Technology is driving innovation in social entrepreneurship, where access to information, education, mobile connectivity, artificial intelligence (AI), and cryptocurrencies have made it possible to modify the social impact. Our research focuses on the formation, integration, and execution of ideal training programs that contribute to positive results in economic axes defined in terms of Technological Innovation, Social Entrepreneurship, Innovative Solutions for Social Challenges, efficiency, scalability, and financial sustainability. This research needs to solve the problem of developing a training program in technological innovation and social entrepreneurship because currently, these programs face several problems partially solved in the literature; these problems are mostly: lack of alignment with organizational objectives, lack of relevance and applicability, deficiencies in program design, lack of top management support, and inadequate performance evaluation. Technological innovation and social entrepreneurship in vocational training are implemented as processes that introduce new technologies, methodologies, and approaches to improve the learning and performance of an organization's workers. In this research, measures and metrics were implemented that allowed various aspects to evaluate and improve the performance of the training program, metrics were implemented that made it possible to assess multiple aspects and enhance the performance of the training programs. Our research axes show that quantitative feedback surveys established our performance indicators were conducted to evaluate the relevance and applicability of the program. Due to their characteristics, the results obtained in this research allows to solve this problem and empower the participating people and organizations to create social and environmental impact; they also allowed to increase productivity and define more efficient processes. For this reason, this research work identified the factors that intervene in using training programs within a public entity by collecting qualitative and quantitative data

Keywords: entrepreneurship, education, training, knowledge, SMEs, social entrepreneurship, economic activities, talent

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DEVELOPMENT OF A TECHNOLOGICAL INNOVATION AND SOCIAL ENTREPRENEURSHIP TRAINING PROGRAM TO GENERATE SERVICES IN A MEXICAN PUBLIC ENTITY

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1. Introduction

Technological Innovation and Social Entrepreneurship Training Program in a Mexican public entity can drive economic development, address social issues, improve public services, foster innovation, promote sustainability, engage with the community, attract talent, and enhance the entity's global competitiveness. It can be a valuable investment in the region's future and the country.

Research on training for public entity impact is indeed crucial for several reasons. Public entities, which include government agencies, non-profit organizations, and public institutions, play a significant role in society. Their effectiveness and efficiency in delivering services and addressing societal challenges have a direct impact on the well-being of communities and the overall functioning of government. In México, it is necessary to develop and improve essential services, such as healthcare, education, transportation, and public safety. In this case, the Research can identify best practices in training that can enhance the quality of these services, making them more efficient and effective.

In the last century, the International Labor Organization (ILO) created the Inter-American Center for the Development of Knowledge in Vocational Training (CINTERFOR) to meet the needs of countries, companies, and individuals in the training and professional development of Human Resources.

In a rapidly evolving world driven by technology, the intersection of technological innovation and social entrepreneurship has become a powerful force for positive change. This dynamic synergy has the potential to address pressing social and environmental challenges while also creating sustainable and impactful solutions. The Technological Innovation and

Social Entrepreneurship Training for Services program seeks to empower individuals and organizations with the knowledge, skills, and mindset needed to leverage technology for the betterment of society [1, 2].

Our world faces many complex issues, from climate change and resource scarcity to inequality and healthcare disparities. To tackle these challenges effectively, innovative solutions are essential. With its ability to connect, automate, and scale, technology offers a promising avenue for creating positive social and environmental impact.

Social entrepreneurship has emerged as a vital approach to driving change. Social entrepreneurs are individuals and organizations that apply entrepreneurial principles to develop innovative solutions to societal problems. They seek to generate profit and create lasting positive impact on communities and the planet.

Technological innovation plays a pivotal role in the success of social entrepreneurship. From blockchain solutions for transparent supply chains to AI-driven healthcare initiatives, technology can amplify the reach and impact of social ventures. However, harnessing these tools requires a deep understanding of technology and social entrepreneurs' unique challenges.

Technological Innovation and Social Entrepreneurship Training for Services program is designed to bridge this knowledge gap [3]. It is a comprehensive training initiative that equips participants with the following:

1. Technology literacy: participants will gain a foundational understanding of various technologies, including AI, blockchain, IoT, and data analytics. They will learn how these technologies can be harnessed for social and environmental benefit.

2. Business acumen: entrepreneurial skills, such as business planning, financial management, and marketing, are essential for the success of social ventures. The program offers training in these areas tailored to the needs of social entrepreneurs.

3. Impact assessment: understanding how to measure and communicate a venture's social and environmental impact is crucial for attracting investors and partners. The program provides tools and methodologies for impact assessment.

4. Networking and collaboration: building a supportive network of like-minded individuals and organizations is essential for the growth of social ventures. The program facilitates networking opportunities and collaboration among participants.

5. Mentorship and resources: experienced mentors and access to resources such as funding opportunities and incubation support will be available to program participants.

Through this program, let's aim to cultivate a new generation of socially conscious entrepreneurs equipped with the knowledge and skills to drive technological innovation for the betterment of society. By fostering a culture of social entrepreneurship, let's aspire to address pressing global challenges and create a more sustainable and equitable future.

The following modules will delve deeper into technological innovation, social entrepreneurship, and their intersection. Together, let's explore case studies, best practices, and emerging trends that highlight the potential of this transformative approach.

Cooperation between the various regional member countries in Latin America and the Caribbean has promoted actions to exchange knowledge and capacity building. As a member country, Mexico has several educational and job training institutions aligned with the strategies designed by the Network created by CINTERFOR, where they offer different training programs, plans, and actions that organizations can use for human talent management.

Training is an activity that all public and private companies must consider in their work programs, and in turn, it is a right that workers must increase their quality of life and productivity levels that will conclude that this scientific topic is relevant. Therefore, it is essential to design new strategies that meet current training and development needs, where technology and digital media play a crucial role in their application.

2. Literature review and problem statement

According to the International Labor Organization (ILO), vocational training is a strategy used by organizations from all economic sectors, which serves as an instrument for updating people's skills and abilities to improve performance and performance in their jobs. In addition, it is part of the productive development policies as a fundamental articulation to have decent jobs, productivity growth, and the promotion of technological development [4].

In the same international framework [5] defines professional training by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as an educational process that uses the study of technologies and sciences. To acquire knowledge, skills, abilities, and competencies related to economic life sectors. In addition, it is part of a permanent learning system that interacts with economic development and social welfare.

In Mexico, the Federal Labor Law [6, 7], establishes that training is a fundamental activity that seeks to provide new skills and abilities to the workers of the country's public and private institutions, perfecting and updating the knowledge and attitudes already acquired to improve the educational level.

