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Futures Study to identify trends in the Fintech sector: Application of Natural Language Processing

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Abstract. The purpose of this document is to provide an overview of trends in the Fintech sector that will allow organizations in the industry to consider possible futures in order to outline strategies for growth and permanence in the market; knowledge of the possible future generates a competitive advantage within organizations. To identify the trends, we performed documentary research using Artificial Intelligence/Natural Language Processing to detect patterns of Political, Economic, Social, Technological and Legal elements, resulting in the following trends: "Fintech as a driver of development", "Digital Economy" and "Latent Risks and Challenges of the Environment".
Keywords: Futures Study, Fintech, Trends, AI/Natural Language Processing.

1 Introduction

New technologies have brought benefits to society, software and hardware are present in people's daily routine and economic sectors are transforming and evolving to satisfy new necessities of the population. The financial sector develops products and services that are compatible with the use of new technologies.

Thus, the traditional financial sector has been overtaken by the demands of users who are interested in more dynamic products and services that can be used and viewed at any time without the need to go to a physical establishment and to make use of a gateway, in response to this situation traditional financial companies adapt their products, but in turn arise Fintech, which in its structure are a startup.

Fintech companies are prone to disappear if they don´t adapt to changes in the shortest possible time, thus creating the need to anticipate them by prospecting the future using all the tools at hand to create strategies. Therefore, the objective of this research is the identification of trends in the Fintech sector through PESTEL analysis.

2 Theoretical basis

2.1 Futures study

The analysis of the future allows the questioning of actions taken in the past, present, and future in terms of decision making within an organization and thus generate projections. These studies are a glimpse of quantitative and qualitative aspects that are dynamically related and constantly evolving. It has been recognized that changes in the environment referring to economic, technological and political factors generate significant transformations for these; while cultural and psychological aspects take longer to generate representative impacts [1].

Dator [2] mentions that in order to carry out prospecting, three points must be considered for its formulation:
1. Identify what novel, cyclical and ongoing forces will be present and find ways to use them to move toward the most favorable future.

2. The study of futures must be an academic activity; therefore, any assertion of the future must be supported by a theory of stability, social change, forecasting methods and social design.
3. Society is composed of diverse factors such as biology, environment, culture, technology and human actions; when any of these factors is altered, behavior, beliefs and values change. Currently, the main agent of change is the technological factor.

Some fundamental principles of futures studies are [2]:
1. Futurists cannot predict the future.
2. A prediction is intended to be a true statement an accurate statement about the future.
3. Futurists can forecast alternative futures.
4. A forecast is intended to be a logical and useful statement about the futures.
5. Futures are plural, alternative, diverse, possible.
6. Futures studies help institutions and individuals to visualize, design and move toward preferred futures rather than passively accepting what "will be".

Future studies can be approached from two main currents, the first is the North American, which emphasizes the military objective and mastery of technology. The second is European, which includes futurology, role-oriented foresight and the participation of social factors, strategic foresight closely related to strategic planning, as well as human foresight oriented to the common good, participatory leadership and democracy [1].

Baena [3] mentions that the future can be planned on the basis of trends, which are events of three types:
1. Those that are a continuation of the present and the past, having to understand what is happening today and what was happening before. These first trends are used by strategic planning.
2. Trends that are more or less cyclical and are also found in history, philosophy, beliefs and customs. To be discovered and understood requires the use of mathematical techniques.
3. There are also events in the future that are totally new, of which there is no record and therefore no experience of how to act; these trends can be called emerging events and are often the most important in determining the future.

2.2 Fintech Sector

Since the economic crisis of 2008, traditional financial services have changed, banks began to digitize their processes, which allowed them to have better organized data, giving rise to new services and products oriented to the characteristics of customers, opening new markets that are served by companies called Fintech [4].

The term Fintech comes from the English words *Financial Technology* and is the union of digital technologies and financial services. These new business models are based on the use of the application of technologies to provide innovative services to companies, individuals and governments. The main areas of action of Fintech are electronic payment platforms, crowdfunding, loans and others [5].

