Revista Iberoamericana para la Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

https://doi.org/10.23913/ride.v16i32.2955

Scientific articles

Instrumento de evaluación de nanociclos de vida empresariales en las microempresas de México: ensayo teórico–metodológico documental

An evaluation instrument for business life-cycle nanocycles in Mexican microenterprises: a theoretical–methodological essay

Instrumento para avaliação de nanociclos de negócios em microempresas no México: um ensaio teórico-metodológico documental

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Resumen

En México, las microempresas representan el 98.1% de las unidades empresariales, de acuerdo con datos gubernamentales. Sin embargo, el índice de cierre de operaciones entre 2008 y 2018 supera el 75%. En este contexto, el presente ensayo propone un instrumento de evaluación orientado a analizar los factores internos y externos que intervienen en los nanociclos de vida de las microempresas, entendidos como unidades analíticas de corta duración dentro de su ciclo de vida organizacional.

El ensayo se desarrolla bajo un enfoque teórico–metodológico de carácter documental, sin aplicación empírica directa, sustentado en una revisión de literatura especializada. A partir de dicha revisión, se proponen indicadores que limitan o favorecen la capacidad de supervivencia empresarial. Asimismo, el ensayo contribuye al fortalecimiento del conocimiento conceptual y metodológico del análisis del ciclo de vida empresarial en microempresas.

Palabras clave: microempresas, supervivencia empresarial, ciclo de vida empresarial, nanociclos, instrumentos de evaluación.

Abstract

In Mexico, microenterprises represent 98.1% of business units, according to government data. However, the business closure rate between 2008 and 2018 exceeded 75%. In this context, this essay proposes an evaluation instrument aimed at analyzing the internal and external factors involved in the nanocycles within the business life cycle of microenterprises, understood as short-term analytical units within their organizational life cycle.

The essay follows a documentary theoretical–methodological approach, without direct empirical application, supported by a review of specialized literature. Based on this review, indicators that may limit or support business survival are proposed. Furthermore, the essay contributes to strengthening the conceptual and methodological understanding of business life-cycle analysis in microenterprises.

Keywords: microenterprises, business survival, business life cycle, nanocycles, evaluation instruments.

Resumo

No México, as microempresas representam 98,1% das unidades de negócios, segundo dados governamentais. No entanto, a taxa de fechamento entre 2008 e 2018 ultrapassou 75%. Nesse contexto, este ensaio propõe uma ferramenta de avaliação destinada a analisar os fatores internos e externos que influenciam os nanociclos dos ciclos de vida das microempresas, entendidos como unidades analíticas de curto prazo dentro de seu ciclo de vida organizacional.

O ensaio é desenvolvido utilizando uma abordagem teórico-metodológica de natureza documental, sem aplicação empírica direta, e baseia-se em uma revisão da literatura especializada. A partir dessa revisão, são propostos indicadores que limitam ou favorecem a sobrevivência dos negócios. Além disso, o ensaio contribui para o fortalecimento da compreensão conceitual e metodológica da análise do ciclo de vida dos negócios em microempresas.

Palavras-chave: microempresas, sobrevivência dos negócios, ciclo de vida dos negócios, nanociclos, ferramentas de avaliação.

Revista Iberoamericana para la Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

Date Received: November 2025 **Date Accepted:** May 2026

Introduction

According to the National Institute of Statistics and Geography (2021), A microenterprise is defined as one with between zero and ten employees. Under this classification, microenterprises represent 98.1% of all business units in Mexico. However, between 2008 and 2018, the survival rate of microenterprises was less than 15%.

Currently, institutional and regulatory classifications of microenterprises in Mexico are based primarily on the number of employees. Under this approach, microenterprises are often analyzed in a generalized way, without delving into the key performance indicators that impact business survival.

In this regard, Kotler and Armstrong (2012) present seven dimensions that influence the potential of micro-enterprises: financing, legal formalization, human capital management, cash flow, technology adoption, electronic commerce (e- commerce) and administrative methods.

Thus, this article contextualizes the dimensions in the Mexican environment, considering the lifespan of the company, as well as the development potential of micro-enterprises.

Each dimension incorporates specific indicators based on the stage of the life cycle, conceptualized as nanocycles . These indicators are evaluated using an ordinal scale and contextualized to the Mexican business ecosystem.

Despite the extensive literature on business life cycles, there are still limitations in contextualizing them to the Mexican ecosystem, particularly in analyzing their repercussions on nano -life cycles in micro-enterprises .

Therefore, this essay aims to propose an instrument for evaluating the life cycle stages of microenterprises. To this end, it analyzes the challenges associated with nanocycles in relation to time and development dimensions.

Literature review

Theoretical foundations of the proposal

According to Greiner (1998) , the growth potential of a microenterprise is related to its capacity to generate value through the efficient use of its resources. He also points out that microenterprises experience significant changes resulting from management decisions, which have a cyclical impact on their growth over time.

In turn, Flamholtz and Randle (2007) They emphasize that the growth of micro-enterprises depends on the ability to recognize the need for change, which converges with the models of Cummings and Worley (2009) , who state that business growth is related to the appropriate use of resources over time.