For this, companies must provide the necessary tools and use the new technologies that are being developed since they are essential to raising the levels of productivity in companies and improving the quality of life of people.

In the Mexican regulatory framework that involves training within the government sector, the Federal Law of Workers at the Service [7]. In the Article 123 of the Constitution [8] instructs workers to attend the instances that provide training actions for work, to improve their professional preparation and raise the levels of efficiency in the positions where they carry out their work. In addition, it encourages public bodies to create unions and working conditions that establish guidelines to promote institutional growth, with the help of collaborative actions such as updating and leveling knowledge and complying with the social commitment.

Before defining training and its importance, it is necessary to define a business model and its components. A business model can be understood as a conceptualization of how a company generates (or plans to develop) profits. This concept encompasses the value proposition that a company offers to its diverse clientele, showcasing the company's capabilities, the array of partners required to conceive, market, and deliver this value to customers, and the financial relationships necessary to establish sustainable revenue streams [9]. Training has the potential to facilitate the company's growth, it is recognized as a process that promotes in-depth knowledge on specific topics, providing and developing habits and abilities that allow activating labor competencies to carry out functions aimed at achieving objectives with responsibility and commitment. Within on-the-job training, communication is a fundamental element to adequately transmit information, knowledge, understanding of reality, and reasoning, as it is the key to success in any project for quality management in human talent [10].

For example, in [10] consider that the development of information and knowledge management are opportunities that all hierarchical levels of the organization must take advantage of since intellectual capital is the primary value to obtain competitive advantages in cultural performance- business. The impact of training directly affects the objectives set by an organization since ignorance and lack of staff skills minimize the actions to be followed in the production processes.

The ILO, through the Inter-American Center for the Development of Knowledge in Vocational Training, mentions the importance of adapting to vocational training policies and guidelines to take advantage of the consequent opportunities in the integration of the global economy, derived economic, social and technological change that has emerged in recent years. It is how a country of high productivity and with sustained and inclusive growth, is based on the updated capacities and abilities of the human capital on which it is sustained. Therefore, human talent is considered a vital and indispensable factor in promoting sustained and sustainable growth in any economy since increasing the knowledge and skills of individuals contributes to the ability to live with greater freedom.

On the other hand, the authors of [11] introduces the Knowledge and Innovation Economy (ECI) as the foundation for developing skills in Micro, Small, and Medium Enterprises (MSMEs) in Latin America and the Caribbean since it identifies productive innovation as a process for the creation, introduction, and application of novel thoughts in the work areas that generate individual and group advantages. This innovation is conceived as a behavior based on four stages: the recognition of the problem, the originality of new ideas, the promotion of solution proposals, and the application of the recommendations in productivity.

It should also be noted that, at the International Labor Conference held by members of the ILO, the levels of improvement in productivity, employment growth, and technological development were qualified, highlighting the importance of training as an international, national, and regional strategy for promoting innovation, business development, technological progress, economic diversification and the growth of skills that help countries to accelerate the creation of dignified and decent jobs. However, the negative factors resulting from the lack of educational and professional training that led to low productivity, less job creation, low-quality and poorly paid work, inefficient competitiveness, and deficit in the social and economic development of the countries were also mentioned Countries.

The Economic Commission for Latin America and the Caribbean (ECLAC) mentions that skills tend to depreciate due to the gaps in global economic change and the emergence of new technologies and business models, so it is necessary to update them regularly. In this sense, people must integrate into a new world of work with the help of the opportunities offered by education and technical and professional training, permanently acquiring skills, understanding, and practical knowledge related to employment in the different sectors of society [12].

Approaching training from the point of view of management sciences, the authors focus this activity on quality management in organizations. A different approach to integrating the professional training of workers is to direct it dynamically towards compliance with quality systems, updating the knowledge, skills, and behavior of workers to perform the daily function [13, 14]. The transformation of attitudes results from changes in human capabilities since intellectual capital evolves as learning is acquired. Therefore, it is necessary to align training actions simultaneously with organizational objectives.

In this same approach, the results obtained from established processes result from the capacities, skills, and attitudes that workers use in their work. It is how new training methods and personal and professional development must be designed to maximize production standards, minimize costs due to errors, and effectively use the resources used by companies. Training is essential for structuring individual interests with groups and potentiating internal and external competitive advantages.

Innovation in training is a strategy that public and private organizations have adapted to the teaching processes of their collaborators, derived from social, cultural, and economic demands, where the use of technology plays a key role. The authors of [15] show that the transformation of education is due to technological advances arising from the change in conceptions and pedagogical and didactic approaches that stem from learning experiences supported by information and communication technologies (ICT). Likewise, the educational orientation must be flexible and practical through the support of distance learning, managing new innovative methods, and predominating the integration of ICT in academic and job training processes.

With the advent of the technological revolution, companies have encountered new challenges when communicating information to their collaborators. This is why they have sought tools that allow them to enter the digital age with the support of innovation in teaching-learning methods. To modernize information management. [12], mentions that the widespread introduction of ICTs significantly changed how people live since the traditional model in which people interact has been modified. Now, the devices linked to the Network are used as channels to transmit and receive information, evolving the way of relating between the individual, culture, and teaching.

The use of telecommunications, Internet accessibility, the development of mobile devices, and the range of existing applications promote new ways of communicating and sharing information through digital formats or through visible and auditory means. In this sense, training processes supported by technology and the Internet have acquired an important place in learning methods in the educational context since they were created to overcome the modern challenges that people face today [16, 17].

Undoubtedly, implementing ICT in educational processes improves the quality of teaching-learning methods in the pedagogical and social fields since it is flexible in using innovative technological instruments such as virtual platforms, digital applications, and specialized software. ICTs in distance education facilitate the sharing of knowledge and experiences without the need for physical interaction between the people involved but through technical means where space and time factors flow to transmit information. These mechanisms are common in the everyday life of individuals and are regularly present in the environments where they interact, thus further facilitating access to alternative teaching-learning methods. Among them, m-learning or mobile electronic learning stands out, whose function is based on self-managing the way of training with the help of mobile devices [18–23].

The concept of m-learning is described as the combination of forms of learning based on mobile electronic devices linked to wireless networks with Internet access without needing a predetermined physical space or established schedules. This definition is created from the diversification of the "e-learning" concept, which arises from the need to adapt to the technological world to develop distance learning strategies. In other words, e-learning refers to electronic learning designed for the self-management of people who wish to acquire knowledge using electronic, computer, technological, and digital tools.

Paper [20] defines online training as e-learning because using technological and computer tools is expected to produce and transmit knowledge between members, societies, and organizations, supported by digital media and specialized software. This technology has made it possible to increase the flexibility of communication between members of organizations since it allows them to interact and disseminate ideas and knowledge through digital channels quickly.