[6] uses the term Fintech to describe activities and services that are influenced by technological factors, the traditional financial context and the international economy, as well as the implementation of the collaborative economy, such as: personal and corporate financial management, crowdfunding, financial education, loans and payments, among others.

A Fintech company offers innovative solutions to financial problems with the support of available technology, specializing in very specific areas of financial services and starting from a startup format and characterized by being oriented to an area of finance, using new technologies, being innovative and presenting an alternative to traditional financial services, being flexible and adapting to changes more easily [7].

2.3 Fintech in Mexico

In 2021, the companies belonging to the Fintech sector in Mexico were 512, operating and offering digital services with a growth of 16% over the previous year with 441 companies. Figure 1 shows how these companies were distributed, representing the organizations with the highest participation in the sector being those dedicated to lending with 21%. In second place, with 18%, are Fintech companies oriented to payments and remittances, followed by technology companies for financial institutions with 14% and corporate finance management with 11%. The remaining areas of the Fintech sector account for less than 10% of the total [8].
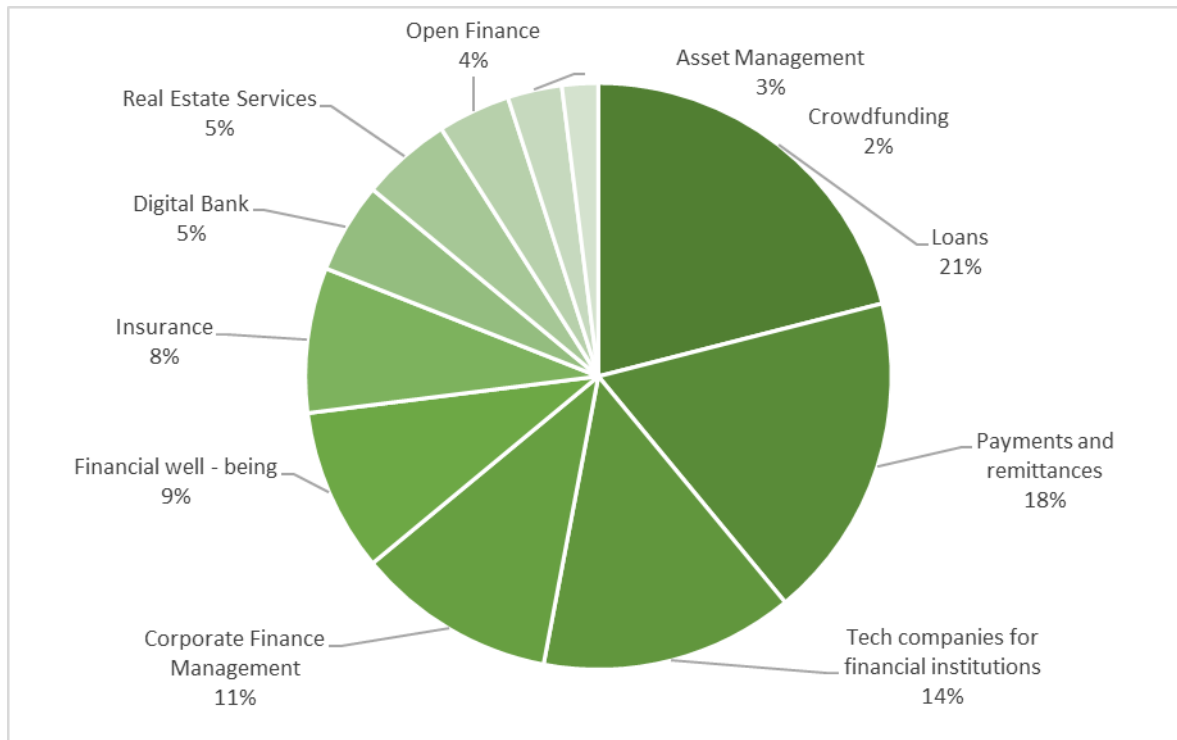
Fig 1 Distribution of Fintech companies in Mexico 2021

According to the report [8], Fintech companies in Mexico generate between 11 and 50 jobs per economic unit, 36% of the organizations create jobs outside the country, and of this total, 31% belong to Latin American countries, 12% to the United States or Canada, and less than 10% to other countries in the world.