In parallel, Kotler (2006) It highlights the importance of profitability factors and emphasizes the correlation between economic growth and the need to strengthen operations. For his part, Dickinson (2011) It proposes a financial approach, in which a relationship between cash flow and the level of indebtedness is explained.

Several authors agree that the central axes in the business life cycle are represented by time and the size of the organization (Cummings and Worley , 2009; Flamholtz and Randle, 2007; Greiner, 1998; Kazanjian , 1990; Kotler, 2006). However, the phases and specific elements for overcoming each stage differ among the various approaches.

Under this premise, the life cycle model of Kotler and Armstrong (2012) It offers a conceptual framework for analyzing the business life cycle, considering two axes: the dimensions of growth potential (Y) and years of operation (X). The analysis allows each dimension to be addressed independently and comprehensively over time through different stages.

This article proposes a theoretical framework for the life cycles of microenterprises based on the dimensions of growth potential and their indicators. These elements are compared over time using nanocycles to define the current state of microenterprises and analyze how the indicators either promote or hinder their growth.

Elements for the determination of nanocycles of life

The following considerations are raised for the characterization of nanocycles :

1. The Y-axis evaluates growth potential based on defined dimensions.
2. The X-axis represents time in years, starting from the beginning of operations (year zero) until year ten.
3. The life cycle considers the stages of introduction, development, and maturity.
4. The dimensions of the Y-axis consider: financing, legal formalization, human capital management, cash flow, technology adoption, e-commerce, and administrative methods.
5. The Y-axis indicators will be evaluated using a structured progression ordinal scale with values from 0 to 15.

Temporal delimitation of the X axis (Time / years)

The X-axis represents the time dimension through standardized stages by years, based on the average survival of micro-enterprises.

In this regard, the competitiveness and survival study developed by the National Institute of Statistics and Geography (2018) indicates that 57.4% of micro-enterprises close operations after two years of activity; 68% do so between three and six years, while 75% do not exceed ten years in the market.

Table 1 and Figure 1 show the percentage of company closures and the years in the market, demonstrating that the first ten years are the most complex in terms of business survival, due to the higher concentration of closures during that stage.

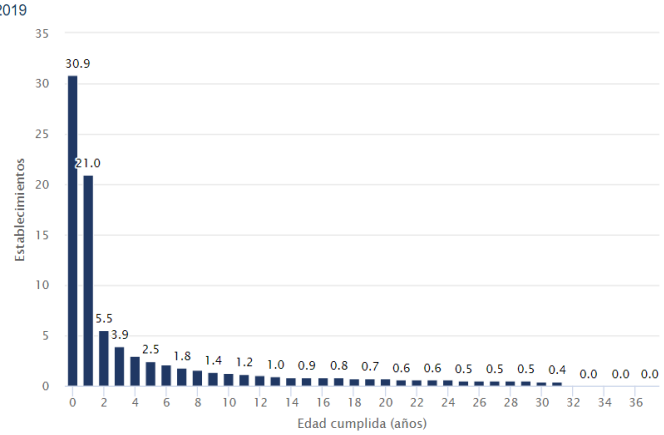
Table 1 Percentage of business **closures**

Years	0	1	2	3	4	5	6	7	8
Percentage of Closures	30.92%	20.97%	5.50%	3.91%	3.03%	2.47%	2.09%	1.81%	1.60%
Years	9	10	11	12	13	14	15	16–20	21–30
Percentage of Closures	1.43%	1.29%	1.18%	1.09%	1.01%	0.94%	0.88%	0.74%	0.53%

Note. Prepared by the author based on INEGI (2018)

Figure 1

Percentage distribution of microenterprise closures by years of operation



Note. Prepared by the author based on INEGI (2018)

Temporal delimitation of the Y-axis (Development)

Several authors agree that organizational size is an indicator of development in microenterprises (Greiner, 1998; Kotler and Armstrong, 2012). In this sense, organizational development is influenced by technological, economic, political, and legal factors, all of which affect organizational growth (Cummings and Worley , 2009).

For his part, Kazanjian (1990) It links business development with innovation, which impacts operations, structure, and marketing. Cummings and Worley (2009) They agree on the need to implement technology as a factor for business development.

In this regard, Flamholtz and Randle (2007) They raise the relationship between organizational growth and business development. Likewise, Cummings and Worley (2009) They argue that the increase in operations leads to a strengthening of the organizational infrastructure.

In parallel, Avolio et al. (2011) group organizational development into four fundamental factors: operational, administrative, strategic, and external.

Contextualizing the literature to the commercial ecosystem in Mexico, INEGI (2018) highlights seven dimensions related to growth potential: financing, legal formalization, human capital management, cash flow, technology adoption, electronic commerce (e-commerce) and administrative methods.

Therefore, the Y-axis represents a theoretical relationship between dimensions, so that the development of the organization influences the trajectory of the curves in each nanocycle of life according to the performance of said dimensions.

Conceptual framework

Financing dimension

According to the study of According to Segarra-Blasco and Teruel (2009) , micro-enterprises exhibit greater sensitivity to financial variations, because operating liquidity acts as the engine of the organization's daily activities, directly impacting operational performance.