Training programs in innovation and social entrepreneurship represent an unsolved problem in the literature that involves various elements. One of the main elements that make up these problems is the incorrect development of a study plan that effectively covers both technological innovation and social entrepreneurship, which represents a challenge. Balancing technical skills with social impact is essential to ensure that program content remains relevant. Another problem is that training programs need help to provide practical, real-world experience; it is necessary to integrate functional components, such as internships, projects, or collaboration with social enterprises.

Training in technological innovation and social entrepreneurship faces several challenges and problems. The most common is the need for more financial resources to provide adequate training in technological innovation and social entrepreneurship and the lack of budget to hire experts to provide tools and technology.

In some organizations, employees may only accept change to adopt new technologies or business approaches if they have a clear strategy and long-term vision. To address these problems, various research works in the literature seek to develop clear strategies, allocate adequate resources, and promote a culture of innovation and entrepreneurship.

3. The aim and objectives of the study

The aim of this study is to improve the Technological Innovation and Social Entrepreneurship Training Program in a Mexican public entity. This will make it possible to improve the Entrepreneurship Training Program, and therefore to increase the efficiency of social and technological Innovation.

To achieve the aim, the following objectives were set:

– evaluate the existing training programs and methodologies public entities use to obtain demographic information;

– identify and knowing the perception of the public servants on technological innovation and social entrepreneurship;

– it is necessary to know the latest industry trends and best practices to determine if current and aligned with the organization's goals and objectives;

– investigate different training delivery methods and technologies that could enhance the learning experience and engagement of public entity employees;

– define conceptual directions in assessing cost-effectiveness of training current programs, including the allocation of resources and the return on investment for these initiatives with the new programs and social and technological trends.

4. Materials and methods

4. 1. The objectives and hypothesis of the study

Public entities are organizations, agencies, and government institutions that provide public services and are accountable to the general population. Due to what was stated above, the following objectives are established:

1. Evaluate the existing training programs and methodologies public entities use to determine their effectiveness, strengths, and weaknesses.

2. Identify the specific training needs within public entities. It could involve surveying employees and analyzing the skills and competencies required for their roles.

3. Research the latest industry trends and best practices to ensure the training content is current and aligned with the organization's goals and objectives.

4. Investigate different training delivery methods and technologies that could enhance the learning experience and engagement of public entity employees.

5. Analyze the cost-effectiveness of training programs, including the allocation of resources and the return on investment for these initiatives.

6. Explore ways to make training more inclusive and considerate of diversity in public entities, ensuring that it meets the needs of a diverse workforce.

7. Research and address any legal and compliance requirements related to training within public entities, which may vary depending on the jurisdiction and type of organization.

8. Develop and implement metrics to measure the effectiveness of training programs, including assessing how well they contribute to improved job performance and achieving organizational goals.

9. Establish mechanisms for collecting feedback from employees who undergo training and use this feedback to improve the training programs continuously.

10. Research strategies to ensure that knowledge and skills acquired during training are effectively transferred and applied in real-world work settings.

11. Engage with various stakeholders, including employees, managers, and the public, to gather input on training needs and priorities.

The specific objectives of the study were to define using our input data depend on goals, and challenges faced by the public entities. The ultimate aim is to enhance the training processes within these organizations to improve the quality of public services, the skills of employees, and overall organizational effectiveness.

4. 2. Research methodology

The present research is descriptive in scope and was based on a systematic review of the literature to understand the main factors that are perceived about technological innovation and social entrepreneurship of training in the different sectors of society, to identify and interpret those most relevant for the personnel that works in a public entity that provides tourist services in Mexico City.

A descriptive research study is a type of research that aims to provide a detailed and accurate description of a phenomenon, event, situation, or subject. This type of research primarily focuses on observing and documenting facts and characteristics rather than explaining or analyzing them. Descriptive analysis is often used when researchers want to gain a better understanding of a topic or when they want to establish a baseline for future investigations. Here are some key characteristics of research that are descriptive in scope:

1. Objective description: descriptive research aims to provide an accurate and unbiased account of a phenomenon. Researchers try to avoid personal bias or interpretation in their descriptions.

2. No manipulation of variables: unlike experimental research, where researchers manipulate variables to establish

causation, descriptive research does not involve the manipulation of variables. Instead, it focuses on observing and measuring existing variables.

3. Observation and measurement: researchers use various methods such as surveys, questionnaires, interviews, comments, and content analysis to collect data. These methods help in gathering information and characteristics related to the research topic.

4. Cross-sectional design: descriptive research often employs a cross-sectional design, where data is collected simultaneously or over a relatively short period. It allows researchers to capture a snapshot of the phenomenon under investigation.

5. Qualitative or quantitative data: descriptive research can involve both qualitative and quantitative data. Qualitative data is descriptive and non-numeric, while quantitative data is numeric and can be analyzed statistically.

6. Statistical analysis: when quantitative data is collected, descriptive statistics like mean, median, mode, standard deviation, and frequency distributions are often used to summarize and present the data.

7. Sample selection: researchers typically use various sampling techniques to select a representative sample of their study population or group. The goal is to ensure that the model accurately reflects the characteristics of the larger population.

8. Generalizability: descriptive research does not aim to establish causal relationships or make broad generalizations about a population. Instead, it provides a detailed description that can be used for further research or decision-making (Fig. 1).

To obtain quantitative data, a poll was designed with 15 questions on the Likert scale to determine levels of agreement, assigning them a value for their qualitative interpretation: agree=5, agree=4, neither agree nor disagree=3, disagree=2, and disagree=1 in addition to requesting demographic aspects such as age, sex, marital status, education, position level and seniority and four dichotomous questions with a yes or no answer to analyze knowledge on electronic training. Additionally, 77 physical polls were randomly applied to different public servants in the central office to obtain statistical data for movement analysis.

