Journal of Information Systems Engineering and Management
2025, 10(11s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Government Funding and Its Influence on Product Innovation in Micro, Small, and Medium Enterprises (MSMEs): A Comprehensive Review

Devesh Chand[1], Professor (Dr.) Arvind Mohan[2], Arpit Walia[3]
[1]*Ph.D. Scholar, Department of Management Studies, Graphic Era Deemed To be University, Dehradun, India*
Email: kelpaljargau@gmail.com
[2] *Department of Management Studies, Graphic Era Deemed to be University, Dehradun, India*
Email: arvindmj99@gmail.com
[3]*Uttaranchal Institute of Management, Uttaranchal University, Premnagar, Dehradun, India*
Email: arpitwalia91@gmail.com

ARTICLE INFO

Received: 14 Nov 2024

Revised: 26 Dec 2024

Accepted: 14 Jan 2025

ABSTRACT

Introduction: Background: Micro, small, and medium enterprises form the critical part of driving economic growth, employment, and innovation in most countries around the world. However, they equally face important barriers, such as financial constraints, difficulties in accessing technology, and competitive pressures from larger firms. Government funding through grants, loans, tax incentives, and innovation hubs seeks to mitigate these barriers by enabling MSMEs to innovate, develop new products, and enter new markets.

Methods: This review evaluates the role that government funding has played in the product innovation process of MSMEs. Various mechanisms of funding were assessed in regard to their efficacy in driving innovations, and some challenges facing MSMEs in accessing the programs. Through comparative case studies and cross-regional analyses, insight is developed concerning the effectiveness of government initiatives and policy frameworks in place.

Results: Government funding has increased the R&D capacity among MSMEs, helped create new products, and enabled market expansion. For instance, initiatives such as Horizon 2020 of the European Union have contributed to improving MSME technological innovation. Yet, obstacles are set in the convoluted process of application and rigid eligibility criteria, and in differences among regional mechanisms that impede accessibility and effectiveness for this kind of initiative. This is risky because it creates overdependence on government funding that may be discontinued in the case of changes in policy. It has been responding to these kinds of challenges with the development of collaborative funding mechanisms and innovation ecosystems by forming partnerships between MSMEs and research institutions.

Conclusions: The most crucial role played by government funding is in overcoming the financial and technical problems of MSMEs in the development of a new product. Some useful policy measures for maximizing impact would include simplification of application procedures, designing programs considering heterogeneous needs, and encouraging joint innovations. Long-term sustainability of government-funded innovations and removal of regional and sectoral imbalance are some aspects that future studies may consider. These findings support the argument for more targeted, efficient, and inclusive funding approaches to enhance innovation in MSMEs and promote economic growth.

Keywords: Government Funding, MSMEs, Product Innovation, Grants, Subsidies, Sustainability, Cross-Border Collaboration.

INTRODUCTION

MSMEs form part of the backbone of the economic fabric in both developed and developing nations. The definition of MSMEs for most countries is based on the size of the enterprise, considering the number of employees, annual

turnover, and balance sheet total. For instance, the European Commission states that micro enterprises are those that employ less than 10 people and have an annual turnover or balance sheet total of less than €2 million. The small enterprises employ less than 50 people, with a turnover or balance sheet total not in excess of €10 million, while medium-sized enterprises employ less than 250 people with a turnover of less than €50 million.

Yet, while being relatively much smaller in size compared with large corporations, MSMEs are very important drivers of growth. Most MSMEs globally comprise in excess of 90% and provide more than 50% of employment across the world; World Bank (2020) further states that in developing economies they form the backbone for job creation and reduction of poverty, while in the developed countries, they ensure competition, innovation, and market diversification. MSMEs are also very significant in contributing to the GDP of advanced economies because they are so important for the innovation ecosystem.

Table 1: Common Types of Government Funding

Funding Type	Description	Examples
Direct Grants	Financial support with no obligation of repayment, typically for R&D.	EU Horizon 2020, US SBIR Program
Loans	Government provides funds that must be repaid with interest.	UK's Start Up Loan Scheme, SBA Loans (USA)
Tax Incentives	Reductions in tax obligations to encourage investment in innovation.	R&D Tax Credit (USA), R&D Tax Relief (UK)

The types of government funding provided to MSMEs are summarized in Table 1, including grants, loans, and tax incentives.

