

Public financing proposal to improve the income of the elderly: A case study

Rubén Carlos Álvarez Diez^{1,*}, Reina Margarita Vega Esparza¹,
Verónica Arredondo Luna¹, Lisandro José Alvarado-Peña¹

¹ Autonomous University of Zacatecas, México.

* Corresponding author. ORCID: 0000-0002-0877-2238. Email: ruben@unizacatecas.edu.mx

ABSTRACT

Objective. The study proposes a public financing policy to improve the income of the elderly in Zacatecas, Mexico, by creating productive projects. The aim is to provide sustainable economic alternatives that take advantage of this age group's capabilities, promoting entrepreneurship and labor inclusion among young people. In addition, a bibliometric approach is carried out to identify variables, techniques, tools, or methodologies that can optimize the study's objective and provide greater precision in formulating public policies.

Design/Methodology/Approach. To evaluate the viability of the proposed productive projects, a quantitative approach was used based on financial techniques such as the Net Present Value (NPV), the Profitability Index (PI), and the Internal Rate of Return (IRR). The research is based on a study applied to 2566 elderly people from different municipalities of Zacatecas, in which their need for economic support was identified. As for the bibliometric analysis, the Scopus database performs a performance analysis, and VOSviewer is used as a processing tool.

Results/Discussion. The results show that, with an initial investment of 3,150,000 Mexican pesos, 100 productive projects can be financed with an IRR of 233.65%, indicating high profitability. The proposal improves the income of the elderly and creates employment for young people, generating significant economic and social benefits for the community.

Conclusions. The academic and scientific community identifies everything related to the elderly as an area of interest and growth, so developing knowledge in this field is appropriate. In addition, implementing public policies that support productive projects for the elderly is feasible and profitable. These initiatives improve the economic conditions of this age group and contribute to local economic development and social cohesion.

Originality/Value. This study provides an innovative perspective by linking elderly entrepreneurship with public resources to foster economic inclusion. It proposes a model that can be replicated in other regions with similar demographic characteristics.

Keywords: older adults; silver economy; personal development; entrepreneurship; financing; public policies; public policies.

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INTRODUCTION

MEXICO, like the rest of the world, is aging. From the perspective of the increase in the older adult population, which may multiply shortly, and the consequent decrease of children and young people in the country, social problems can be observed, such as the decrease in tax collection, the increase of chronic degenerative diseases, a health system with insufficient problems and an adult population without economic certainty that allows them to solve their most basic needs. According to Mexico's Institute of Informatics, Geography and Statistics (Press Release Un. 475/19, 2019), the older adult population represented 12.3% of the total in 2018. However, by 2050, this age group will comprise around 13 million people, i.e., between 25 and 29 % of the total population.

In the search for alternatives that government institutions at Mexico's three levels should consider, it is pertinent to visualize the design of public policies that address the different needs of this age group, including economic security, which for now only a few can enjoy.

Thanks to the good practices and experience applied in other countries around the world, this work aims to exemplify the positive impact on the creation of enterprises that, with the support of government agencies, allow the opening of small workshops and/or businesses in which older adults (OA) can develop activities following their physical and mental capacities and experience acquired during their productive life. In this way, these productive projects can satisfy the economic needs of the age group and facilitate the insertion into the labor market of young people with little experience who can take advantage of their skills and competencies to benefit the productive projects headed by older persons.

OAs face significant economic challenges due to a lack of stable income and social and financial support. Exploring their economic prospects is crucial to understanding the necessary policies to improve their well-being and promote social inclusion. In this sense, those aged 60 years and older are considered OAs. With longevity, the physical capabilities of this age group often decline,

as does the onset of diseases that prevent them from being physically, psychologically, and economically self-sufficient.

More developed countries have seen an increase in OAs, a trend becoming widespread in many nations, including Mexico. According to the Committee on the Elimination of Discrimination against Women, in its General Recommendation No. 27 on older women and the protection of their human rights,

The number of older persons is expected to reach more than 2 billion by the year 2050, or 22% of the world's population, an unprecedented figure double the current 11% of the population over 60.

At the same time, by then, the child population is expected to decrease from the current 29% to 20%. This raises questions for the population and their governments regarding schemes that will enable the decreasing population of productive age to support the older population, as the latter require greater care, attention, and economic resources to cope with the problems of their age, according to the United Nations (United Nations, 2010).

In Mexico, one of the main problems for OAs is their economic independence, which prevents them from living with dignity. The National Survey of Demographic Dynamics (ENADID, in Spanish), published in 2018 by the National Institute of Statistics and Geography (INEGI, in Spanish) (Press Release Un. 475/19, 2019), revealed that:

The number of people aged 60 and over residing in Mexico is 15.4 million, representing 12.3% of the total population. Most of them (47.9%) live in nuclear households (formed by a single family nucleus: it may include a couple with or without unmarried children or a head of household with unmarried children), almost four out of ten (39.8%) reside in extended households (a single family nucleus or more, and other people related to him or her) and 11.4% make up single-person households; that is, they live alone.

This same study reflects that by the second quarter of 2019:

(...) 21.7% of older adults who live alone and are employed do not receive benefits, 15.7% receive Christmas bonuses, and only 13.4% have paid vacations. Retirement or pension is received by 36.7% of the OA in Mexico, 36.6% receive economic support from the government, and 34.4% depend on their work for their income (Press Release Un. 475/19, 2019, p. 3).