The case study by Dahmen and Rodriguez (2014) shows that micro-enterprises lack formal financial education, as well as a limited adoption of administrative and financial controls, which limits their growth potential.

According to INEGI (2018), at the national level, 93% of microenterprises in the introductory stage are financed by family and friends, while the remaining 7% access bank loans. These conditions impact growth potential and limit access to private financing sources.

Dimension of legal constitution

According to the World Bank Group report (2016) , Mexico ranked 60th out of 190 in the world ranking related to the ease of legally formalizing a company, which highlights areas of opportunity in the legal incorporation processes.

In this regard, the World Bank Group (2016) identifies the indispensable factors in the legal constitution of a business, which require state and federal administrative procedures, established by various institutions, including the Mexican Social Security Institute [IMSS] (n.d.), the Ministry of Economy [SE] (n.d.-a, b, c, d) and the Tax Administration Service [SAT] (n.d.) .

From this perspective, microenterprises face complex challenges in formalizing their operations, while the lack of legal mechanisms fosters informality. This impacts their potential for financial and operational growth, limiting their transition to later stages of the business life cycle.

Human capital management dimension

Gebreeyesus 's (2007) study on the size of microenterprises by number of employees suggests that microenterprises with organizational tendencies toward self-employment exhibit a sustainable growth rate compared to companies with larger staff structures. However, a direct relationship is noted between the level of operational formality and the performance of microenterprises.

For their part, the postulate of Orlando and Pollack (2000) delimits two categories in employment structures: paid and unpaid workers, which expose the degree of formalization both labor and organizational.

The Ministry of Economy (SE) reports that in Mexico only 30.9% of microenterprises operate under formal schemes. In contrast, the remaining 69.1% participate in the informal sector, receiving payments in cash or in kind, and in some cases, without any remuneration. These conditions limit their access to ongoing training for the development of their activities.

For her part, Yuleva-Chuchulayna (2019) points out that micro-enterprises should prioritize quality processes over the volume of employees, given that human capital training generates greater benefits for the organization despite its associated costs.

Cash flow dimension

Likewise, Dickinson (2011) It proposes an approach to the Anthony and Ramesh (1992) model for analyzing financial performance based on cash flows. In this approach, the level of indebtedness is considered one of the main indicators of growth over time .

On the other hand, Brigham and Houston (2009) Cash flow is defined as the availability of liquid resources generated by an organization to meet its short-term obligations. In this sense, cash flow is related to the operational and financial capacity to maintain liquidity and fulfill immediate commitments.

In this sense, Dickinson's model (2011) identifies five main stages and three alternative ones, called *Shake These stages* are associated with adjustment, consolidation, and maturity processes. Together, these stages define the financial status of organizations, considering their liquidity capacity based on cash flows, as shown in Table 2.

Table 2 Cash flows according to the **Dickinson** model

Phases	Acronym	Description
Introduction phase in cash flows	FO = Negative FE = Negative FI = Negative	High investment in financing and operations. Investments are showing negative performance due to the need for capital injections.
Cash flow development phase.	FO = Positive FE = Negative FI = Positive	Operating costs are starting to generate positive, albeit moderate , returns; however , investment in expansion and growth remains negative due to the associated costs.
Maturity phase in cash flows.	FO = Positive FE = Negative FI = Negative	Operating costs show stable and positive behavior, the investment flow continues to offer negative results, but to a lesser extent.
Shake out 1 Reinvention	FO = Positive FE = Positive FI = Positive	The company adapts to new technologies through innovation and by restructuring its business model to strengthen profitability.
Shake out 2 Consolidation	FO = Positive FE = Positive FI = Negative	The organization merges with others or absorbs smaller companies as options for business consolidation, seeking to strengthen its market position.
Shake out 3 Maturity	FO = Positive FE = Positive FI = Positive	The organization enters a stage of expansion and experiences accelerated growth; in this stage, accelerated growth or decline may occur.
FO = Operations Flow FE = Cash Flow FI = Investment Flow		

Note. Prepared by the author based on Dickinson (2011)

Technology adoption dimension

According to Cunningham et al. (2023) , microenterprises consider two classic approaches to technology adoption: one associated with the cognitive process and the perception of value by micro-entrepreneurs, and another linked to the recognition of market opportunities. Together, both approaches respond to the need for competitiveness through differentiating elements as a business development strategy.

In this regard, Juniarti and Azizah (2021) point out that technology adoption is related to the complexity of the environment and the user experience. They also identify the ability to

generate changes within the organization as the main limitation, considering that market conditions influence adoption positively or negatively.

Buteau 's study (2021) on the role of technology in micro-enterprises points out that implementation requires a scalable infrastructure that is consistent with the operational capacity throughout the nanocycles of the organization's life.

In this sense, several authors agree that the implementation of technology in the organization maximizes growth potential, which boosts scalability and acts as an evolutionary factor over time (Buteau , 2021; Cunningham et al., 2023; Juniarti and Azizah , 2021).