There are a lot of challenges most of these enterprises go through such as financial-capability, technological, and manpower. Most MSMEs face definite constraints due in part to financial capabilities among other disadvantages relative to advanced technologies, impediments to be overcome when aiming at acquiring skilled high-quality labour. As just mentioned, by and large-in this situation-constraints remain huge barriers that hamper these businesses moving into newer ranges including products, henceforth keeping under pace the altering consumer demands against changing technologies available.

Product innovation is the lifeline that keeps MSMEs going in saturated markets or industries dominated by larger firms. Innovation enables the MSMEs to differentiate themselves and adapt to changing consumer preferences to meet the demands of evolving markets. According to Sharma (2019), "The capability of an enterprise to develop new products or improve its existing products to remain competitive is not merely a matter of survival but one of staying in competition.".

In this environment, however, several barriers to product innovation may be especially true for MSMEs. One prominent barrier pertains to finance; MSMEs often cannot invest in R&D due to a lack of capital and frequently cannot use conventional sources of bank finance because, as smaller firms, they're perceived as inherently riskier for the lenders of money (N. S. & Gupta, 2023). Moreover, MSMEs usually lack infrastructure, expertise, or even access to sophisticated technologies that larger firms normally have at their disposal.

MSMEs are also faced with intense competition from larger firms that enjoy economies of scale and financial and technological resources (Baghel, 2020). This places the smaller firms at a competitive disadvantage in terms of innovation and market reach. Regulatory barriers and an excessively complicated administrative process further complicate the innovation efforts of MSMEs, especially in countries with strict product development and market entry regulations (Bakhtiari & Bruno, 2019).

Considering the role and contribution of MSMEs to economic growth, as well as driving innovation, various governments throughout the world came to realize the increased need for giving support to enterprises in general, and especially towards innovation. This will involve grants, loans, tax incentives, and government programs supportive of creating innovation hubs relevant in helping them reduce some of the financial challenges faced by MSMEs in the development of products. These programs have been designed to help MSMEs create new products and enhance processes, among other methods aimed at their attainment of sustainable growth.

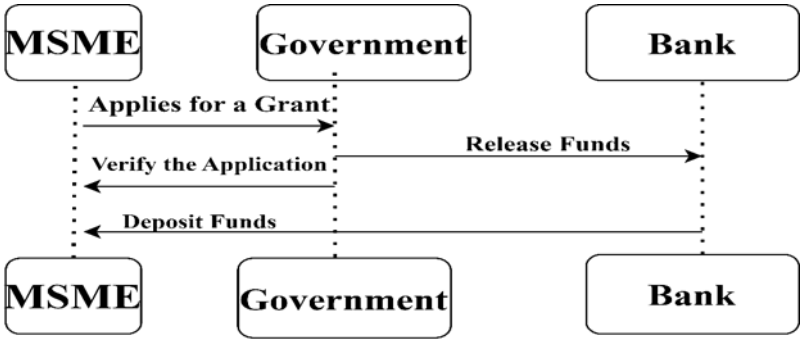

Fig 1: Role of Government Interventions in MSME Innovation

The critical role of government interventions in addressing innovation barriers for MSMEs is depicted in Figure 1, showing financial and policy-based support.

Although MSMEs face a plethora of internal and external barriers, focused government interventions can, however, help empower them to break through such obstacles and build an enabling environment for innovation. Directly, through financial support or indirectly by creating enabling policy frameworks, the government can greatly build the capacity of MSMEs for product innovation and thereby raise economic competitiveness.

Purpose of the Review

The following review will highlight how government funding influences product innovation in MSMEs. This paper discusses how MSMEs may make more successful innovations of their products based on such a wide array of government funding mechanisms, such as grants, tax incentives, loans, and innovation hubs. It commences by examining what sorts of government funding programs have been pursued by several jurisdictions and proceeds by critically considering what results there might be with regards to their capability to promote innovations.

Key objectives include:

• Identifying the types of government funding programs available for MSMEs in product innovation and discussing how these programs work.

• The performance and challenges of these funding mechanisms have to be assessed from the point of view of MSMEs and government policymakers.

• Analyze how these programs drive innovative activity in accordance with factors contributing to their effectiveness, such as program design and eligibility requirements, and some external ones, like market conditions or regulatory environments.

Case studies showing in practice how such government funding programs have helped towards product innovation among MSMEs. These will provide the review with specific examples of how such initiatives by the government have succeeded or failed in the pursuit of objectives.