The National Evaluation Council (CONEVAL, in Spanish), in its publication entitled "Poverty and the Elderly in Mexico", states that the economically active population (EAP) of Mexico in OA is composed of 33.5%, of which 47.2% corresponds to men and 22% to women (Press Release No. 475/19, 2019, p. 6). This reflects that working conditions, public policy regarding the pension system, and the lack of foresight and knowledge to generate savings to meet their old age force a third of this age group to seek alternatives that generate income to meet their needs.

Up to this point, considering the situation faced by the OAs in urban areas and, generally, in rural conditions, the problems they face are more significant since there are factors such as the depopulation of communities due to the phenomenon of migration to the country's large cities and even outside the country. There is also a lack of health centers that can adequately attend to the physical problems of their inhabitants, scarce opportunities for economic development, and a lack of educational centers, among others. According to the National Institute of Women of Mexico (INMUJERES, in Spanish):

(...) the older adult population represents 10.1% of the total rural population (10.0% of women and 10.2% of men) and 8.6% of the urban population (9.2% of women and 8.0% of men), according to 2010 census data" (Pobreza y personas mayores en México, 2018, p. 7).

As in many Latin American countries, the malaise in rural areas is characterized by a lack of development opportunities and adequate services.

According to CONEVAL, in its publication "Distribución porcentual de la población

ocupada, según clasificación de ocupación y grupos de edad, México 2018", more than a third of the OAs continue working in different sectors, as they do not have sufficient income to cover their needs. The principal sectors are agricultural and livestock activities (farming, forestry, fishing, and hunting), where people aged 60 or older still work. Street vending, various domestic jobs (mainly cleaning and maintenance), and commerce and sales-related activities become the first sectors of the economy in which these OAs are employed or self-employed. Thus, Garay (Situación de las personas adultas mayores en México, 2015) states that:

(...) the condition of poverty created by the absence of development and the extension of marginalization leads to the need to continue working at an advanced age. It ratifies a situation of high vulnerability in which the family appears as a close source of support in old age. The evidence for 2006 shows that there are different behaviors among men and women in terms of the households in which they live (p. 17).

The International Committee of the Red Cross (ICRC, 2016) defines the concept of economic security as "the ability of individuals, households or communities to meet their basic needs in a sustainable manner and with dignity." Similarly, it considers that, among other aspects, economic, geographic, and cultural elements may vary in the meaning of this concept. However, in all cases, it should consider elements such as their food and how they obtain it, their income level, their general living conditions, and the capacity of governments to address the problems of society. Therefore, thinking about the economic security of the OAs implies generating public policies that guarantee the aspects above.

A public policy "can be considered a specific action plan oriented towards achieving perfectly identified, delimited and feasible objectives, where governing consists of a government by policies" (Razo González, 2014, p. 80). The author indicates that public policies are "those organized by the State in the face of the social, economic and cultural consequences of population and individual

aging.”. These public policies must take into account the development of the communities in which the OAs can carry out activities that allow them to satisfy their economic and cultural needs and contribute to local development according to the vision of Quispi, Ayaviri and Maldonado (2016, p. 63), who defines local development as: “... a process of multiple dimensions where diverse social actors and specific elements of the territory intervene, which allow and produce changes to improve the quality of life of the population.”

In Mexico, various institutions at the three levels of government have been responsible for promoting public policies that can address common problems SMEs face. Among the institutions that encourage self-employment are The National Institute for the Elderly (INAPAM, formerly INSEN in Spanish), the Secretariat of Agriculture and Rural Development (SADER, in Spanish), the National System for the Integral Family Development (DIF, in Spanish), the Mexican Social Security Institute (IMSS, in Spanish) and the Institute of Security and Social Services for State Workers (ISSSTE, in Spanish), the Secretariat of Finance and Public Credit (SHCP, in Spanish), the National Employment Service (SNE, in Spanish), among others, which are part of the current public policy aimed at OAs. These public agencies become a fundamental element for creating small businesses that allow the OAs to develop their labor and economic development since private banks do not consider this age group a priority in the products they offer to their clients.

Entrepreneurship can be understood as “a social process and entrepreneurial subjects act as social agents that relate dynamically in grids in which they develop information, funds, and legitimacy to survive and thrive economically” (International Committee of the Red Cross, 2015, p. 435), and that, as a positive consequence, can yield benefits to the OAs that through their knowledge and/or activities generate productive projects for themselves. Social entrepreneurship seeks to create small business units that meet the needs of those who conform to them, generating welfare and development in their environment: “Social entrepreneurship can offer innovative solutions to help solve problems

of social integration, socially dysfunctional behavior and socioeconomic development, such as the development of micro-financial practices” (Razo González, 2014, p. 13) and that, being functional, allow reinvesting their profits for the growth of these social entities.