Ajzen 's behavioral theory (1991) and Luszczynska and Schwarzer 's behaviorist theory (2015) and Qureshi et al. (2008) They agree that technological implementation requires four stages: perception of control, attitudes towards technology adoption, perceived efficiency, and focus on innovation.

Dimension of technological tools for e- commerce

Regarding the use of digital media for e- commerce activities , Bermeo Giraldo et al. (2022) highlights that micro-enterprises use various digital media to generate two-way communication, considering social media as an active preference due to its ease of use.

However, it is noted that its use is often inefficient, stemming from a lack of specialized training. On the other hand, specialized websites and third-party platforms are presented as alternatives designed to meet the needs of the digital market.

In this regard, Dickinson (2011) and Caballero and Lara (2021) conceptualize s- commerce (social commerce) as an approach that integrates social networks in a commercial context, classified into: third-party platforms, *s- commerce* , messaging services and *e- commerce platforms* .

Finally, the lack of implementation of digital business tools in early stages is highlighted, due to different factors, such as: lack of knowledge or the perception of inefficiency.

Dimension of administrative methods

According to the National Institute of Statistics and Geography (2018) , administrative control is one of the main problems in micro-enterprises, stemming from a lack of knowledge to design, manage and maintain rigorous controls over operations; this situation is reflected in the implementation of traditional control methods and in a resistance to organizational change.

For their part, Caballero and Lara (2021) They point out that micro-enterprises require organizational structures for effective management, which are progressively strengthened over time, leading to a division of tasks that allows each area to assume specific responsibilities in control and monitoring activities.

Likewise, Lövstål (2008) points out that the growth of organizations requires the formalization of production processes, which allows the construction of organizational structures oriented towards the delimitation of actions and processes.

In the early stages, intuitive, unstructured, and informal structures are preferred; however, when the organization undergoes changes, the adoption of new rational structures capable of responding to the ecosystem in a systematic way is required.

The main processes that micro-enterprises face are: administration, accounting, human resources, sales and material resource management; however, these models are flexible, which allows their adaptation to the various organizational realities.

In this context, the increase in organizational operations requires the implementation of hierarchical administrative tools, aimed at ensuring operational compliance throughout the stages of the nanocycles of life.

Methodology

The present research corresponds to a theoretical-methodological study of documentary design, non-experimental and of descriptive scope without empirical application or statistical validation.

In this sense, the study focuses on the construction of an instrument for evaluating nanocycles of life, considering both dimensions and indicators, which are evaluated using an ordinal scale.

In this regard, each ordinal scale has a structured progression order through a scoring system of 0 to 15 points, which was designed based on the evolutionary variations of each dimension; therefore, the progression intervals are based on a literature review regarding organizational life and not on prior statistical validation.

For the purposes of this study, nanocycles of life are defined as those gradual evolutionary changes within the organizational stages of micro-enterprises in each dimension.

Methodological design

Regarding the methodological design, the study is based on a literature review on business life cycles of micro-enterprises, defining both dimensions and indicators, as well as their contextualized influence on the Mexican environment.

For its part, the documentary review focused on the selection of theoretical contributions related to life cycles, thereby making it possible to delimit the performance indicators with the greatest potential to boost the growth of micro-enterprises.

Similarly, the theoretical frameworks allowed for the identification of relevant elements that impacted the development of the instrument. With this in mind, the proposal considers the evaluation of independent and joint dimensions using two evaluation axes: the X-axis corresponding to time, and the Y-axis associated with growth potential.

Thus, the evolution of micro-enterprises was defined in three fundamental stages: introduction, development, and maturity.

In turn, for the evaluation of each stage, a sub-stage analysis was implemented, which aims to increase the analytical depth of the instrument, identifying gradual changes in each stage of the life cycle.

The dimensions, indicators, stages and substages of nanocycles were presented in the literature review without any claim to empirical validation.

Finally, the methodological design contemplates the weighting of the dimensions and indicators through a structured progression ordinal scale of 0 to 15 points, progressively distributed according to the stages of the nanocycles, allowing a theoretical-methodological structuring.

Construction of the assessment instrument

The delimitation of each stage within business nanocycles is related to the evolution of dimensions and the time spent in the market.

In this sense, the dimensions considered in the study are: financing, legal formalization, human capital management, cash flow, technology adoption, electronic commerce (e-commerce) and administrative methods.

Each of the dimensions is evaluated independently using a structured progression ordinal scale as previously stated, which allows the identification of the current status of the microenterprise.

The instrument employs a hybrid evaluation approach, which analyzes the dimension as a whole and individually assesses performance by indicator. This approach allows for both comprehensive and individual evaluation of dimensions and indicators.

Regarding the indicators, a gradual scoring system is implemented by stages delimited by the phases of: introduction, development and maturity within the business nanocycles .

Consequently, the instrument allows for the independent and comprehensive measurement of each dimension. Furthermore, the presented intervals correspond to the structured progression established for the evaluation of nanocycle lifecycles. The score assignment corresponds to the indicator with the highest level of correspondence with respect to the observable characteristics of the organization.

For illustrative purposes, each dimension can be classified into three levels.