Structure of the Paper

The review is organized as follows:

1. Introduction: This provides a background of the paper through describing the role that MSMEs play in the contribution to economic growth, product innovation, and problems faced by MSMEs. The review objectives are also outlined and introduce the structure of the paper.

2. Background: The paper will deeply explore MSMEs, their economic importance, and challenges in product innovation. The paper will further give an overview of the various government funding programs available to MSMEs, such as grants, loans, tax incentives, and innovation support programs.

3. Evaluation of Government Funding Programs: The paper will also identify the different funding programs, which are instituted by the government for MSMEs, explaining how each of them works and what a particular MSME will have to meet to acquire them. There will also be discussed the likely outcomes of each type of funding on product innovation.

4. Influence of Government Funding on Product Innovation: This discusses how product innovation is affected by government funding in MSMEs; some positive cases were noted together with a critical look at MSMEs challenges in their attempt to access and use such funds.

5. Effective Utilization of Government Funding: Various key factors are analyzed that act as catalysts and barriers to government funding programs in order to support innovation effectively: the nature and characteristics of the MSME, the program design, and the implementation context, as well as other conditions such as general market and the regulatory environment.

7. Future Trends and Policy Implications: This section looks toward the future for government funding programs for MSME innovation and points to new directions in policy development, while some recommendations are given on how to improve funding schemes.

8. Conclusion: This will be the final section that will summarize the review findings, present conclusions, and provide recommendations for policy makers and MSMEs.

Case studies would be incorporated in a few sections, mainly into the sections on Types of Government Funding Programs, Impact of Government Funding on Product Innovation, and Evaluation of Government Funding Programs, which will make the report appealing with real cases of how the MSMEs had used these funding programs offered by the government for innovation and growth attainment

BACKGROUND

Micro, Small, and Medium Enterprises (MSMEs) are defined based on their size, measured in terms of employees, annual revenue, and balance sheet total. These enterprises form the backbone of most economies, contributing significantly to economic growth, employment, and innovation. According to the European Commission (2021), MSMEs are classified into three categories:

• Micro enterprises: Fewer than 10 employees and annual turnover or balance sheet total under €2 million.

• Small enterprises: Fewer than 50 employees with an annual turnover or balance sheet total under €10 million.

• Medium enterprises: Fewer than 250 employees and an annual turnover not exceeding €50 million or a balance sheet total not exceeding €43 million.

Table 2: Government-Backed Innovation Ecosystems

Program Type	Description	Example
Innovation Hubs	Physical or virtual spaces for collaboration between entrepreneurs and researchers.	Silicon Roundabout (UK)
Accelerators	Intensive support programs aimed at scaling early-stage startups.	Y Combinator (USA)
Incubators	Provide resources and mentorship to help businesses grow over time.	The Hatchery (Canada)

Government-backed innovation ecosystems, including accelerators and incubators, provide essential resources for MSMEs, as seen in Table 2.

MSMEs account for a significant portion of businesses worldwide. In both developed and developing economies, they represent over 90% of businesses and employ more than 50% of the global workforce (World Bank, 2020). These enterprises are crucial for creating jobs, fostering entrepreneurship, and promoting local economic development, particularly in emerging economies. In fact, MSMEs often account for a large share of GDP, highlighting their essential role in the economy (Jones, 2016).

Issues in Innovation Faced by MSMEs

Innovation, especially product innovation, is highly crucial for MSMEs if they are to remain competitive and answer the ever-changing demands of consumers, along with keeping pace with technological changes. However, many barriers stand in the way of the innovation potential of MSMEs:

1. Financial Constraints: The main problem with MSMEs is the lack of capital. Limited financial resources act as a constraint for MSMEs to invest in R&D or any innovation activities. Howell (2017) added that the financial constraint

becomes worse due to the difficulty in accessing traditional loans or financing through banks, as smaller businesses are perceived to be riskier investments than larger ones.

2. Poor Technological and Knowledge Resources: Unlike large enterprises, MSMEs are mostly unable to afford infrastructure, a talented workforce, and access to advanced technologies which act as enablers of product innovation. A lack of technological capability will negatively affect the activities of the MSME in designing and testing new products and bringing them to market (Mina et al., 2020).

3. High Competition: Most MSMEs face very stiff competition from larger enterprises enjoying economies of large-scale operations, with easy access to better resources and established brand equity. It becomes relatively difficult to justify the risk and cost of product innovation on account of competitive disadvantage (Nandeeswaraiah & Ramana, 2019).