Some of the successful cases of entrepreneurship in Mexico include the following:

- Dehesa San Isidro is an artisan producer that, through organic farming, prepares green nopal juice, dehydrated table olives, black olives, olive salt, apricot and peach jams with vanilla, and a dehydrated nopal snack with chili and sugar. Currently, their products are sold in well-known supermarkets such as City Market, Soriana, City Club, La Comer, and small local stores (Maldonado, 2018).
- After working for several companies, Basilio Capetillo started his company, Industrias Makech, at the age of 50. This company manufactures ecological urinals, toilets, sinks, and bathroom accessories, which he has successfully exported to countries such as Spain, Costa Rica, Colombia, and Guatemala (Pineda, 2018).
- Kuidis Salud is a digital platform founded by two Venezuelans based in Mexico. It started with a concept where doctors recommended this tool to their patients to hire a physiotherapist (Maldonado, 2018).
- The Mexican Association of Senior Entrepreneurs 50 and over (AMES50+, in Spanish) started investigating in 2018 to develop a method to help people in this segment of the population create fruitful businesses with a low probability of failure. This company has a membership system that ensures its members have access to advice on business creation and personal development and a remote collaboration platform.
- Business Senior, developed by Mari Carmen Cabrera in Mexico, is an educational program for senior citizens that includes 26 subjects that promote entrepreneurship and creativity.

At the international level, some cases of success in the implementation of public policies for the economic self-sustainability of

the OAs that can be replicated in Mexico due to their good practices include:

- Biiugi Program (Germany). “It offers an online platform that allows senior entrepreneurs to connect with more experienced entrepreneurs to get advice and share experiences” through information technology.
- Prime Program (United Kingdom). The Prince of Wales Foundation “...provides education and financial access to adults over 50, who are unemployed or in poverty, to start their businesses”.
- The Mature Entrepreneur Project Program (Poland) “supports entrepreneurship for those over 50 to keep their business running or start one.” It is an opportunity for older adults who have already started a business proposal or are in the process.
- Emprendedores de Oro (Costa Rica). It is an educational program offered through the University of Costa Rica. It consists of seven Saturday modules over one year and prepares the OAs in motivation and self-improvement, quality of life, generational integration, financial management, talent development, marketing and sales, and microenterprise development. Similar programs are being promoted in El Salvador and Costa Rica.
- Ministry of Women and Social Development (Peru). The program “Micro-enterprises for the older adult population of 10 districts of Metropolitan Lima and Callao”, where the main objective is that older adults use their time to promote and create micro-enterprises according to their capabilities, valuing their knowledge and experience throughout their lives (Manso, 2019, p. 149-150).

Governments are approaching the social problems of the growing group of elderly people from different perspectives. In the examples mentioned above, it is possible to observe the common objective of creating programs that encourage the self-employment of OAs. Thus, the feasibility of implementing a project that involves an investment of public resources to benefit vulnerable groups in a society is identifiable to the extent that it can

be kept in operation once it is launched, generating economic benefits for those who work in such projects. Thus:

(...) the evaluation of benefits and costs corresponding to specific investment projects, based on the principles of economic analysis... has become an established working discipline, widely used by official, national, and international bodies, linked to financing investments for economic development (Pineda, 2018, p. VIII-IX).

According to the 2017 Golden Age Index,

encouraging older adults to remain in productive activities for longer, in addition to bringing a benefit to people’s health, would raise GDP, consumer purchasing power, and even tax collection levels (Garcia, 2018).

An example that allows us to identify the benefits of supporting the productive projects of the OAs is England, where “... 70% of the businesses started by people over 50 survive five years, as opposed to those started by young people, whose survival rate is only 28%” (People over 50 can also be entrepreneurs, 2020).

Promoting small businesses through implementing public policies that allow the OAs to generate a decent income through the knowledge and experience acquired throughout their lives can be an alternative. With the appropriate support and advice, they can employ young people to carry out the activities that, due to their conditions, they can no longer perform.

When an investment project is initiated, an outlay of resources must be made to obtain future benefits. Of course, its feasibility must first be evaluated through a cost-benefit analysis to identify whether there will be a desired return so that, based on this, the appropriate decision on the possible investment can be made. An investment project is “any alternative for companies to generate economic benefits in the future, over a relatively long period, through the disbursement in the present of a large amount of resources” (Oelckers, 2015, p. 324).

This proposal only attempts to break down some of the steps involved in an investment project but only to assess its feasibility using the main financial tools. Some of the economic elements taken into account in this proposal are shown below:

- Initial investment: the first resources a project needs to start operating. It is important to point out that this phase represents the most important disbursement at the beginning of the project, as it requires keeping cash available to meet general expenses, invest in materials and fixed assets, mainly. This is what Ochoa and Saldívar (1988, p. 324) call: “Investment in working capital”.
- Net Present Value (NPV): allows us to know the present value, depending on the time of calculation, and the cash flows in the following years (Garcia, 2018).
- Internal Rate of Return (IRR). It indicates the future value of an investment project; thus, “...it tells us the average profitability that the capital that remains invested in the project generates” (Simisterra *et al.*, 2018, p. 14).

Finally, to strengthen the proposal for public financing to improve the income of older adults in Zacatecas, this research includes a bibliometric analysis that ensures that the key aspects of addressing the economic problems of this group have been addressed. This approach allows for a systematic review of the existing literature, in which patterns and trends in public policy and financing research are revealed. Thus, the theoretical framework of the study is enriched. The proposed model is optimized by contrasting its elements with scientific evidence, improving its accuracy and applicability for the implementation of economic support policies for older adults in Mexico (Álvarez-Diez *et al.*, 2020; Álvarez-Diez and López-Robles, 2022; Álvarez-Diez *et al.*, 2023; Gamboa-Rosales, 2021).