1. Introduction stage – Minimum score of 0 points and maximum of 5 points.
2. Development stage – Minimum score of 6 points and maximum of 10 points.
3. Maturity stage – Minimum score of 11 points and maximum of 15 points.

Likewise, the overall score for the instrument corresponds to the sum of the scores obtained for each dimension, with a range from 0 to 105 (7 dimensions × 15 points). Based on this, three overall stages in the life cycle are proposed:

1. Introduction stage – Score from 0 to 35 points.
2. Development stage – Score of 36 to 70 points.
3. Maturity stage – Score of 71 to 105 points.

In turn, performance evaluation is compared over the duration of the organization's existence, in an interval of zero to ten years, distributed in three stages:

1. Introduction stage – from 0 to 2 years.
2. Developmental stage – from 2 to 7 years old.
3. Maturity stage – from 7 to 10 years old.

In case of discrepancies between the overall score and tenure, the overall score is prioritized as the performance indicator in the nanocycles of life. These discrepancies result from the nonlinear growth stemming from the differentiated evolution of organizational dimensions.

Procedure for constructing the instrument by indicators

For this instrument, the dimensions are classified and the corresponding evaluation criteria are detailed. These criteria are measurable using an ordinal scale and are organized into three defined stages: introduction, development, and maturity.

Each dimension is evaluated using indicators and classified into stages based on a scale of zero to fifteen points; the result represents the level of business development by dimension, as shown in Table 3.

Table 3 Dimensions and evaluation indicators

	Introduction		Development		Maturity	
	Indicator	#	Indicator	#	Indicator	#
1 - Dimension - Financing	1. Without financing	0	4. No changes compared to the previous stage	6	7. No changes compared to the previous stage	11
	2. Personal financing	3	5. Non-bank financing for individuals	8	8. Formal bank financing	13
	3. Financing from family or friends	5	6. Initial bank financing	9	9. Government bank financing	14
					10. Government programs	15
2 - Dimension - Legal Constitution	1. Without any legal registration	0	3. No changes compared to the previous stage	6	7. No changes compared to the previous stage	11
	2. Registration with the SAT (Tax Administration Service) with business activity	5	4. Registration of trade name	8	8. Registration of employees with the IMSS	12
			5. Obtaining the articles of incorporation	9	9. Municipal tax return	13
			6. Obtaining RFC	10	10. Notification of opening of commercial establishments	14
					11. Registration in the SIEM	15
3 - Dimension - Human capital management	1. Self-employment without employees	0	4. No changes compared to the previous stage	6	8. No changes compared to the previous stage	11
	2. Self-employment with at least 1 unpaid employee	3	5. With at least 2 employees without employment benefits	8	9. With at least 2 employees with employment benefits	12
	3. Self-employment with at least 1 salaried employee, without benefits	5	6. With at least 3 employees without employment benefits	9	10. All employees with employment benefits	13
			7. With at least 1 employee with employment benefits	10	11. At least 2 employees with formal training	15
4 - Dimension - Cash Flow	1. Without any measurement	0	3. No changes compared to the previous stage	6	5. No changes compared to the previous stage	11
	2. Introduction 1; FO (-) - FE (-) - FI (-)	5	4. Development 1; FO (+) - FE (-) - FI (+)	10	6. Maturity 1; FO (+) - FE (-) - FI (-)	12
					7. *Shake out 1* ; FO (-) - FE (-) - FI (-)	13
					8. *Shake out 2* ; FO (+) - FE (+)- FI (+)	14
					9 . *Shake out 3* ; FO (+) - FE (+) - FI (-)	15
	1. Lack of technology adoption due to difficulty	0	4. No changes compared to the previous stage	6	7. No changes compared to the previous stage	11

5 - Dimension - Technology Adoption	2. Openness to technological adoption	3	5. Implementation of technology for competitiveness and positioning	8	8. Use of technology for operational efficiency	13
	3. Initial technological implementation	5	6. Implementation of technology as an early innovation process	10	9. Use of technology for value creation	14
					10. Use of technology for continuous innovation.	15
6 - Dimension - Technological tools for e-commerce	1. Without any digital means.	0	4. No changes compared to the previous stage	6	8. No changes compared to the previous stage	11
	2. With at least 1 two-way communication medium	3	5. With at least one two-way communication channel and one social (non-business) channel	8	9. With at least 1 business profile in *s- commerce* and 1 business media outlet	13
	3. With at least 1 personal profile on social media	5	6. With at least 1 business profile on non-business social media	9	10. With s- commerce , business communication, and a partially implemented e-commerce platform	14
			s- commerce interface	10	11. With s- commerce , business communication, and an implemented e- commerce platform	15
7 - Dimension - Administrative Methods	1. Without any administrative method	0	4. No changes compared to the previous stage	6	8. No changes compared to the previous stage	11
	2. Using an analogical method	3	5. With more than three analog methods	8	9. With all digital control methods	13
	3. With two analog methods	5	6. With at least one digital control method and two analog methods	9	10. With a hierarchical organizational structure	14
			7. With at least one digital control method and three analog methods	10	11. All processes are fully hierarchical	15

Note: Original work

For the evaluation of the instrument, it is considered that the organization's growth is based on the sum of the scores obtained and on the organizational capacity to develop the evaluated dimensions. However, this growth does not follow a linear relationship, since the dimensions evolve in different ways.