4. Regulatory Challenges: Most markets have very complex regulatory environments that make the process of product development by MSMEs very complicated. Product certification, intellectual property protection, and compliance with local standards are some of the issues that may delay or prevent MSMEs from innovating effectively (Prakash, Kumar, & Verma, 2021).

5. Risk aversion: Given their relative constraint in finance, MSMEs are much more conservative compared to large firms in the decision to undertake risk. In these cases, if an innovation project fails, its impact might turn into an uphill task-something as crucial as business closure or job losses. This could, therefore, cause MSMEs to step away from pursuing ideas deemed innovative or any new technologies simply out of the fear of losing everything when there is, indeed, a huge promise of great advantages in the marketplace (Ramadhona, Syafri, Maryani, & Achmad, 2023)

Product Innovation: Role in MSMEs Therefore, product innovation is very significant to the survival and development of MSMEs. As a result of competitive pressures and frequent changes in market demand, product innovation can provide a better way through which MSMEs can successfully compete with their rivals. This will enable capturing new market segments, improving operational efficiencies, and catering to emerging consumer preferences by innovating products from MSMEs (Rana & Choudhary, 2019).

For instance, a small manufacturer of electronics that introduces an improved energy-efficient product may gain the attention of environmentally conscious consumers and thereby create some advantage over larger, less nimble competitors.

Apart from this, product innovation provides a route to relevance for MSMEs through rapid evolvement with technology-driven markets. In technology sectors, life cycles of the products are turning out to be shorter than ever, and unless an enterprise continuously re-innovates what it is selling, it is likely to easily lag behind. New product offerings will help these firms in sustaining the interest of customers in businesses or manufacturing sectors that have a highly competitive atmosphere, such as consumer goods (Selvamuthu, Logeswari, & Karthika, 2021).

In addition, successful product innovation may have significant effects on MSMEs in increasing their productivity, improving the use of resources, access to a good reputation in the marketplace, and opening new avenues for revenue streams, increasing market share, as well as promoting access to global markets, especially when such product innovation is scalable and can be marketed to an international market. According to Audretsch (2014), this calls for fostering a culture of innovation as one of the major strategic focuses that MSMEs should aim at in order to sustain success in the long run.

TYPES OF GOVERNMENT FUNDING PROGRAMS

Government funding for MSMEs indeed adopts various structures generally, each with a specific mission. The most common means provided by government incentives include direct grants and loans or perhaps tax breaks; each comes under different features with exclusive benefits attached but depends upon strategic objectives in attaining different finance needs within companies.

Fig 2: MSME Government Support Programs

Figure 2 outlines the various types of government support programs available to MSMEs, emphasizing their targeted objectives and applications.

1. Direct Grants:

Direct grants refer to non-repayable financial contributions that are offered to MSMEs in the funding of defined innovation projects, which can take the form of R&D, technology adoption, or even product development. In addition, the special value of grants for MSMEs consists of providing resources for them without demanding their return; hence, the firms may realize risky and valuable innovative ideas. The basis of selection in many instances depends on areas that represent priorities for either the national or regional agendas in such fields as sustainability, digitalization, and advanced manufacturing (Xie & Zhang, 2021).

Example of Direct Grant Programs: 1. Horizon 2020 (EU): This grant provided by the European Union represents the mega funding program designed with the goal to inspire innovation in research and development across sectors. It avails the possibility of accessing grants for MSMEs that are participants in research and innovations across sectors like energy, health, the digital economy, environmental fields, and so on. It also tries to bridge the gap in research to be able to develop market-ready innovations. This makes this program an effective tool for promoting the development of technological capabilities and competitiveness of MSMEs to compete in global markets.

2. Loans: The interest rates for the loans provided to MSMEs are rather smaller, while their conditions can also be softer than those specified in traditional finance institutions. Government-backed loans are developed for the purpose of delivering affordable capital for MSMEs to finance innovation and expansion projects. These may include loans for purposes like equipment purchases, scaling of production, or R&D activities. Example of Loan Programs: Small Business Innovation Research Program - USA SBIR is a US government program that makes available competitive feeds as well as grants to small companies for R&D in technological innovation. The Program covers three phases that go all the way from early concept funding up to product development and commercialization (Quimba & Rosellon, 2019).