3 Methodology

The methodology used is a documentary research conducted in 6 stages, which include content analysis and semantic analysis of 100 secondary sources of information that were reviewed and classified with the PESTEL tool, acronym for Political, Economic, Sociological, Technological, Ecological and Legal factors, and which aims to observe the environment of an organization in order to list the changes in the environment that may influence the growth and development of this through the observation and reflection of various variables that allow the construction of postulations that may occur in the future [9].

Being a Design Thinking technique, PESTEL can be performed according to the following six steps:
1. Choice of topic: key topics to look for in news related to the Fintech sector were selected, such as *financial education, financial startups, impact of covid-19 on the Fintech sector*.
2. Signs of change: recurrently mentioned topics are sought, in order to find patterns or relationships between them, making worksheets that included title, summary, its importance and the source from which it was obtained. Mainly, this phase of documentary research was carried out in information media such as newspapers and magazines in the Latin American context during the year 2022.
3. Matrix: The information collected in the previous step is classified according to the subject of the environment where they have an impact on *Political, Economic, Social, Technological, Ecological or Legal (PESTEL)* issues.
4. Pattern Search (NLP): through Artificial Intelligence/Natural Language Processing techniques, we search for relationships between news to find key ideas that make a difference in the environment.
5. *Insight* or also called key ideas: are those that for the researcher set a pattern of what is happening in the current and future environment, these ideas may or may not be related.

6. Futures wheel: in this step we proceeded to write the key idea in the center and derive secondary ideas that represent what could happen in a given period of time. From the secondary ideas, more ideas can be derived that will represent a future.

4   Results

Natural Language Processing (NLP) is the function of software or hardware components in a computer system that analyzes or synthesizes spoken or written language [10,11]. In *Graphext* [12] semantic analysis is performed using NLP artificial intelligence algorithms to identify the semantic connections of the change-signal research conducted in the documentary research.

In Figure 2, the semantic network of the "change signals" compiled in the research can be observed, each node represents a news or change signal related to the Fintech industry. The blue cluster represents, a set of news that share significant terms that are linked to the semantic named: "fintech as a driver of development", while the orange cluster is closely related to "digital economy", finally the semantic cluster with the least amount of news or change signals compiled is the one named "Risks and latent challenges of Fintech".

The documentary research could be consulted by the interactive dashboard that was created in Graphext. The sources consulted and the summary of each "change signal" can be downloaded by clicking on the link located under the following visualization:
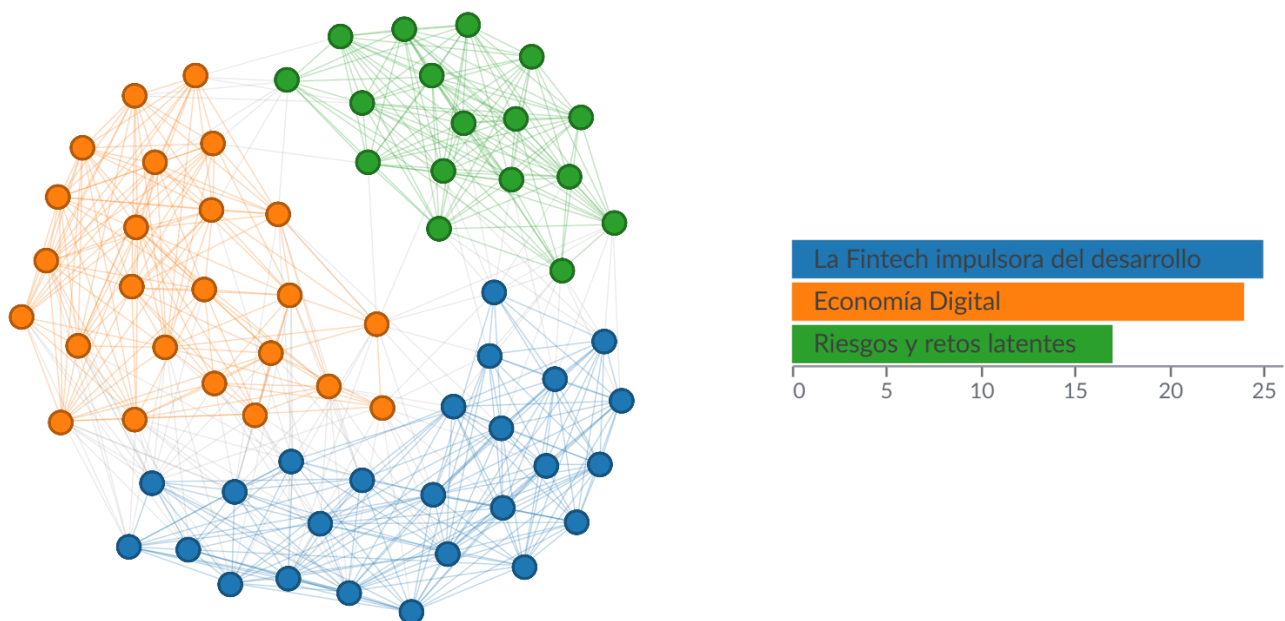