Therefore, the evaluation proposal defines the minimum and maximum scores for each stage, so that based on the results it is possible to generate the organizational evaluation and identify areas of opportunity for growth and transition between stages.

Taken together, this instrument evaluates the dimensions independently, promptly identifying areas for improvement in microenterprises. This allows for a detailed analysis of each dimension from both specific and global perspectives. Based on the instrument's overall score and the operating time, Tables 4–6 present the optimal scenarios for each stage and substage.

The classification intervals were established using proportional criteria of theoretical progression, with the purpose of maintaining a homogeneous distribution between stages and facilitating the conceptual interpretation of the instrument.

Table 4 Evaluation in the Introduction stage

Stage	Substages	Score		Time		
		Min	Max	Min	Max	Extent
Introduction	1st Substage	0	5	0	6	Months
Introduction	2nd Substage	6	14	> 6	12	Months
Introduction	3rd Substage	15	21	>12	18	Months
Introduction	4th Substage	22	35	>18	24	Months

Note: Original work

The so-called “year zero” represents the initial stage of organizational structuring prior to the operational consolidation of the microenterprise, used for analytical purposes to identify early development conditions.

Table 5the Development Stage

Stage	Substages	Score		Time		
		Min	Max	Min	Max	Extent
Development	1st Substage	36	44	>2	3	Years
Development	2nd Substage	45	53	>3	4	Years
Development	3rd Substage	54	62	>4	5	Years
Development	4th Substage	63	70	>5	7	Years

Note: Original work

Table 6. Evaluation at Maturity Stage

Stage	Substages	Score		Time		
		Min	Max	Min	Max	Extent
Maturity	1st Substage	71	80	>7	8	Years
Maturity	2nd Substage	81	89	>8	9	Years
Maturity	3rd Substage	90	98	>9	9.5	Years
Maturity	4th Substage	99	105	>9.5	10	Years

Note: Original work

This proposal allows comparing years of presence in the market with the performance achieved in each stage and substage, facilitating the identification of areas that limit the organization's growth over time.

Revista Iberoamericana para la Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

Results

Instrument results

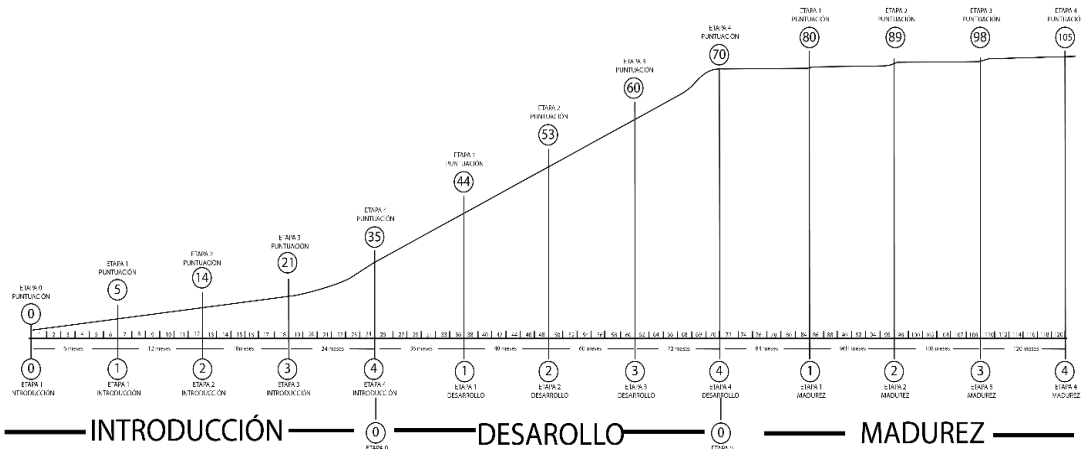
The following results are presented as a conceptual and analytical development of the logic and theoretical behavior of the proposed instrument, under the methodological considerations previously established in a Mexican context.

The results presented correspond to a theoretical representation of the proposed instrument and do not constitute empirical evidence derived from its application in the field.

For the evaluation of business nanocycles , theoretical scoring thresholds are established for each stage, which must be exceeded to progress to the next stage.

As each stage is overcome, the complexity of the next increases as a result of organizational evolution. In this sense, the present work allows us to approximate the identification of factors associated with business survival, as shown in Figure 2.

Figure 2the progression of business nanocycles



Note: Original work

Result of the introduction stage in nanocycles of life

The introduction stage is presented under four sub-stages, each with specific scores and time ranges that allow the evaluation of the organization's current status, as well as the identification of factors that favor or restrict growth.

In this sense, the slope of the curve corresponding to the introduction stage shows an increase between substage three and four, which corresponds to the speed of evolution required to overcome the introduction stage.

For their part, substages one, two and three correspond to the initial phases of the consolidation process, presenting a progressive growth with structural restrictions, in which organizational efforts are oriented towards survival and adaptation to the commercial context, as represented in Figure 3.