3. Tax Incentives: Most governments offer various tax incentives to motivate MSMEs to invest in R&D and product innovation; this may involve tax credits, deductions, or allowances that cut the effective cost of R&D activities. In general, by reducing the tax burden, such incentives allow MSMEs to reinvest more capital into their innovation activities. Example of Tax Incentives Program: The UK's Research and Development tax credit program provides a rebate or tax deductions against qualifying research and development activities, with businesses accessing a percentage recovery of their qualified R&D through either an uplift to their enhanced expenditure or their additional tax-deductible sums. MSMEs in the United Kingdom can seek the return of part of their R&D cost, which reduces to a certain limit, the load brought about by the innovation phenomenon (Saptono et al., 2024).

Table 3: Types of Government Funding Programs and Their Impact on MSME Innovation

Funding Type	Description	Target MSMEs	Purpose of Funding	Benefits	Challenges Faced	Example Programs	Geographic Region
Direct Grants	Financial support that doesn't require repayment.	All MSMEs, especially those focusing on innovation.	To support R&D and product development.	Boosts innovation by directly funding R&D.	Complex application processes; limited availability.	Horizon 2020 (EU), SBIR (USA)	EU, USA
Loans	Financial assistance provided by the government that must be repaid.	MSMEs with proven viability in the market.	To support business expansion and innovation.	Facilitates business expansion with manageable repayment terms.	High interest rates; difficulties in repayment.	Start Up Loan Scheme (UK), SBA Loans (USA)	UK, USA
Tax Incentives	Reductions in tax obligations to incentivize R&D or new product development.	MSMEs in sectors with high R&D intensity.	To reduce the financial burden and foster innovation.	Promotes R&D by offering tax relief.	Complex eligibility criteria; slow processing.	R&D Tax Credit (USA), R&D Tax Relief (UK)	USA, UK
Innovation Hubs	Physical spaces offering collaboration, resources, and funding.	Startups and SMEs with high growth potential.	To facilitate collaboration and innovation through access to resources.	Accelerates innovation and market access.	Limited to certain regions; high competition.	Silicon Roundabout (UK), TEC de Monterrey (MX)	UK, Mexico
Accelerators	Structured programs that provide mentorship, resources, and funding to startups.	Early-stage MSMEs and startups.	To help startups scale through mentorship and funding.	Provides intensive mentorship, networking, and seed funding.	High competition for entry; short time frame.	Y Combinator (USA), Seedcamp (UK)	USA, UK
Incubators	Long-term support for business development, offering office space, mentorship, and resources.	MSMEs in need of growth support over time.	To provide long-term support and resources.	Access to space, mentorship, and networking.	Limited geographic reach; program fees.	The Hatchery (Canada), Techstars (USA)	Canada, USA
Public-Private Partnerships	Collaboration between government and private companies to co-fund MSME growth and innovation.	MSMEs in tech, green energy, and high-tech sectors.	To leverage private-sector expertise and funding.	Accelerates product development with private funding.	Risk of unequal partnerships; misaligned goals.	India's Clean Energy Fund, PPP for Tech Startups (Germany)	India, Germany
Crowd Funding Platforms	Government-backed platforms allowing MSMEs to raise funds from the public.	Small innovative MSMEs with limited access to traditional funding.	To support MSMEs with community-driven funding.	Enables MSMEs to raise funds without traditional financing.	Public mistrust; lack of investor confidence.	Kickstarter (USA), Crowdcube (UK)	Global

Case Study 1: Using Grants for R&D

Another such example of how effective a grant program by the government can go is XyloTech, an independent biotech firm based out of Spain that used the Horizon 2020 award to research its new material usage in the fabrication of medical equipment. This grant enabled them to bridge the critical stages of R&D without heavy indebtedness and thus allowed them to easily and successfully develop a prototype that attracted private investment. Today, the company has commercialized its product and expanded internationally. This illustrates how government grants offset financial barriers for MSMEs in bringing innovative products to market (Adobas, Dela Cruz, Vigonte, & Abante, 2024).