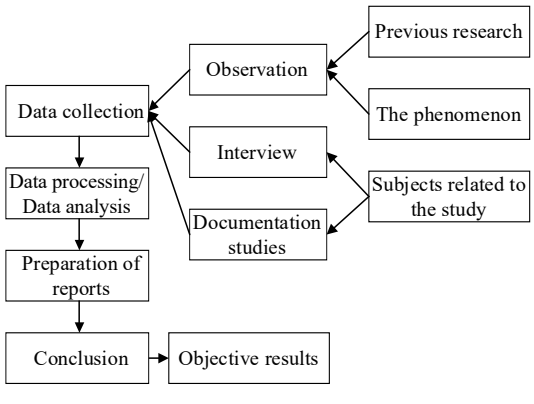


Fig. 1. A descriptive research schematic description proposed by Creswell
Source [5]

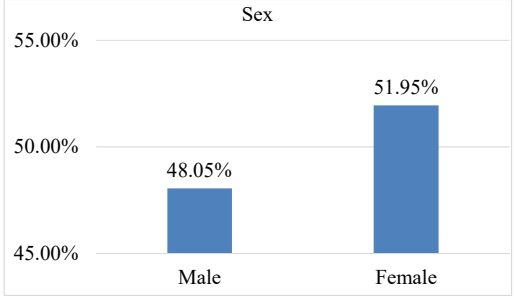
5. Results of research on technological innovation and social entrepreneurship training program to generate services in a Mexican public entity

5. 1. The demographic information

The demographic information obtained from the interviews carried out is shown in tables and graphs by sex (Fig. 2), age (Fig. 3), civil status (Fig. 4), school level (Fig. 5), Position level (Fig. 6) and antiquity (Fig. 7).

Sex	Interviewers
Female	40
Male	37
Grand total	77

a

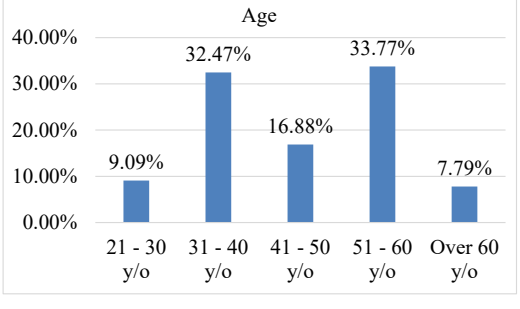


b

Fig. 2. The demographic information obtained from by sex: *a* — interviewers; *b* — percent graph

Age	Interviewers
21–30 years old	7
31–40 years old	25
41–50 years old	13
51–60 years old	26
Over 60 years old	6
Grand total	77

a



b

Fig. 3. The demographic information obtained from by age: *a* — interviewers; *b* — percent graph

The results obtained to classify the level of agreement are based on the Likert scale, assigning values to determine which situation is in favor and which is not. The 15 questions were graphed with the given values, where agree=5, agree=4, neither agree nor disagree=3, disagree=2 and disagree=1:

1. Training programs are provided at the workplace (Fig. 8).

2. The training given in the workplace has been efficient (Fig. 9).

3. The training provided at the workplace is aligned with the functions Fig. 10.

4. The training provided at the workplace is innovative and modern (Fig. 11).

5. The training provided at the workplace is done online and in person (Fig. 12).

6. The workplace has digital and technological tools for online training (Fig. 13).

7. Workplace has a virtual platform to provide training activities (Fig. 14).

8. Do you consider that you have the necessary knowledge and skills to perform your online training properly (Fig. 15).

9. Your workplace has designated spaces for training personnel (Fig. 16).

10. You have better results in your activities when you train online (Fig. 17).

11. Do you think the online training courses provided at your workplace are adequate (Fig. 18).

12. Do you consider the use of mobile devices an efficient tool to carry out training courses (Fig. 19).

13. It is necessary to design digital applications to facilitate online training (Fig. 20).

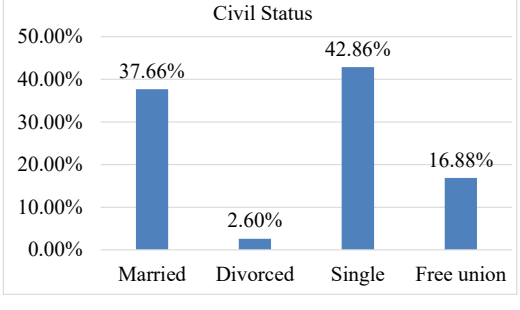
14. The results obtained from the training have innovated the activities and functions in your workplace (Fig. 21).

15. Do you think that new training methods should be innovated and implemented in your workplace (Fig. 22).

To synthesize the results, a matrix was made to determine the scale that was resolved the highest by questioning (Table 1).

Civil status	Interviewers
Married	29
Divorce	2
Single	33
Free union	13
Grand total	77

a

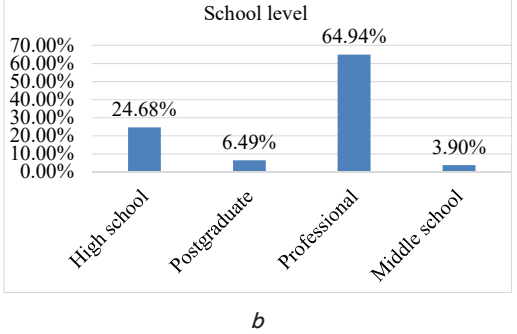


b

Fig. 4. The demographic information obtained from civil status: *a* — interviewers; *b* — percent graph

School level	Interviewers
High school	19
Postgraduate	5
Professional	50
Middle school	3
Grand total	77

a

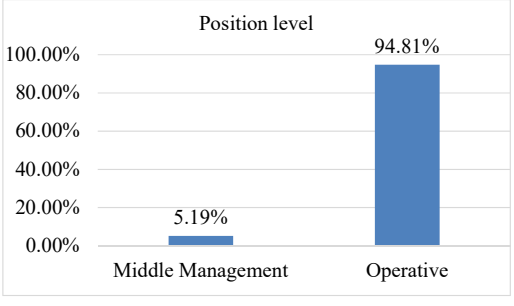


b

Fig. 5. The demographic information obtained from school level: *a* — interviewers; *b* — percent graph

Position level	Interviewers
Middle management	4
Operative	73
Grand total	77

a

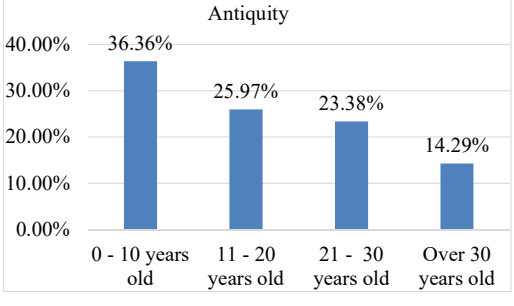


b

Fig. 6. The demographic information obtained by position level: *a* — interviewers; *b* — percent graph

Antiquity	Interviewers
0–10 years old	7
11–20 years old	25
21–30 years old	13
Over 30 years old	6
Grand total	77

a

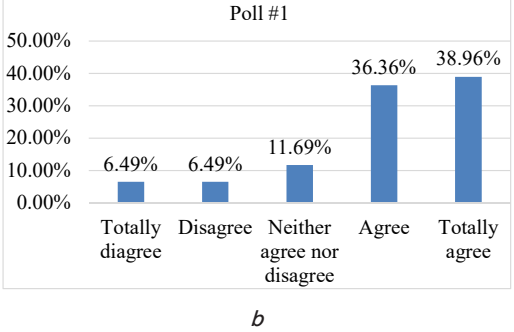


b

Fig. 7. The demographic information obtained by antiquity level: *a* — interviewers; *b* — percent graph