METHODOLOGY

The article’s methodology begins with a bibliometric analysis to assess the performance

of the relevant literature on public policies of economic support for the elderly, using the Scopus database to identify key publications and the VOSviewer tool to process and visualize the networks of the main topics. This bibliometric analysis provides a comprehensive overview of the predominant techniques, tools, and methodological approaches in the study of public policies and the financing of productive projects for the elderly, allowing the identification of key elements to optimize the research model. Subsequently, an exploratory quantitative approach is applied to evaluate the financial viability of the productive project proposal, using tools such as the net present value (NPV), the profitability index (PI), and the internal rate of return (IRR). This analysis is performed with financial data obtained from local and national studies, integrating the bibliometric findings in the development of the proposed model to improve the accuracy and applicability of public policies aimed at the elderly in Mexico (López-Robles, 2019; López-Robles, 2020a,b; Otegi-Olaso, 2019; Rodríguez-Salvador, 2022).

For the search in the Scopus database, specific parameters were used to identify relevant literature on the silver economy, the elderly generation and the markets related to this demographic group, and terms related to public policies and strategies. The search focused on the title, abstract, and keyword terms: “silver econom*”, “silver generation*”, “silver market*”, “elderly econom*”, “elderly generation*”, “elderly market*”, “aging econom*”, “aging generation*”, “aging market*”, “third age econom*”, “third age generation*”, and “third age market*”, in combination with “policy*”, “policies”, or “strateg*”. In addition, results were filtered to include only articles (ar), book chapters (ch), conference papers (cp), and reviews (re) in English, as shown in the following advanced search: TITLE-ABS-KEY(“silver econom*” OR “silver generation*” OR “silver market*” OR “elderly econom*” OR “elderly generation*” OR “elderly market*” OR “elderly econom*” OR “ageing econom*” OR “ageing generatio*” OR “ageing market*” OR “third age econom*” OR “third age generation*” OR “third age market*”) AND TITLE-ABS-KEY(“policy*” OR “policies” OR “strateg*”) AND (LIMIT-TO

(DOCTYPE,"ar") OR LIMIT-TO (DOCTYPE, "ch") OR LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (LANGUAGE, "English"))).

As a result of this search, 136 publications were identified since 1979, with a total of 1670 citations and an h-index of 20. These results suggest a growing academic interest in the intersection between the economics of the elderly and public policies, reflecting a consolidation of knowledge and a significant impact on the study area. On the other hand, in the search for projects that encourage the creation of microenterprises supported with public resources as part of the OAs policy, this research aims to expose, through the example of the creation of a company producing pasta and sauces called "Moles" in Mexico, which are made with varieties of chili peppers and spices that season various types of meats and which, depending on the region of the country, are named in different ways. These moles are widely used on special occasions to celebrate with families. In the case of Zacatecas, the example is based on the mole called "Asado de boda," which will support the proposal of the financial project, which can be executed by any person with skills, interests, or experience in the elaboration of products by the OAs.

This idea arises from the results obtained in a study conducted in 2018 by the Academic Research Body UAZ-CA-206, "Management, Evaluation and Training Processes of Public Policies in Mexico," where the sample:

(...) was obtained in different municipalities of the state of Zacatecas and was applied to 2,566 MAPs over 65 years of age, previously selected in face-to-face interviews". This research, among other results, showed that 99.7% of those interviewed require economic support due to the absence or insufficiency of a pension or retirement pension (Saldivar, 2012, p. 230).

As previously mentioned, financial tools were used to test the feasibility of this proposal. The Net Present Value (NPV) method discounts all cash flows at present value. For this purpose, the minimum acceptable rate of return (MROR) is used as the discount

rate, which is also added to the return that the investors intend to obtain and the interest rate of the financing sources (loans). The NPV equals the algebraic sum of the project's cash flows, discounted to the present with the MATR. The following formula was used:

$$VPN = \sum_{t=0}^n \frac{A_t}{(1+r)^t}$$

Where...

r = required rate of return

A_t = each of the cash flows of the project

t = period in which each cash flow is obtained

Decision-making is based on accepting those projects in which the present value of the positive cash flows is at least equal to the present value of the negative cash flows. This means that a project can be viable if its NPV is zero, the positive cash flows are equal to the negative cash flows, and all cash flows have been discounted using the TREMA or the rate of return expected by investors. In this case, the project can be said to generate the required return. On the other hand, if the NPV is positive, the project generates an added value to investors above what is needed.

As for the profitability index, also known as the cost-benefit of a given project, it uses the same information as the NPV method; only that, instead of adding algebraically the present value of the positive and negative cash flows, it divides the present value of the future cash flows of the project by the amount of the initial investment. This gives the following formula:

$$\text{Profitability index} = \frac{\text{Present value of project cash flows}}{\text{Value of initial investment}}$$

Clearing...

$$IR = \frac{\$ 38'435,641.49}{\$ 3'150,000.00} = 12.20$$

Under Financial Reporting Standard A-3 in Appendix C, profitability

is the entity's ability to generate profits or increases in its net assets. It serves the general user to measure the net income or changes in the entity's net assets concerning its revenues, its stockholders' equity and its own assets. (2012, p. 54).