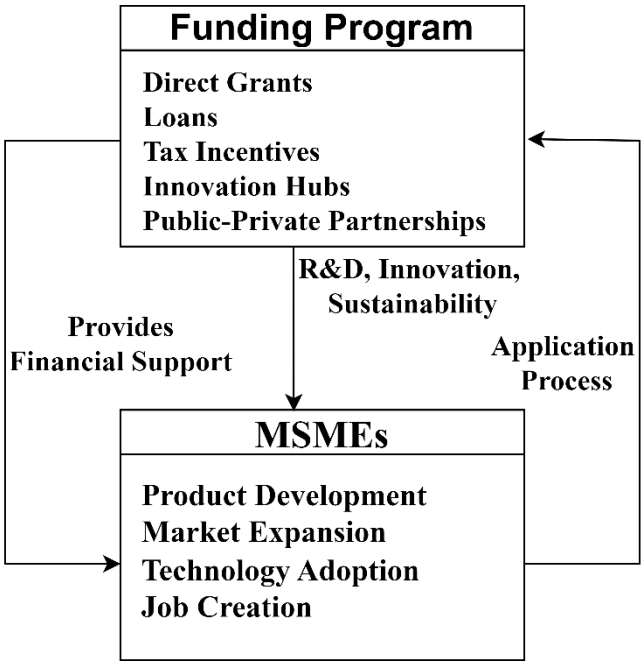

Fig 3: Impact of Government Funding on MSME Product Innovation

The positive impacts of government funding on product innovation, along with potential challenges, are summarized in Figure 3.

IMPACT OF GOVERNMENT FUNDING ON PRODUCT INNOVATION

Positive Effects of Government Funding to MSMEs on Product Innovation

Government funding can bring considerable positive outcomes in product innovation for MSMEs. In such a context, financial and resource constraints are overcome through government funding, which thus allows MSMEs to invest in new technologies, enhance research and development, and bring innovative products to the market. The impacts of such funding can be seen in several key areas:

1. Increased R&D Capacity: Government grants and subsidies provide the MSMEs with financial wherewithal for R&D, which would otherwise be well beyond the limited resources of a small enterprise without external support. This gives the MSME the leeway to try new ideas, enhance their current products, and investigate the use of new technologies that will afford them an opportunity to come up with solutions that can be marketed in an innovative manner (OECD, 2019).

2. Development of a new product: Most of the government funding, especially in grants, is often project-based and may focus on developing new products. This will help the MSMEs prototype, test, and commercialize new products without necessarily being burdened with significant debt or equity investment. Removing financial constraints therefore allows the MSMEs to realize their creative ideas.

3. Improved Market Access: Most of the government funding initiatives also facilitate access to new markets for MSMEs. Most government-backed funding provides opportunities for MSMEs to network with large firms, investors, and international markets. In some cases, government agencies can provide marketing or export support, which is particularly helpful to MSMEs in order to expand beyond their local markets (Zheng & Sheen, 2016).

4. Improved Competitive Positioning: With more resources provided by government funding, MSMEs can enhance their competitiveness in the market by upgrading technologies, enhancing product quality, or reducing production costs. The innovation facilitated by such funding can also provide MSMEs with an advantage over their competitors and thus gain them a better market share (Czarnitzki & Lopes-Bento, 2013).

Table 4: Impact of Government Funding on MSME Innovation (Positive & Negative Effects)

Impact Type	Description	Positive Impact	Negative Impact	Factors Influencing Effectiveness	Examples of Success	Examples of Challenges	Region
R&D Investment	Government funding supports MSMEs in developing new technologies or improving existing products.	Leads to new product development and competitive advantage.	Limited funding may not fully cover R&D expenses.	Availability of funds, simplicity of the application process.	A European MSME developing renewable energy products with Horizon 2020.	A tech startup facing delays due to complicated funding processes.	EU, USA
Market Expansion	Funding assists MSMEs in accessing new markets through scaling operations and improving product offerings.	Expands market access and diversifies product portfolios.	Funding may only cover initial phases, leaving MSMEs stuck.	Regulatory frameworks, international trade agreements.	MSME in Africa scaling its operations with financial support from the World Bank.	A South Asian MSME unable to enter international markets due to lack of sustained funding.	Africa, South Asia
Collaboration with Research Institutions	Government programs may encourage MSMEs to collaborate with universities or research centres.	Facilitates the transfer of new knowledge and technologies.	Partnerships may lead to mismatches in expectations or goals.	Availability of academic partnerships, alignment of innovation needs.	A UK MSME partnering with a university on AI innovation.	A biotech startup unable to align research objectives with government funding.	UK, USA
Product Differentiation	Innovation funds allow MSMEs to improve or create unique products, giving them a competitive edge.	Differentiated products increase the ability to capture niche markets.	Government funds may focus too narrowly on specific types of innovation, limiting broader application.	Market readiness, government focus on certain sectors.	An SME in Europe launching a unique tech product after securing a government grant.	A traditional manufacturer that struggles to innovate due to restrictive funding policies.	Europe, USA
Technological Adoption	Funding supports MSMEs in adopting new technologies that improve efficiency or product quality.	Increases productivity and enhances product quality.	Not all MSMEs can adapt to rapidly changing technologies.	MSME readiness to innovate, technical support available.	A Canadian MSME adopting IoT for manufacturing efficiency with government aid.	A small food company failing to implement advanced machinery due to lack of training or expertise.	Canada, Asia
Employment Growth	Innovation funds enable	Positive economic	MSMEs may struggle to hire	Availability of skilled	A tech incubator in	An SME in the	Germany, India

