sustentáveis:* uma reflexão sobre o futuro das organizações. Atlas.

Bell, M., Pavitt, K. (1995). *The Development of Technological Capabilities.* In: HAGUE, et al. Trade, Technology and International Competitiveness. Washington: World Bank.

Dornelas, José Carlos A. (2008). *Empreendedorismo corporativo:* como ser empreendedor, inovar e se diferenciar na sua empresa. 2. ed. Rio de Janeiro: Elsevier, 166 p.

Dosi, G. Mendonça. (2006). Technique and industrial transformation: theory and an application to the semiconductor industry. Carlos D. Szlak. Campinas, SP: Ed. UNICAMP.

FIEMA (2006). *Cadastro Industrial de São Luís-MA.* São Luís-MA.

Figueiredo, Paulo N. (2003). *Aprendizagem Tecnológica e Performance Competitiva.* Rio de Janeiro: Editora Fundação Getúlio Vargas.

Figueiredo, Paulo N. (2004). Aprendizagem tecnológica e inovação industrial em economias emergentes: uma breve contribuição para o desenho e implementação de estudos empíricos e estratégias no Brasil. *Revista Brasileira de Inovação,* v.3, n.2, jul/dez. p. 323-362.

GEM - Global Entrepreneurship Monitor (2016). *Empreendedorismo no Brasil - 2016* \ Coordenação Simara Maria de Souza Silveira Greco, diversos autores. Curitiba: IBQP, 208 p.

GEM - Global Entrepreneurship Monitor (2019). *Empreendedorismo no Brasil – 2019*: Relatório Executivo \ Coordenação Simara Maria de Souza S. Greco, diversos autores. Curitiba: IBQP, 30 p.

Greco, Simara M. (2008, 2010). *Entrepreneurship in Brazil.* Curitiba: IBQP.

IBGE - Instituto Brasileiro de Geografia e Estatística (2009). *Estimativa populacional 2009.* Disp: < http://pt.wikipedia.org>acesso: 14 jan. 2010.

IBGE - Instituto Brasileiro de Geografia e Estatística (2012). *Síntese de indicadores sociais:* uma análise das condições de vida da população brasileira. Rio de Janeiro.

JUCEMA – Junta Comercial do Estado do Maranhão (2016). *Estatístico do Cadastro:* Microempresa e Empresas de Pequeno Porte. SINREM.

Katz, J. (2003). The chronology and intellectual trajectory of American entrepreneurship education 1876-1999. *Journal of Business Venturing***,** [S.I.], v. 18, n.2, p. 283-300, mar. 2003.

Kim, L. (2005). *Da imitação à inovação.* A dinâmica do aprendizado tecnológico da Coréia. Tradutor: Maria Paula G. D. Rocha. Campinas: Ed. UNUCAMP.

Kuzma, E. L.; Oliveira, S. L. D.; Silva, A. Q. (2017). Competências para a Sustentabilidade Organizacional: Uma Revisão Sistemática. **Cadernos EBAPE.BR**, v. 15, n. Edição Especial, p. 428-444.

Lall, Sanjaya (1992). *Technological Capabilities and Industrialization.* World Development, Vol. 20, Issue 2, p.165-186.

Malhotra, Nareshk (2006). *Pesquisa de marketing:* uma orientação aplicada. 4. ed. Porto Alegre: Bookman.

Marconi, Maria de Andrade, Lakatos, Maria (2007). *Metodologia do trabalho científico.* 7. ed. São Paulo: Atlas.

Milach, S.; Meirino, M. J.; Barros, S. R. S. (2017). *Comunicação, conexão e transformação:* o uso das Novas Tecnologias de Comunicação e Informação pelas organizações na promoção do desenvolvimento sustentável. In: Osvaldo Luís G. Quelha; Marcelo J. Meirino; Sergio Luiz B. França; Júlio V. Neto; Cid A. Filho. (Org.). Tecnologia, Inovação e Sustentabilidade na Gestão, p. 109-122.

Nelson, R., Winter, S. (2005). *Uma teoria evolucionária da mudança econômica.* Tradutor: Cláudia Heller. Campinas: SP: Ed. UNICAMP.

Penrose, E. T. (1959). *The Theory of Growth of the Firm, Oxford:* Brasil Black Well.

PINTEC - Pesquisa e Inovação (2017). S*ustentabilidade e Inovação Ambiental.* Disponível em: http://www.pintec.ibge.gov.br. Acesso em: 22 ago. 2022.

Polary-Pereira, Ilmar (2012). *Gestão por Sustentabilidade Integrada-GSI:* uma análise nas Micro, Pequenas, Médias e Grandes Empresas (MPMGEs), a partir da Literatura e da visão dos Gestores Industriais do Estado do Maranhão. Tese de Doutorado em Administração FGV/EBAPE-RJ.

Polary-Pereira, Ilmar (2015). *Administration, Management and State Research Group-AGE*. CNPq.

Polary-Pereira, Ilmar, RAMOS, Allyson, SILVA, Yasmin, SILVA, Abgail (2016). As contribuições das tecnologias da Administração e perenidade das Micro e Pequenas Empresas-MPEs. *Relatório Final.* Projeto de Extensão selecionado PIBEX, Ed. Nº 06/2015-PROEXAE/UEMA.

Polary-Pereira, Ilmar (2019). Gestão por Sustentabilidade Integrada – GSI: uma alternativa de gestão profissional para as organizações. 1. rd. Curitiba: Appris.

Polary-Pereira, Ilmar (2020). *Administration for integrated sustainability - AIS*: a technology of administration for perennity and success of the organization. CIK - 8th International Conference in Collaboration with SINGEP/UNINOVE University Online Oct. 1-3.

Polary-Pereira, Ilmar; Castro, Danyelly Roberta B. (2021). *Organizações Inovadoras e Sustentáveis.* Relatório Final do Projeto PIBIC/FAPEMA/UEMA, Ed. 15/2020.

Polary-Pereira, Ilmar; Costa, Pereira da Costa (2023). Organizações Sustentáveis: concepções e atributos. *International Journal of Scientific Management and Tourism* Curitiba, v.9, n.6, p. 3738-3763.

Quivy, Raymond, Campenhoudt Van Luc (1995). *Manual de Investigação em Ciências Sociais.* 2. ed. Lisboa – Portugal: Gradativa Publicações, S.A.

Teece, D., Pisano, G. (1994). *The dynamic capabilities of firms:* an introduction. Industrial and Corporate Change, v.1, n.3.

Triviños, Augusto Nibaldo Silva (2009). *Introdução à pesquisa em ciências sociais:* a pesquisa qualitativa em educação. 1. ed. São Paulo: Atlas.

Ulrich, Dave; Smallwood, Norm; Sweetman, Kate (2009). *O Código da Liderança.* Rio de Janeiro: Best Seller.