Figure 3the introduction stage

Note: Original work

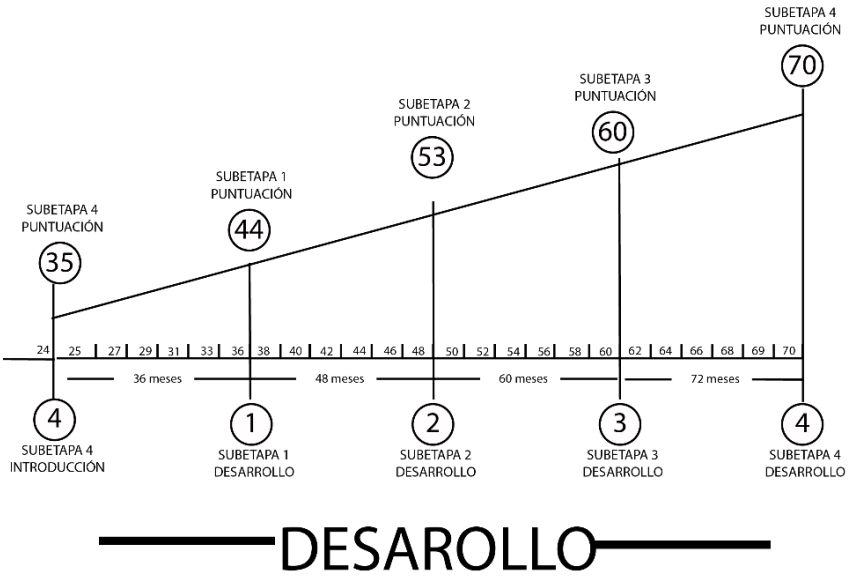
Result of development stage in nanocycles of life

The development stage prioritizes the consolidation of previously established organizational processes, favoring the structural evolution of the organization towards models oriented towards operational efficiency.

Likewise, the priority is geared towards strengthening financial stability, promoting investment in both physical and digital assets.

These assets function as strategic elements that influence the different dimensions of the organizational environment, fostering a synergy aimed at avoiding organizational stagnation.

Figure 4the developmental stage



Note: Original work

Figure 4 presents a natural progression from the last introduction substage and the first development thresholds, considering the relationship between cumulative score and time spent in the market.

The evolution between substages occurs gradually, representing the consolidated result of the synergy between the evaluated dimensions. Furthermore, the accelerated growth in this stage is influenced by organizational conditions and the implementation context.

Maturity stage result in nanocycles

The maturity stage is characterized by less dynamism, since changes occur incrementally and are clearly defined.

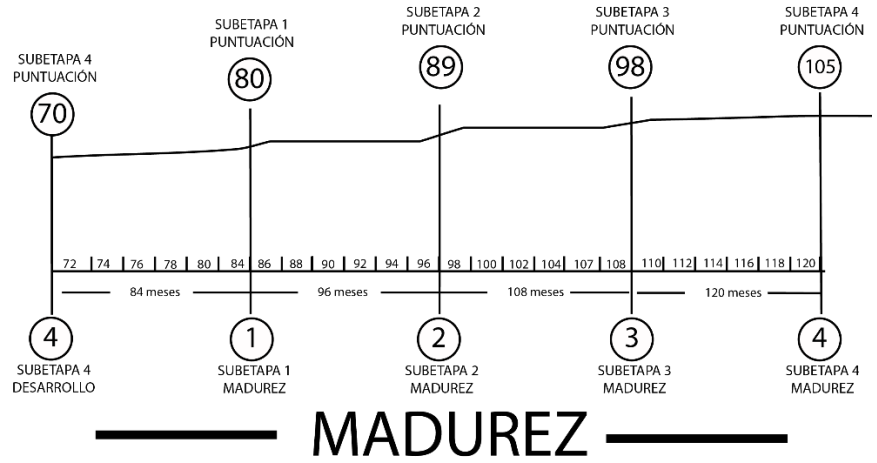
Priority is given to investment with future effects under greater financial stability and less dependence on external resources; in this sense, the staff responds to procedures and hierarchical structures in accordance with the legal remuneration for their activities.

Its growth rate is moderate over the years, given that the structures are fully formalized and the objectives are developed in a structured manner.

The division of labor promotes specialization of functions and facilitates the identification of areas for strategic improvement over time .

For its part, technological adoption is integrated into organizational processes through qualified personnel; thus, the maturity stage is distinguished by small incremental changes.

Figure 5the maturity stage



Note: Original work

Discussion

This essay presents the development of a conceptual instrument for evaluating the nanocycles of business life in microenterprises. Its construction is based on the identification of dimensions, indicators, stages, and substages derived from an analysis of the literature on business life cycles.

The main contribution of the study consists of the conceptual structuring of an instrument aimed at representing internal evolutionary dynamics of micro-enterprises through organizational dimensions and ordinal progressions.

The analysis allows comparing the instrument with the approaches presented in the literature, which allows an approximation for the evaluation of nanocycles of life.

Methodologically, the research allows for the analysis of micro-enterprises through specific dimensions, as well as the key indicators for their business permanence.