	MSMEs to expand, creating new jobs in local communities.	impact by boosting employment.	the necessary skilled labor.	workers, job training programs.	Germany leading to the creation of new tech jobs.	agricultural sector in India unable to expand due to limited skilled labor.	
Sustainability Initiatives	Government funding can help MSMEs in adopting sustainable practices and products.	Encourages the development of eco-friendly products, contributing to environmental sustainability.	Limited funding for green initiatives or high competition for environmental grants.	Government's focus on green technologies, availability of eco-grants.	A green tech MSME in the US developing a sustainable product line through federal funding.	An agricultural MSME in Southeast Asia unable to secure funding for sustainable farming practices.	USA, Southeast Asia
Increased Competitiveness	Government funding supports MSMEs in improving efficiency, innovation, and business practices.	Increases the competitiveness of MSMEs in local and global markets.	Funds may only support short-term projects without long-term viability.	Long-term policy focus, MSME internal capability to innovate.	A Canadian manufacturing MSME boosting its product quality with R&D funding from the government.	A Latin American MSME unable to scale due to lack of continuous funding.	Canada, Latin America

Table 4 illustrates the dual impact of government funding on MSME innovation, highlighting the conditions that enhance or impede effectiveness.

Case Study 2: MSME Successfully Introducing a New Product Using Government Support

A successful example can be seen by how government financing has positively improved product innovation of HydroTech. HydroTech secured funding in the Horizon 2020 programs that allowed development of a prototype of a critical, energy-efficient water purifier for residential and business use. Accordingly, the present funding enabled the company to enhance efforts toward R&D, including retesting the performance of the prototypes under different site conditions.

After two years, HydroTech was ready to introduce the new product to the market, gaining recognition both locally and internationally. Support from the European Union helped cover the costs associated with such an expensive procedure in developing the product and carrying out the test cycles. The company subsequently reported a large increase in sales and entered several new international markets, illustrating how government funding can contribute directly to both product innovation and business growth (Fritsch & Görisch, 2014).

Challenges and Limitations of Government Funding

Undoubtedly, government funding holds a lot of benefits, and it is associated with several reasons on their own. They are not absent when regarding challenges, since most MSMEs face such barriers in fully accessing and, therefore, being able to absorb these resources fully. Some typical challenges include

1. Complexity of Application Processes: Government funding programs are usually very time-consuming, complex, and difficult processes to navigate through. MSMEs may therefore lack the human resources or relevant know-how to fulfill detailed applications, as well as meet the strident requirements posed by funding bodies. This in turn leads to valuable opportunities not being availed or delays in securing funds required for critical innovation projects.

2. Eligibility Issues: Many government funding programs target a particular sector, region, or business size, making certain MSMEs ineligible for support. This may create an entry barrier for innovative firms that, despite promising ideas or products, do not meet the exact eligibility criteria (Audretsch & Link, 2019)

3. Program Inefficiencies and Delays: Most government funding is characterized by delays in disbursements, lack of transparency, and engagement with applicants. MSMEs dependent on government funding take a hit by having to

suffer through cash-flow management while they wait for money to be processed, which increases the speed at which these companies can innovate.

4. Too much reliance on funding from outside: While government funding is a useful tool to further develop innovation, there exists a certain risk of MSMEs becoming too reliant on the same funds, limiting internal mechanisms that are sustainable in nature, for further growth initiatives. There is also the added problem should government funding programs be curtailed or altered due to changes in political priorities or economic circumstances (Mazzucato, 2013).

Table 5: Challenges in Accessing Government Funding

Challenge	Description
Complex Application Process	Lengthy, complicated, and bureaucratic application processes.
Eligibility Criteria	Restrictive criteria prevent some MSMEs from accessing funds.
Regional Disparities	Geographic regions experience uneven access to government funding.