Answer	Interviewers
Totally disagree	5
Disagree	5
Neither agree nor disagree	9
Agree	25
Totally agree	30
Total	77

a

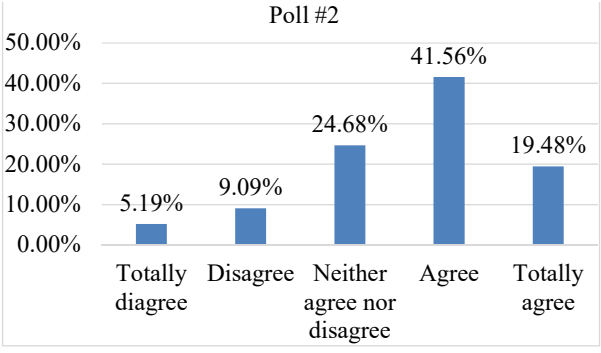


b

Fig. 8. The demographic information obtained of POLL #1: *a* — interviewers; *b* — percent graph

Answer	Interviewers
Totally disagree	4
Disagree	7
Neither agree nor disagree	19
Agree	32
Totally agree	15
Total	77

a

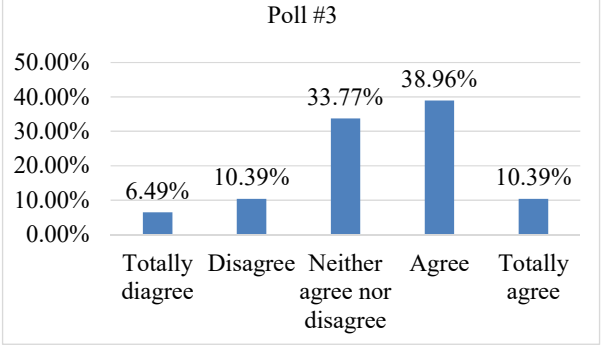


b

Fig. 9. The demographic information obtained of POLL #2: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	5
Disagree	8
Neither agree nor disagree	26
Agree	30
Totally agree	8
Total	77

a

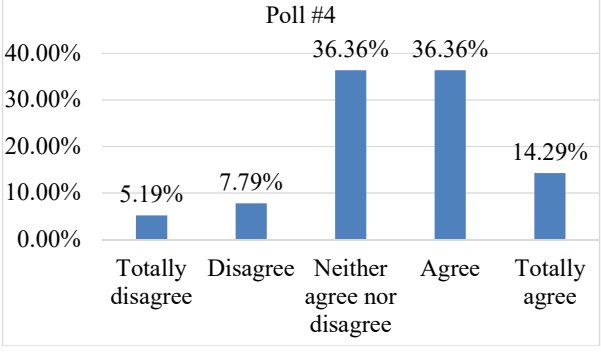


b

Fig. 10. The demographic information obtained of POLL #3: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	4
Disagree	6
Neither agree nor disagree	28
Agree	28
Totally agree	11
Total	77

a

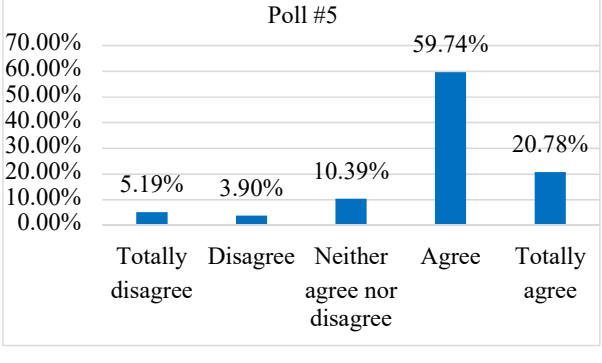


b

Fig. 11. The demographic information obtained of POLL #4: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	4
Disagree	3
Neither agree nor disagree	8
Agree	46
Totally agree	16
Total	77

a

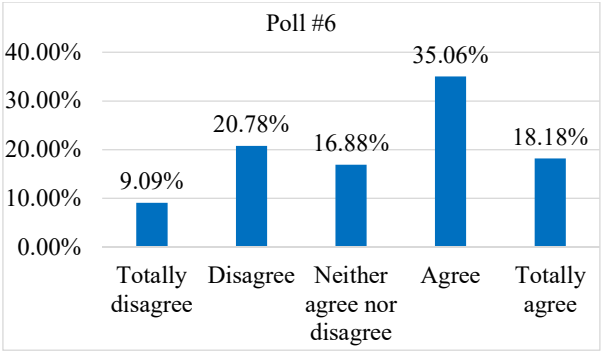


b

Fig. 12. The demographic information obtained of POLL #5: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	7
Disagree	16
Neither agree nor disagree	13
Agree	27
Totally agree	14
Total	77

a

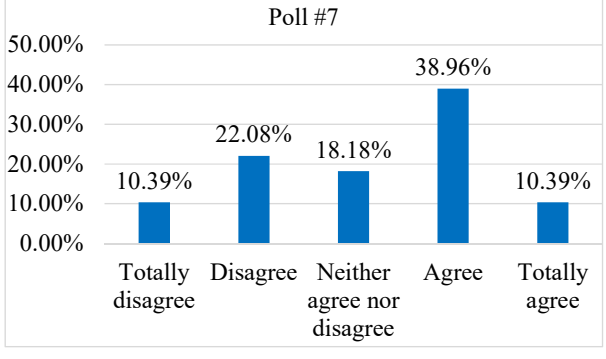


b

Fig. 13. The demographic information obtained of POLL #6: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	8
Disagree	17
Neither agree nor disagree	14
Agree	30
Totally agree	8
Total	77

a

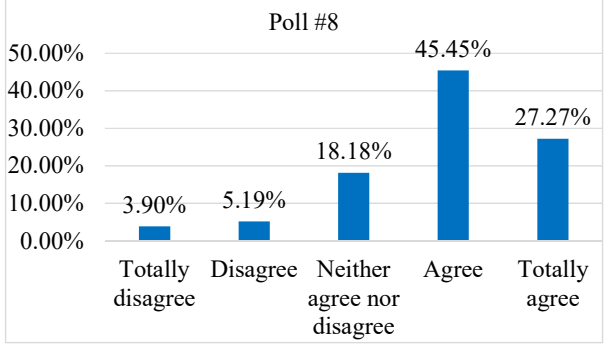


b

Fig. 14. The demographic information obtained of POLL #7: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	3
Disagree	4
Neither agree nor disagree	14
Agree	35
Totally agree	21
Total	77