Fig 2 Semantic network of the change signals compiled in the investigation
Access the data and visualizations interactively at the following link https://public.graphext.com/a7bbba119c71e3ac/index.html.

Additionally, *Graphext* performs the sentiment analysis by algorithms, which findings are relevant to know the "tone" of the "change signals" compiled. Interestingly, the most frequent sentiment perceived in the "change signals" is "negative". Secondly, the most recurrent sentiment is "neutral" and the least frequent is "positive" which indicates that the "change signals" are mostly written in a negative and neutral tone.

On the other hand, with regard to the detection of emotions, it is congruent that the most popular emotion detected within the "signs of change" is the one called "concern", followed by "approval", "realization" and finally a "neutral" emotion. This highlights that "change signals" reflect vulnerabilities in the Fintech sector environment, so it is necessary to conduct foresight studies such as this one, in order to draw possible futures and anticipate changes in the environment and turn potential threats into opportunities for the sector.
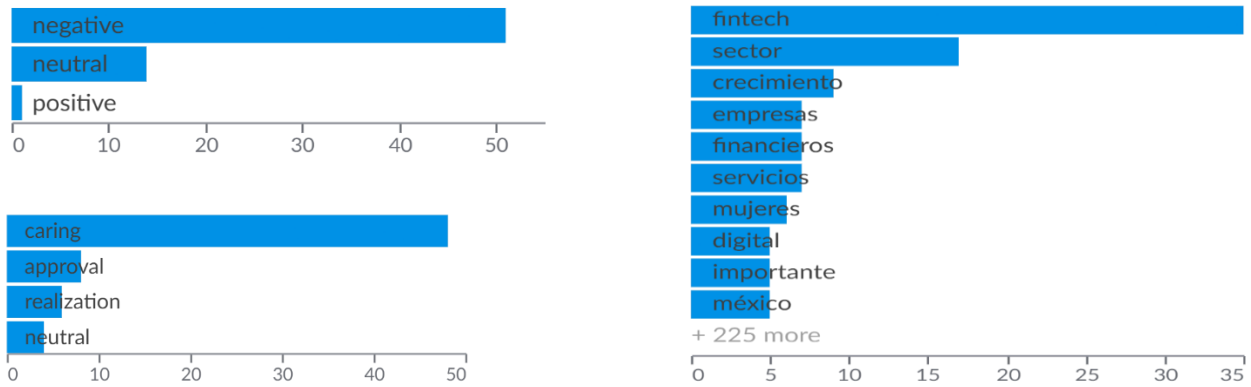
Fig 3 Semantic elements detected

4.1 Fintech as a driver of development

In Figure 4, the Fintech sector will drive the country's development in the future, since the number of organizations in this sector is increasing by an average of 15% each year in Mexico [13].