The proposal coincides with the classic contributions on the structure of life cycles developed by authors such as Cummings and Worley (2009), Flamholtz and Randle (2007), Greiner (1998), Kazanjian (1990) and Kotler (2006), who highlight the existence of relationships between structural changes and organizational growth.

In contrast, contemporary authors such as Avolio et al. (2011), Caballero and Lara (2021), Cunningham et al. (2023) and Yuleva-Chuchulayna (2019) point to asynchronous relationships between organizational indicators in micro-enterprises, as a consequence of evolutionary performance over time.

nanocycle proposal is configured as an evaluation instrument based on the theories of organizational life cycles contextualized to the microenterprise ecosystem in Mexico, incorporating dimensions and indicators oriented to the particularities of the market.

Unlike classical and contemporary theory, this essay proposes an evaluation model using a structured progression ordinal scale for the analysis of nanocycles of life.

However, the differentiator is based on the operationalization of the dimensions and organizational changes over time through stages and substages, which allows for a detailed and iterative analysis.

In this regard, the present essay corresponds with the literature on microenterprise survival and growth by being based on the models of Kotler and Armstrong (2012) and Greiner (1998), incorporating dimensions derived from the study of microenterprises by INEGI (2018) .

Previous research has revealed the relevance of financing and cash flow in the development of micro-enterprises, as they constitute determining elements for their operation and financial stability, which coincides with the approaches of Dahmen and Rodríguez (2014) and the Dickinson model (2011).

Likewise, the technological factors proposed by Luszczynska and Schwarzer (2015) and Qureshi et al. (2008) highlight the gradual and evolutionary implementation of technological tools, which corresponds with the postulates developed by Bermeo Giraldo et al. (2022).

In this regard, both the production and administrative processes proposed by Caballero and Lara (2021) share a relationship with the postulates on staff training proposed by Yuleva-Chuchulayna (2019), both consider that organizational strengthening is an empowering element in staff training in micro-enterprises.

Finally, the discussion confirms that the instrument is a tool for the organizational analysis of microenterprises in the Mexican context. Furthermore, the study allows for an analysis of organizational status, identifying both areas for improvement and problems through structured indicators.

However, this instrument has inherent limitations due to its theoretical nature and the lack of empirical application. Therefore, the results represent a conceptual and structural development of the model, and their validation in future research requires empirical applications.

Furthermore, the lack of statistical validation limits the operational generalizability of the instrument, so its scope should be interpreted from a conceptual and exploratory perspective.

Conclusions and recommendations

The nanocycles of microenterprises consist of stages of introduction, development and maturity; however, the speed of evolution differs in each of them depending on the context and market conditions throughout the life cycle.

In parallel, this study establishes that the growth relationship does not follow a linear pattern; on the contrary, it varies from organization to organization, since maturity observed in one dimension is not necessarily accompanied by development in the others. Consequently, organizations exhibit non-homogeneous dimensions.

In this context, asynchronous growth is understood as the differentiated evolution of organizational dimensions, in which certain areas may present higher or lower levels of development compared to others within the same time period.

Based on the above considerations, microenterprises can present three evaluation conditions. The first, called “adequate”, occurs when the organization is at a level of correspondence between the level of development and the time spent in the market, according to the criteria established in the proposed evaluation.

The second, called “acceleration”, occurs when an organization reaches a level of development higher than expected based on its time in the market, which allows access to the next stage more quickly.

The last scenario, called “decline”, is identified when an organization falls below the “adequate” curve, indicating a progressive deterioration of organizational dimensions.

The proposed evaluation framework can be expanded by incorporating more dimensions to strengthen the model's analytical sensitivity and facilitate the identification of opportunities in microenterprises. In this sense, the instrument allows for future lines of research focused on its empirical evaluation and organizational implementation.

An important consideration is that each cycle corresponds to theories on the life cycles of microenterprises. Furthermore, it is established that the beginning and end of each stage are linked.

Regarding the decline phases, the proposed instrument does not consider this phase due to the wide variability within each sector. However, the analysis suggests that a relationship contrary to the methodological postulates could represent processes of organizational deterioration.

In other words, the progressive development of each independent dimension does not necessarily represent the joint growth of the dimensions, so the stagnation of a specific dimension can generate processes of decline or deceleration.

Finally, the maturity stage allows for incremental modifications; however, each structural increase implies greater financial requirements. In this sense, this condition can represent a risk in the face of operational crises or changes in the organizational environment.

Future lines of research

Although the present proposal offers an alternative for the continuous analysis of micro-enterprises, the lack of empirical application in dynamic environments limits comprehensive validation.

In this sense, it is pertinent to apply the proposal in a practical context through longitudinal qualitative studies, with the aim of analyzing the organizational impact over time.

Furthermore, future researchers are advised to implement the study in defined markets. Therefore, implementation in dynamic markets such as retail is suggested, along with a delimitation by specific subsectors in order to observe the evolutionary processes of the dimensions more precisely.

Additionally, quantitative research would allow the statistical identification of the variables with the greatest impact on the growth of micro-enterprises, as well as determining those with greater or lesser relevance within the proposed model for its contextualized modification.

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