There is a very close relationship between net income and the capital invested to obtain profitability. This is one of the indicators that most organizations look for in any project they undertake, and it is no exception in this case. Another of the financial tools used in this study was the Internal Rate of Return (IRR), which is defined as follows:

The discount rate that equals the present value of the project's revenues to the present value of the expenditures. It is the interest rate that, used in calculating the Net Present Value, makes it equal to zero (Varela, 2019, p. 77).

Different discount rates must be tried to calculate the IRR until the present rate is found to be equal to the cash inflows and outflows, which makes the NPV equal to zero.

$$\text{IRR} = \frac{\text{First year cash flows}}{\text{Initial investment}}$$

$$\text{IRR} = \frac{7'360,000}{3'150,000} = 233.65\%$$

RESULTS

The results of this study begin with a comprehensive bibliometric analysis that identifies the most relevant techniques, variables, and methodological tools in research on public financing to improve the income of the elderly. To this end, the Scopus database and the VOSviewer visualization tool were used to identify key patterns and emerging trends in the literature. This strengthened the study's conceptual framework and guided the selection of the elements analyzed. Subsequently, financial tools, such as Net Present Value, Profitability Index, and Internal Rate of Return, were applied to assess the viability of productive projects led by older adults in Zacatecas using specific data from local

studies. The results of this financial analysis highlighted the importance of factors such as initial investment, operating costs, and projected income. They also revealed their strong relationship with the economic sustainability of the elderly. This integration of methods allowed a deeper understanding of the impact of public financing and the generation of more practical recommendations for developing public policies that encourage entrepreneurship and improve the income of older people in various contexts.

Figure 1 shows the academic, scientific, and business production on public funding to improve the income of the elderly, according to Scopus. The graph shows two sets of data: the number of publications, represented by blue bars, and the number of citations received by those publications, represented by a dotted green line. From 1979 until the early 2000s, the number of publications could have been higher, with less than five per year. However, from 2010 onwards, a gradual increase in the number of publications is observed, reaching a significant peak in recent years, especially in 2022 and 2023, with more than 15 publications per year. This trend indicates a growing academic and scientific interest in public financing for the elderly.

In terms of citation impact, this remained low until approximately 2008. From that year onwards, there is a considerable increase in the number of citations, especially from 2018 onwards. This increase suggests that more recent research has had a more significant impact on the scientific community, which could be related to the growing importance of aging and global public policy issues. The relationship between the number of publications and citations shows that, although the number of publications has grown steadily, the number of citations has had an even steeper growth, indicating that more recent research is more frequent and more influential.

In summary, the figure reflects a growing interest in and significant impact on the study of public financing for older adults. This highlights that this is an expanding field of research that is becoming increasingly relevant in the academic and scientific literature.

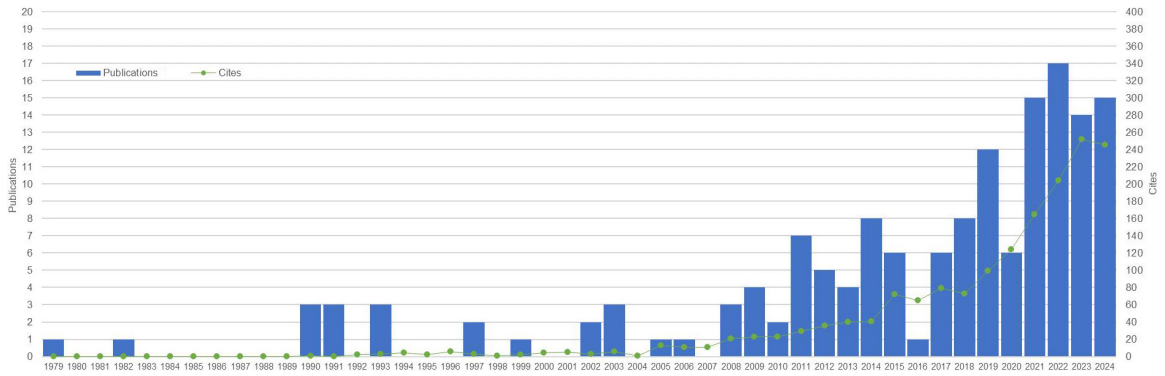


Figure 1. Academic, scientific, and business production and its impact in the field of public financing to improve the income of older adults, according to Scopus.

Similarly, Table 1 provides an analysis of the principal authors, organizations, countries, and areas of knowledge that contribute

to the study of public financing to improve the incomes of the elderly. The most productive authors are Bogataj, D.; Bouri, E.; Butt, S.