a

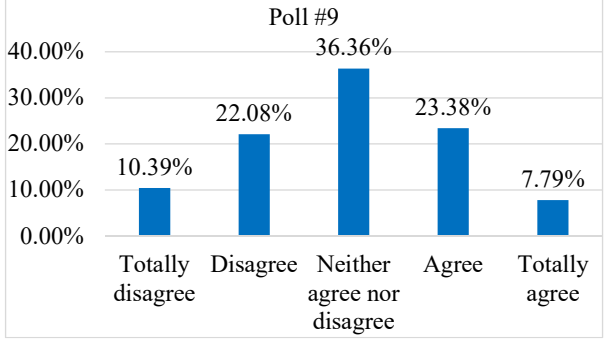


b

Fig. 15. The demographic information obtained of POLL #8: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	8
Disagree	17
Neither agree nor disagree	28
Agree	18
Totally agree	6
Total	77

a

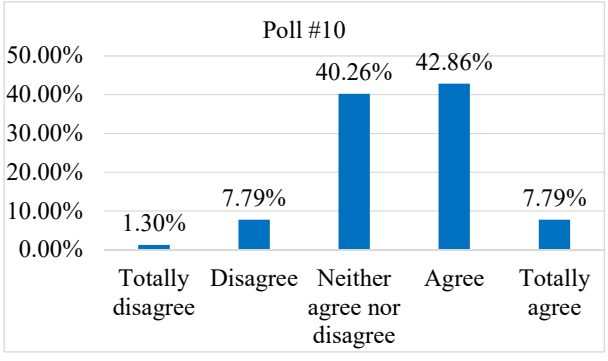


b

Fig. 16. The demographic information obtained of POLL #9: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	1
Disagree	6
Neither agree nor disagree	31
Agree	33
Totally agree	6
Total	77

a

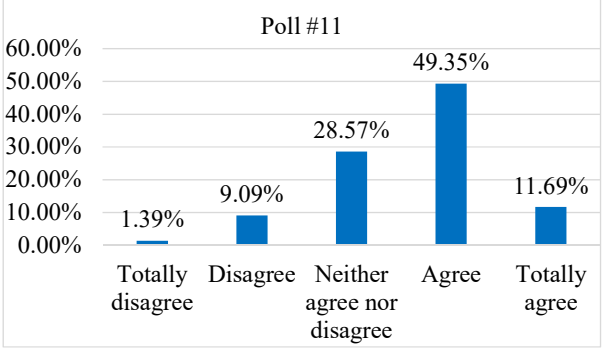


b

Fig. 17. The demographic information obtained of POLL #10: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	1
Disagree	7
Neither agree nor disagree	22
Agree	38
Totally agree	9
Total	77

a

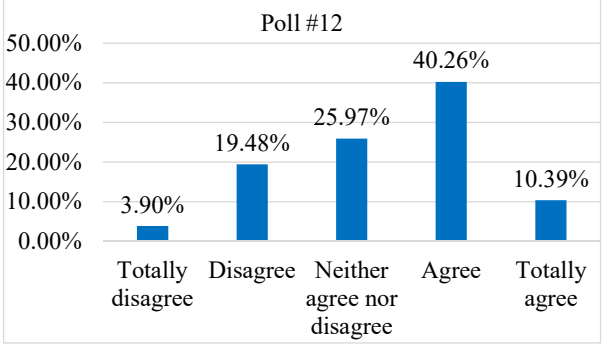


b

Fig. 18. The demographic information obtained of POLL #11: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	3
Disagree	15
Neither agree nor disagree	20
Agree	31
Totally agree	8
Total	77

a

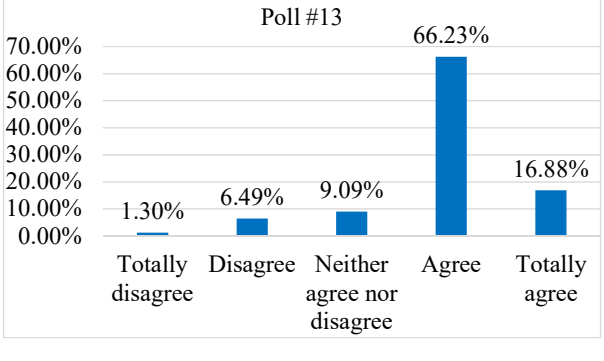


b

Fig. 19. The demographic information obtained of POLL #12: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	1
Disagree	5
Neither agree nor disagree	7
Agree	51
Totally agree	13
Total	77

a

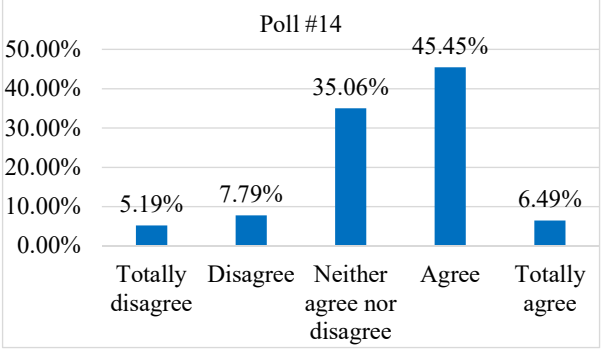


b

Fig. 20. The demographic information obtained of POLL #13: *a* – Interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	4
Disagree	6
Neither agree nor disagree	27
Agree	35
Totally agree	5
Total	77

a

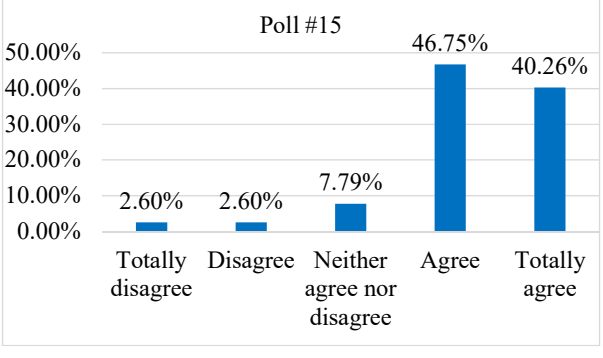


b

Fig. 21. The demographic information obtained of POLL #14: *a* – interviewers; *b* – percent graph

Answer	Interviewers
Totally disagree	5
Disagree	5
Neither agree nor disagree	9
Agree	25
Totally agree	30
Total	77

a



b

Fig. 22. The demographic information obtained of POLL #15: *a* – interviewers; *b* – percent graph

Table 1

Matrix show the scale that was resolved the highest by questioning

Questioning results	Frequency count by questions															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Disagree	5	4	5	4	4	7	8	3	8	1	1	3	1	4	2	60
Disagree	5	7	8	6	3	16	17	4	17	6	7	15	5	6	2	124
Neither agree nor disagree	9	19	26	28	8	13	14	14	28	31	22	20	7	27	6	272
Agree	28	32	30	28	46	27	30	35	18	33	38	31	51	35	36	498
Agree	30	15	8	11	16	14	8	21	6	6	9	8	13	5	31	201
Total																1155

Demographic information is important for various reasons, as it provides valuable insights into the composition and characteristics of a population. Here are some of the key reasons why demographic information is significant.