Likewise, the sector will promote different areas such as: appropriate legislation, inclusive finance, capital attraction and women in the Fintech sector, which will allow for the development of the sector.
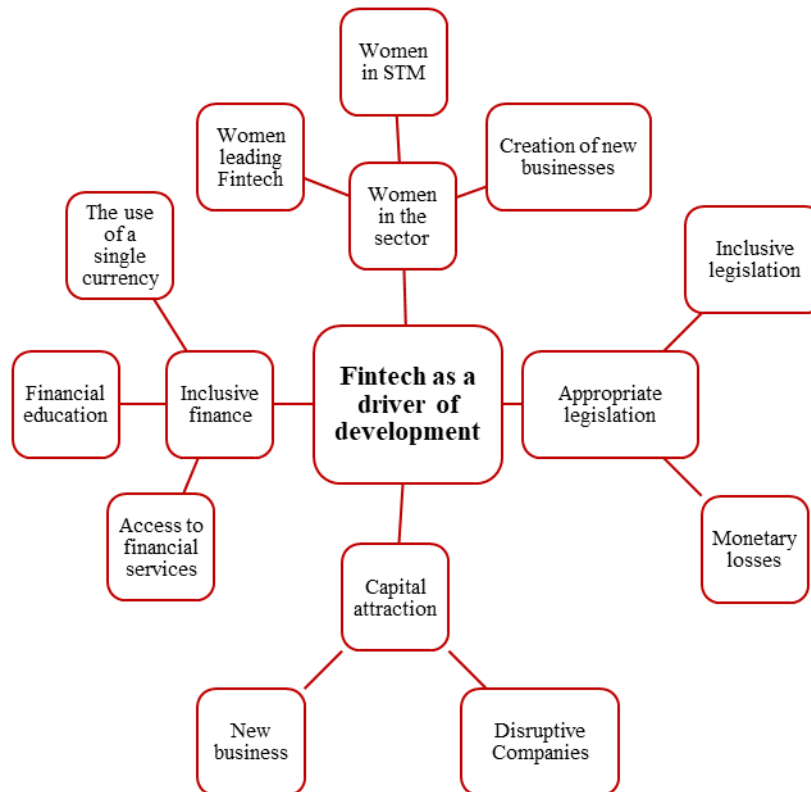

Fig 4 Fintech as a driver of development (information from [14-16])

4.1.1 Appropriate legislation

Mexico published laws for the regulation of the Fintech sector, causing a growth of organizations that offer these services, considering the PESTEL analysis, the regulation helps the cooperation of government and companies, because the creation of new business models requires a detailed explanation of the operation, this type of information can only be provided by the Fintech companies.

The government must modify its regulatory institutions as well as create other specialized institutions that will be able to meet the needs of Fintech companies and customers in order to ensure the protection of data and transactions, it is also necessary to create international legislation because these organizations are no longer limited to having customers in a single country, the business model has allowed them to be global companies in local territories.

4.1.2 Capital attraction

Due to its growth, the Fintech sector has attracted the attention of foreign companies to offer innovative services and products that are accepted by the Mexican market, resulting in an increment investment in the country.

4.1.3 Inclusive finance

Fintech companies are creating environments to promote access to financial services, supported by financial education through the use of technologies such as portals and applications, courses and providing information on the advantages of having healthy finances.

Fintech companies provide opportunities to access loans, investments and advice for a different sector than de traditional banking, like Micro enterprises and SMEs.

Government agents will be promoting financial literacy to the population through courses and applications aimed to women and entrepreneurs because their contributions will be relevant in the economy.

4.1.4 Women in the Fintech sector

Women in the Fintech sector are a minority, but their participation is expected to increase due to the social movements that have been experienced in recent years because they are having an interest in pursuing a career in the STEM areas (*Science, Technology, Engineering and Mathematics*).

From their perspective, women create companies that are mainly related to consulting, education, personal and organizational finance, crowfunding and social impact.