Description	(Publications) Description
Most productive authors	(2) Bogataj, D.; Bouri, E.; Butt, S. A.; Draheim, D.; Hammoudeh, S.; Leventhal, R. C.; Lippert, S.; Lucey, B. M.; Moschis, G. P.; Nyren, C.; Ono, T.; Pappel, I.; Pecchenino, R. A.; Walker, A.
More productive organizations	(2) The University of Sheffield; Poznań University of Economics and Business; Newcastle University; La Trobe University; Opole University of Technology; Trinity College Dublin; Metropolitan State University of Denver; Georgia State University; University of Tsukuba; Drexel University; Keio University; National and Kapodistrian University of Athens; Universiti Malaya; Michigan State University; The University of Western Australia; Università degli Studi di Verona; Tallinna Tehnikaülikool; Holy Spirit University of Kaslik USEK; Università degli studi Magna Graecia di Catanzaro; Sunway University; University of Economics Ho Chi Minh City; Trinity Business School; LeBow College of Business; INRAE
Most productive countries	(32) United States (14) United Kingdom (11) China (9) Japan; Spain (8) Italy; Poland
More productive sources	(4) Resources Policy (3) Frontiers In Public Health; Sustainability Switzerland (2) Ageing and Society; Economic Change and Restructuring; Environmental Science and Pollution Research; Innovation the European Journal of Social Science Research; Journal of Consumer Marketing; Journal of Macroeconomics; Journal of Population Economics; Sinergie; Small Enterprise Research; Springer Proceedings in Business and Economics.
Main research areas	(57) Social Sciences (55) Economics, Econometrics and Finance (47) Business, Management and Accounting (21) Medicine (19) Environmental Sciences

Table 1. Principal authors, organizations, countries, and areas of knowledge in the field of public financing to improve the income of older adults according to the Scopus database.

A.; Draheim, D.; Hammoudeh, S.; Leventhal, R. C.; Lippert, S.; Lucey, B. M.; Moschis, G. P.; Nyren, C.; Ono, T.; Pappel, I.; Pecchenino, R. A.; and Walker, A.; each with two publications. This group of researchers comes from diverse fields of expertise, indicating an interdisciplinary approach to studying public financing and the economic well-being of the elderly.

The universities most active in this research are The University of Sheffield, Poznań University of Economics and Business, Newcastle University, and La Trobe University, each with two publications. These institutions are located in different countries, suggesting broad international collaboration and a growing global concern for the issue. In terms of the most productive countries, the United States leads the production with 32 publications, followed by the United Kingdom (14), China (11), Japan and Spain (9 each), and Italy and Poland (8 each). This geographical distribution reflects considerable interest in both developed and developing regions.

The journals most active in publishing related research are Resources Policy, with four publications and Frontiers in Public Health and Sustainability Switzerland, with three publications each, suggesting that the topic is of interest to journals focused on resource policy and public health and sustainability. The main areas of knowledge in which this research is concentrated are social sciences (57 publications), economics, econometrics and finance (55), business, management and accounting (47), medicine (21), and environmental sciences (19). This thematic diversity indicates a multifaceted approach ranging from economic and financial aspects to social, management, and health implications, reflecting the subject's complexity and cross-cutting nature.

Thus, the table highlights a broad global and interdisciplinary involvement in research on public funding for the elderly, underscoring its growing importance in multiple academic and professional fields.

In this regard, Figure 2 shows the evolution of the primary research, development, and innovation topics in the field of public funding to improve the income of the elderly

(1100 topics). Two main cores stand out in the visualization: "population aging" and "silver economy", which are connected to several key concepts. The term "population aging" is a central core, indicating its predominant relevance in the research. This theme is linked to other concepts such as "economic growth", "social security", "employment" and "education", reflecting a comprehensive approach that encompasses both economic and social aspects of aging, evidencing the need for public policies that consider these multiple dimensions to improve the income and quality of life of the elderly.

The "silver economy" is associated with terms such as "trade," "investment" and "regression analysis," suggesting that research in this field focuses on understanding how specific economic activities and investments can tap into the market potential of older adults by using quantitative methods such as regression analysis to assess their impact. The relationship between population aging and the economic opportunities that this age group represents is highlighted by the interconnections between "population aging" and "silver economy", with links to terms such as "economic growth", "employment" and "investments". This suggests that the development of the silver economy is closely related to strategies to foster economic growth and improve employment opportunities for the elderly.

In addition, the color gradient from blue to green and then to yellow shows the temporal evolution of research topics from 2005 to 2020. More recent topics like "silver economy" and "trade" appear in lighter colors. In contrast, "aging population" and "economic growth" are spread over a more extended period, evidencing that they have been the subject of research for a long time. This demonstrates that the "silver economy" is an emerging field, while "population aging" is an established study area. In summary, Figure 2 reflects that the field of research on public financing to improve the incomes of the elderly is expanding, integrating new approaches to the silver economy and market opportunities without neglecting population aging and its economic and social implications.