Demographic data helps governments and organizations make informed decisions about resource allocation, infrastructure development, and public policies.

5. 2. Perception of the public servants on technological innovation and social entrepreneurship

To identify the perception that public servants had regarding technological innovation and social entrepreneurship of training in a public entity that provides tourist services, the total results are shown in Fig. 23.

43.12 % of the people interviewed have a positive perspective regarding technological innovation in training. Hence, the entity where the study was carried out has the necessary tools, infrastructure, and personnel to deliver the programs and actions-training, training, and updating knowledge.

Likewise, to validate the reliability coefficient of the applied instrument, the correlation matrix between the items of the questionnaire and the responses of the subjects interviewed was prepared (Table 2).

To estimate the proposed data's reliability index, the instrument's degree of significance was sought through Cronbach's alpha (α) coefficient, used to express internal consistency from the variation of the items [14].

The most used formula for its calculation is expressed in equation (1):

$$\alpha = \frac{k\left(1-\Sigma si2/st2\right)}{k-1}, \quad (1)$$

k is the number of items in the instrument, k=15;

$\Sigma si2$ is the sum of the variances of the scores in the item, $\Sigma si2$=15.23;

$st2$ the variance of the total scores of the questionnaire, $st2$=94.79.

Table 2

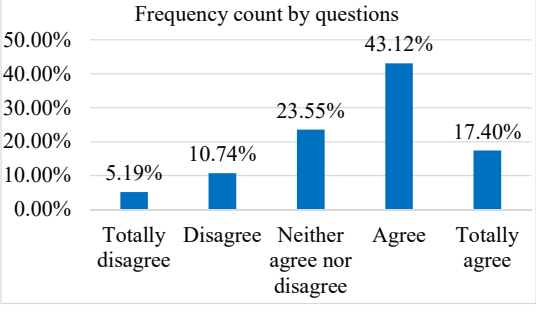
Matrix frequency count by subject. Source result of our research

Items																Sum
–	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Total by item in 77 subjects	304	278	259	267	298	256	244	298	228	268	278	257	301	262	323	4121
Variances	1.34	1.121	1.037	1.002	0.918	1.544	1.413	0.996	1.18	0.639	0.731	1.055	0.628	0.838	0.78	94.79

In this sense, and according to the authors Rodríguez and Reguant [14], the reliability calculated from the instrument applied in the public entity obtained a value of 0.8992, where the level of significance is higher than the minimum acceptable score (between 0.70 and 0.80), while the appropriate degree of reliability ranges between 0.70 and 0.95. Therefore, it can be deduced that the reliability of the questionnaire is high when it exceeds the minimum established and oscillates between the appropriate levels.

Answer	Total	Percentages
Totally disagree	60	5.19 %
Disagree	124	10.74 %
Neither agree nor disagree	272	23.55 %
Agree	498	43.12 %
Totally agree	201	17.40 %
Total	1155	100 %

a



b

Fig. 23. Frequency count by question: *a* – interviewers; *b* – percent graph

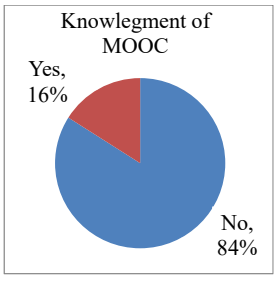
On the other hand, in the dichotomous questions answering yes and no, they were asked to indicate if they knew the meaning of different contemporary concepts referring to technological innovation in training where the lack of knowledge of the following words can be observed:

– knowledgement of MOOC (Fig. 24);
– knowledgement of E-learning (Fig. 25);
– knowledgement of M-learning (Fig. 26);
– knowledgement of a Webinar (Fig. 27).

Finally, it can be observed that more than 50 % of the people interviewed need to be made aware of contemporary definitions of the mechanisms used to train people through electronic, digital, technological, and mobile means, giving guidelines to improve the areas of opportunity in learning innovation.

Answer	Interviewers
No	65
Yes	12
Grand total	77

a

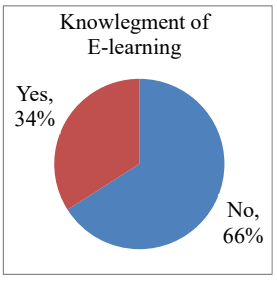


b

Fig. 24. Result obtained of the answer "Knowlegment of MOOC": *a* – interviewers; *b* – percent graph

Answer	Interviewers
No	51
Yes	26
Grand total	77

a

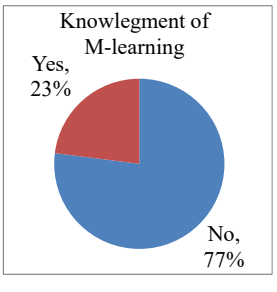


b

Fig. 25. Result obtained of the answer "Knowlegment of E-learning": *a* – interviewers; *b* – percent graph

Answer	Interviewers
No	59
Yes	18
Grand total	77

a

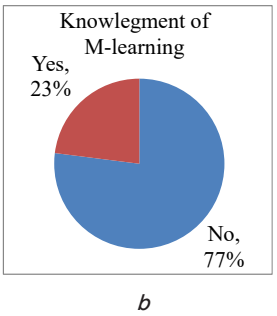


b

Fig. 26. Result obtained of the answer "Knowlegement of M-learning": *a* – interviewers; *b* – percent graph

Answer	Interviewers
No	59
Yes	18
Grand total	77

a

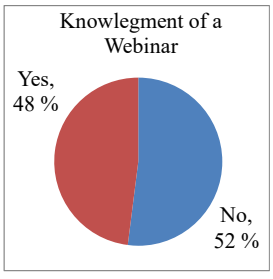


b

Fig. 26. Result obtained of the answer "Knowlegement of M-learning": *a* – interviewers; *b* – percent graph

Answer	Interviewers
No	40
Yes	37
Grand total	77

a



b

Fig. 27. Result obtained of the answer "Knowledgement of a Webinar": *a* — interviewers; *b* — percent graph

5. 3. Data analysis in dynamics

The retroactive data obtained together with the highlighted trends allowed to obtain two graphs that help evaluate the situation more broadly:

1. Definition of objectives and metrics: the Fig. 28 clearly shown the definition of the objectives of the training program used, shows the specific entrepreneurship skills. The number of successful startups launched, the impact on the community and the increase in innovation within the public entity are shown.