4.2 Digital Economy

Fintech companies will offer more than one financial service in alliance with other Fintech or companies to capture a larger market, any types of payment and virtual or physical currency will be used, traditional banking will evolve and include digital services, and technology companies will set the standard for research and development (R&D). Figure 5 represents the digital economy.
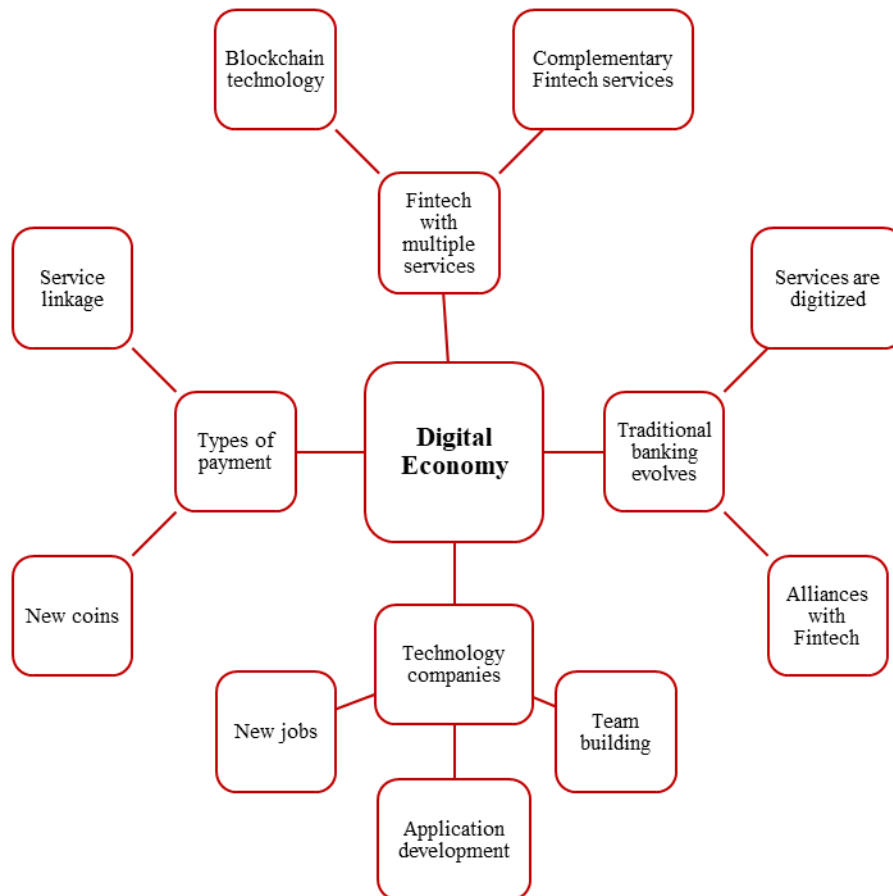
Fig 5 Digital Economy Futures Roundtable with information from [17, 18, 19]

4.2.1 Traditional banking is evolving

Due to the restrictions that traditional banking offer services to certain sectors of the population, they must change their processes and procedures to stay in the market, finding the alliance with emerging and consolidated Fintech companies to take advantage and have an interesting profit margin.

One more modification that traditional banking will make is digitalization, which means that it will use technologies to offer its services and products, to reach the *millennial* and Z generation market, since they prefer this type of services due to their flexibility characteristics and they can reach to an internet connection with no time limit or geographic barrier.

4.2.2 Tech companies

Tech companies will continue to grow, this is a consequence of different factors such as the increase in infrastructure with the arrival of 5g connectivity. Efforts will focus on the creation of new professions and jobs, especially those related to user experience, digital marketing, and software development, in addition to the creation of virtual jobs or hybrid models. Tech companies will be responsible for designing products that facilitate personal and professional life.

4.2.3 Payment Methods

The development of new technologies will facilitate the obtaining of resources, whether physical or virtual, which will be used for the payment of goods and services of the same nature, governments will be in charge to design regulations of digital currencies, in addition to creating initiatives for the cryptocurrency market.

Paying for goods and services will be even easier due to the homogeneity of all payment systems belonging to a country in order to speed up the process, and regulations will be implemented so that international payments can be made without so many intermediaries.