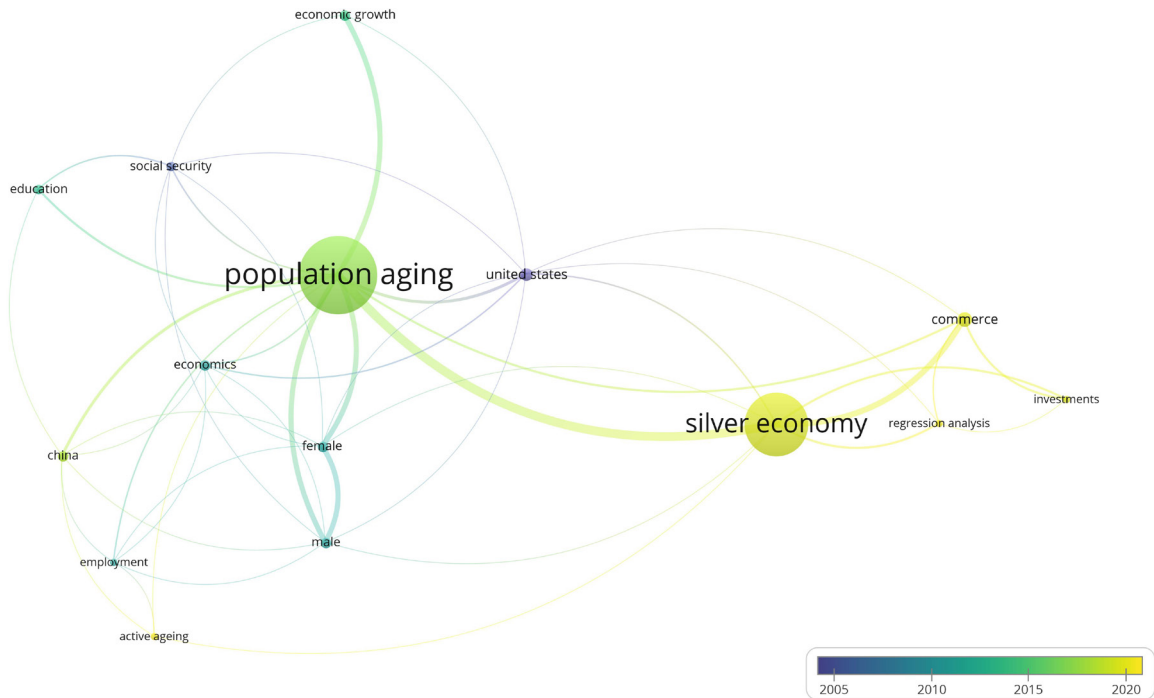


Figure 2. The evolution of primary research, development, and innovation topics in public financing to improve the income of older adults, according to Scopus.

As has been explained, income diversification in the Zacatecas environment is imperative to improve the living conditions of the elderly population, and one possibility is to evaluate economically profitable projects that, from the point of view of public policy, would be supported from different angles. This section presents the results of the cost-benefit analysis that considers the possibility of enhancing the experience of the elderly in the state of Zacatecas (Mexico). This can be extrapolated to any population, considering the specific characteristics of the region where this initiative will be developed.

The cost-benefit analysis contemplates producing typical regional products in Zacatecas, led by older adults. With their experience and leadership, which in a traditional society such as the one in Zacatecas is even more significant, they will be the main coordinators of the group that will develop the productive project. The project also aims to employ the older people who participate in it and transmit experience and values at work and income to unemployed people with little

education, mainly a young audience. This will have an impact on:

1. The increase in income of the elderly population in Zacatecas,
2. The generation of employment in the economically active population that is not employed, and
3. The transmission of experience in the production of a regional product.

To contextualize the proposal, this paper evaluates the project “Elaboration, promotion and sale of mole and/or asado de boda”, tutored by an older adult. This project can be extrapolated to other regional products in which older adults have extensive experience, such as food, typical sweets, drinks, handicrafts, clothing, etc. The methodology and the process of evaluating the economic profitability of each product are based on the same principle. In the following section, the financial analysis will be carried out to assess the proposed project by estimating NPV, IR, and IRR, which will determine its economic profitability.

Financial analysis

Using the mathematical-financial techniques presented in the methodology section, the benefits obtained by investing in the assumptions presented will be determined to determine the initial investment, operating costs, and income that the project can generate. The objective is to obtain results that support or

discourage the execution of the project, taking into account that the amounts shown are estimated in Mexican pesos, as indicated in Table 2. Table 3 indicates that the operating costs are calculated by consulting prices of inputs and base salaries suggested for elaborating the product. Considering annual costs, Table 4 indicates the estimated monthly and yearly total.

Number of older adults considered in the project	100		
Initial investment for basic installation and supplies/project	\$30,000.00	100	\$3,000,000.00
Advertising campaign design	\$100,000.00	1	\$100,000.00
Start-up advertising	\$50,000.00	1	\$50,000.00
Total			\$3,150,000.00

Table 2. Initial investment (Cost-benefit of a project per senior).

	Price/unit	Total
Project/year advertising campaign	\$240,000.00	\$240,000.00
Generation of permanence/per year/senior incentives	\$5,000.00	\$500,000.00
Employees (3 per project, including the coordinating senior)	\$4,000.00	\$14,400,000.00
Project supervision	\$300,000.00	\$300,000.00
Shipping costs/product	\$20.00	\$3,600,000.00
Total		\$19,040,000.00

Table 3. Estimated operating costs.

1 kg	90	
Shipping	10	
Kgs/MONTH	150	
Cost/Processing/Month		\$15,000.00
Cost/Processing/YEAR		\$180,000.00
Cost of product development/year of the entire project		\$18,000,000.00

Table 4. Annual production cost by project.

The expected income is derived from an analysis of the supply of the product in question in the Zacatecas market, as well as from certain assumptions about its production and distribution. In this way, by combining the incentives that would be granted

to the older adults participating in the project and the donations collected per year, the project's economic benefits are obtained. The first fruits considered for the calculation of the project's income will be based on Table 5.