2. Stakeholder analysis: Fig. 29 clearly shows the definition, identification and analysis of the stakeholders involved, including employees, management and potential entrepreneurs. Understand your needs, expectations and concerns regarding the training program.

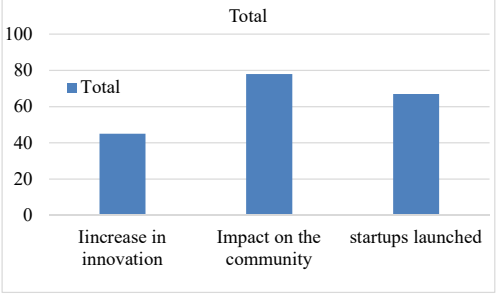


Fig. 28. Definition of objectives and metrics

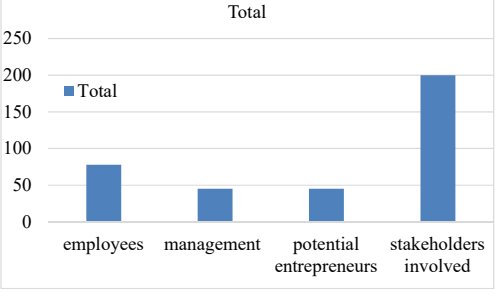


Fig. 29. Stakeholder analysis

5. 4. Investigation of different training delivery methods and technologies that could enhance the learning experience and engagement of public entity employees

Improving the learning experience and engagement of employees of public entities is crucial to their professional development and the effective functioning of government organizations. In this research, three main axes were found in which a substantial improvement can be developed:

1. Learning management systems such as Moodle, Blackboard, and Canvas provide a centralized hub for organizing and delivering training content.

2. Online courses and presential.

3. Mobile learning applications. These apps are designed to generate short, focused lessons that employees can access from their smartphones or tablets.

5. 5. Analysis of the cost-effectiveness of training programs, including the allocation of resources and the return on investment for these initiatives

The key performance indicators obtained on training and development allowed to evaluate whether the amount invested in corporate education is giving the expected return.

These parameters allow a better understanding of the results of the actions related to employee training developed in the company, the data obtained allowed to demonstrate that the company lives an organizational culture focused on learning; guarantees the company's investment in training; better adherence to the company's business objectives; better evaluation on upskilling; It also allowed to know the organizational climate and people's satisfaction with the company.

The main training and development indicators evaluated in this research were:

– 80 % involvement rate;
– 160 completion rate;
– number of hours studied 80 hours;
– score evolution 60 %;
– retention rate 90 %;
– internal mobility 30 %;
– cost per person trained: 5000.00 Mexican pesos.

6. Discussion of research on technological innovation and social entrepreneurship training program to generate services in a Mexican public entity

The results obtained in this research work raise the importance of technological innovation and social entrepreneurship in training as relevant topics that must be considered in the work programs of any public or private organization, derived from the technological advance and digital development that is taking place.

The demographic study provided a solid database to be used as a database by government agencies, companies, and organizations. The data obtained in this research will be used to plan the development of infrastructure, public services, housing, and other basic needs; it helps us allocate resources efficiently and also allows to make informed decisions on public policies, in addition to helping to allocate budgets for education, health, transportation, and other vital areas.

It was observed that knowledge of Internet-based technologies such as MOOC, E-learning, M-learning, and Webinars needed to be improved due to the lack of training and updating (Fig. 28).

Regarding the perception of adopting technology and technological tools, it was observed that 43.12 % have positive perspectives about taking training using technology. However, due to limited budgets, investing in tools, infrastructure, and personnel is necessary. to deliver the programs and actions-training, training, and updating knowledge.

An engagement rate of 80 % means that the money spent on training strategies is being well spent.

The limitations observed in our study are related to the training data, which were theoretically obtained by public institutions that provide access to information. These data often contain biases, noise, and publicly available data sources may contain information. inaccurate, outdated or incorrect. When compared to our study, the training models are similar but the imprecise data gives a false perception and unreliable results. In our study, the training data from public entities is applied to non-theoretical models and although they are susceptible to adversarial manipulation, in which malicious actors can introduce biased or harmful information into the training data to influence the behavior of the model.

To mitigate these limitations, researchers must exercise caution, pre-process data effectively, employ ethical guidelines, and work to address bias and ensure responsible AI development. Additionally, using diverse, well-curated datasets and incorporating domain-specific knowledge can help improve the quality and reliability of models trained with data from public entities.

7. Conclusions

1. The evaluation of training programs and methodologies used by public entities for obtaining demographic information is a complex and multifaceted process. The effectiveness of these programs and methodologies greatly impacts the quality and reliability of the data collected. To address the evolving needs of society and maintain public trust, public entities must continuously adapt, prioritize ethical considerations, and engage in collaborative efforts to improve their data collection practices.

2. The general perception of the process among public servants can vary significantly, so in this research, let's focus on capturing a diverse range of perspectives to provide a comprehensive understanding of their views on technological innovation and social entrepreneurship in the public sector.

To better understand the perception of public servants about technological innovation and social entrepreneurship, a comprehensive analysis was carried out that included surveys, interviews, and literature reviews.

The interviews will be in-depth with a sample of public servants to collect qualitative data and more profound knowledge.

Open-ended questions to explore your perceptions, experiences, and the factors influencing your views are used.

3. Ensuring that training content remains current and aligned with an organization's goals and objectives is an ongoing process that requires adaptability, technology integration, data-driven insights, and a focus on the holistic development of employees. By staying aware of industry trends and best practices and actively incorporating these into training programs, organizations can enhance their workforce's skills and better position themselves for success in an ever-evolving business landscape.

4. Enhancing the learning experience and engagement of public entity employees through various training methods and technologies is a complex but necessary task. It requires a balance of traditional and modern approaches, customization, measurement, and efficient resource allocation. While the upfront costs may vary, the long-term benefits regarding employee competence, job satisfaction, and cost savings can make these investments highly valuable. Public entities should be prepared to evolve and adapt their training strategies continually to meet the changing needs of their workforce and the communities they serve.

5. It is necessary to analyze the profitability of training programs, including resource allocation and return on investment. With this multifaceted approach, a comprehensive understanding of the value derived from training initiatives is guaranteed, strengthening decision-making to make a prospective projection in the development of employees.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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Data availability

Data will be made available on reasonable request.

Acknowledgments

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Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

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