4.2.4 Fintech with multiple services

Another way for Fintech companies to offer more services will be through alliances between these entities in order to create support networks. These alliances will not be limited to financial companies, but also will include others such as telecommunications, food and home delivery.

4.3 Latent environmental risks and challenges

The pandemic caused by the SARS CoV-2 virus set the precedent for certain changes in daily and work life which are present in the development of technologies, economic crises and remote work represented in Figure 6.
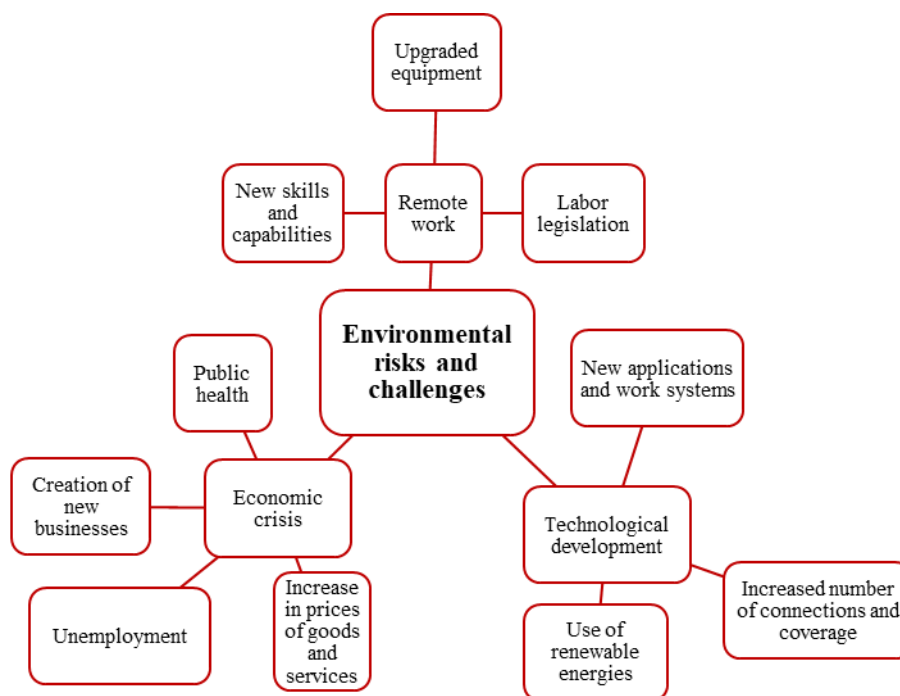

Fig 6 Futures wheel Environment challenges with information [20,21]

4.3.1 Technological development

The arrival of the 5g network is showing that internet connections should be increased, which will increase coverage in less favored communities and will open the options for the entry of new telecommunications service providers, allowing the generation of new jobs.

Renewable energies are a consequence of R&D and are the future because their application provides organizations with a sense of social and environment responsibility, part of the 2030 Sustainable Development Goals.

4.3.2 Economic crises

The pandemic revealed that public health services were limited, therefore is necessary to promote research and development of drugs, techniques and medical procedures to help prevent future health emergencies.

Within this crisis, formal and informal jobs were lost, so many people took the risk of create new business models such as home deliveries, virtual stores supported by social networks, educational services and business consulting.

4.3.3 Remote work

It is necessary to propose legislation to regulate remote work that protects the interests of employees and employers, agreeing on work schedules, the payment of costs and expenses resulting from the activity at home, as well as emotional support due to the lack of interaction with colleagues that may put the worker's health at risk.

5   Conclusions

The study of the future (forecasting) is an activity that requires an analysis from different points of reference that allow the researcher to "create" or "imagine" positive futures. For this reason, forecasting studies are performed on the basis of exploratory methodologies, where the understanding of the past and the present makes it possible to identify events that can be repeated in a similar way and to prepare the different scenarios that can describe the future to formulate strategies to face problems and take advantage of opportunities.

The companies in the sector must consider their future with this new information from their environment in order to create strategies that will allow them to renew their products and services, satisfying the needs of their customers, thus achieving a strengthened and stable sector that will lay the foundation for new economies.

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