Price for sale of mole and/or wedding roast	\$180.00
Number of kgs/month	200
Revenue/year of sales	\$432,000.00
Donations/year (5 pesos/product on average)	\$5.00
Total donations/year	\$12,000.00
Total/project/elderly adult	\$432,000.00
Number of older adults	100
Project total	\$43,200,000.00

Table 5. Income obtained by project. Note: The \$43'200,000.00 is added to the \$1'200,000.00 that the elderly would receive from governmental authorities as support for the project, giving a total income of \$44'400,000.00, as shown in Table 6.

Discount rate	12.00%
Initial Investment	3,150,000.00
Annual revenues	44,400,000.00
Operating and maintenance costs	37,040,000.00
Donations/adult/year	1,200,000.00
NPV (Mexican pesos)	38'435,641.69
IRR	233.65%
Net cash flow for the first year	7'360,000.00

Table 6. Practical example of NPV and IRR calculation.

CONCLUSIONS

From the bibliometric analysis conducted, it can be concluded that the field of research on public funding to improve the incomes of the elderly has experienced significant growth in the last decade, with a notable increase in the number of publications and citations, especially after 2018. This trend reflects the growing interest of the scientific and academic community in understanding the complexities and challenges associated with population aging and the silver economy. Analysis of the most productive authors, organizations, and countries indicates broad international and interdisciplinary participation, with outstanding contributions from institutions in the United States, the United Kingdom, China, and other countries, underscoring the global relevance of this topic in different sociopolitical and economic contexts.

Visualizing the main research topics using tools such as VOSviewer has made it possible to identify key areas of study, such as population aging, social security, employment, and the silver economy. There is a clear interrelation between these concepts, showing that the study of public funding for the elderly encompasses both economic aspects and social, employment, and general welfare dimensions. The temporal evolution of the topics shows that the “silver economy” is a recent field of research linked to market strategies and public policies that seek to take advantage of the economic potential of the elderly. At the same time, “population aging” continues to be a consolidated approach of great importance.

Thus, the bibliometric analysis has made it possible not only to map the current landscape of research on public funding to improve the incomes of the elderly but also to

identify opportunities for future research. These opportunities include the development of innovative public policies that respond to the emerging needs of the aging population and take advantage of the growth of the silver economy. In addition, this bibliometric approach provides a solid framework for formulating more effective strategies that consider current trends and existing gaps in the literature, facilitating the generation of more accurate and applicable knowledge in the development of inclusive and sustainable public policies.

On the other hand, the situation of the OAs, from the economic perspective according to the sources consulted, indicates a complex panorama for this age group since most of them are uncertain in sustaining their needs. The possibility of establishing mechanisms that contribute to the creation of public policies from the three levels of government that allow them to remain in productive businesses and, at the same time, generate jobs for the new generations becomes a hopeful possibility for the elderly and for the young population, who require development opportunities in which they can apply their knowledge and skills.

Positive externalities were found in social profitability since, in collective terms, the citizenry benefits from having a more excellent occupation of the active population and a decent income for the elderly in the state of Zacatecas. The possibility of keeping the elderly occupied generates greater satisfaction in their daily lives since feeling useful in general provides more significant incentives to feel good personally, positively impacting their health.

In the specific case of the present proposal, it is observed that the present value of the project is \$38,435,641.69, when the initial investment would be \$3,150,000, taking as a reference a discount rate of 12%, which is the projection of the value of money over time with a discounted value. For this reason, it was considered that the project is feasible and would be worthwhile to start immediately. In addition, the Internal Rate of Return was 233.65 %, well above the discount rate. Similarly, using the net flows of the first year as a basis, \$7,360,000 would be obtained,

which means that the investment would be recovered 2.3 times in that period since the initial investment is \$3,150,000.

The possibility of creating a virtuous circle that allows financing projects of senior citizens and taking advantage of the knowledge and skills in new technologies of the young people of the entity to promote products on electronic platforms could generate more jobs and more significant revenue for the public coffers through the taxes that these new companies generate.

Anticipating and anticipating the complications that the aging of the Mexican population will entail will make it possible to correct some of the social problems foreseen in the near future for those participating in these productive projects.

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Contribution statement

Conceptualization, software, writing - preparation of the original draft: Rubén Carlos Alvarez Diez.

Methodology, visualization, supervision: Rubén Carlos Alvarez Diez, Reina Margarita Vega Esparza.

Validation: Rubén Carlos Alvarez Diez, Reina Margarita Vega Esparza, María Teresa Villegas Santillán.

Formal analysis, data curation: Rubén Carlos Alvarez Diez, Verónica Arredondo Luna.

Research: Rubén Carlos Alvarez Diez, Reina Margarita Vega Esparza, Verónica Arredondo Luna, María Teresa Villegas Santillán.

Resources, acquisition of funds: Rubén Carlos Alvarez Diez, María Teresa Villegas Santillán.

Writing - proofreading and editing: Rubén Carlos Alvarez Diez, Reina Margarita Vega Esparza, Verónica Arredondo Luna.

Conflict of interest

The authors declare that they have no conflicts of interest.

Data Consent Statement

The data are included in the study. ■

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