MSMEs encounter various barriers in accessing government funding, as described in Table 5, emphasizing the need for simplified processes.

Case Study 3: MSME Struggling with the Application Process

GreenTech Solutions is a small startup in Brazil, and it has sought BNDES funding for the development of a new, solar-powered energy system. Having an innovative product did not avoid many problems throughout the application process for GreenTech.

It included, among other things, detailed financial projections, environmental impact assessments, and a comprehensive R&D strategy. Being a small firm with limited resources, GreenTech had a hard time completing the paperwork and fulfilling all the technical requirements. The company also suffered from delays in the actual receipt of funds, which disrupted the development of its product. This caused GreenTech to be late to market with their product, and the company had to seek other funding to continue their project (Tödtling & Trippl, 2005). This case illustrates the challenges faced by MSMEs in following a complicated application process and possible impacts of delayed government support received in due time.

Lessons Learnt:

From the above case studies, some key lessons can be drawn for both MSMEs seeking funding and the governments designing these programs:

1. Streamline Application Processes: This means streamlining the application procedure for funding programs to make it more accessible to MSMEs. The need for clear and transparent guidelines on access to finance programs, a simple application procedure, and support mechanisms specifically for small businesses will contribute to reducing the administrative burden faced by MSMEs and improve their likelihood of receiving approval for funding applications.

2. Tailor Programs to Diverse Needs: Where a certain number of government programs have their focus on specified sectors or scales, a more holistic approach to funding may well be needed. For instance, it is possible to design programs with the capacity for a broader base of MSMEs to become eligible, which includes businesses in new or developing sectors, without innovation being suppressed by inflexible and inappropriate eligibility criteria.

3. Improve Program Efficiency: Efficiency should be one of the driving variables in program design so that MSMEs can enjoy government funding. Delays in the release of funds or lack of communication will badly affect the ability of MSMEs to move forward with their projects of innovation. The governments should minimize bureaucratic delays and ensure timely processing of applications.

4. Encourage Diversity in Funding Sources: As much as government funding is important, MSMEs should be encouraged to diversify their sources of funding, such as through venture capital, private equity, or crowdfunding. A diversified funding strategy reduces risks from dependence on government support and ensures long-term sustainability (Teece, 2007).

5. Avail them with the opportunities of Mentoring and Networking. Other than access to finance, there are government programs that can offer MSMEs access to mentorship and networking opportunities. Business advisory services programs that link MSMEs to a network of mentors or make them work with other businesses or industry players will raise the chances of success in product innovation. (World Bank, 2020).

LITERATURE REVIEW

Various studies focused on the manifold mechanisms of funding by the government and its relative effectiveness in trying to stimulate innovation within MSME. For example, Beck and Demirgüç-Kunt's (2005) study of government-backed credit schemes used the conclusion reached that access to finance acts as a very important facilitator for the MSME while seeking to innovate. Their findings also revealed that subsidized loans or non-onerous terms from the government, or even grants for specific purposes, significantly enhance MSMEs in their R&D capability and product development. In a related work, Ayyagari, Demirgüç-Kunt, & Maksimovic (2011) also explored how tax incentives and subsidies affect the stimulation of innovation. These programs reduce financial barriers to investment in technological upgrading and product development for small firms.

2. Positive Outcomes of Government Funding: Indeed, the literature has reported that government funding indeed has positive effects on product innovation for MSMEs. For instance, Teece (2007) has pointed out that government intervention to finance R&D and technology development has been decisive in the rise of innovation, especially in emerging technologies. As Mazzucato said, government funding can be a "venture capital" provider for innovation projects that are too risky for private investors due to uncertainty and high failure rates. Teece also added that through government funding, MSMEs are able to build up their technological capabilities, enabling them to create new products and enhance their competitive advantage.

3. Challenges and Negative Consequences: Other works, on the other hand, stress the shortcomings of government funding programs. For example, Czarnitzki and Kraft (2004) assessed several government R&D funding programs and surmised that these programs occasionally produce innovative output yet the funding granted is usually just too hard to apply for and also too slow in disbursement. They further note that some administrative inefficiencies and the high cost of compliance reduce overall government support effectiveness. Zheng adds that overdependence on government funding may make MSMEs vulnerable in cases where funding programs are cut or changed due to changes in political power.

4. Policy and Institutional Support: Studies by Fritsch and Lukas (2001) and OECD (2019) indicated that MSMEs that enjoy such integrated government support, whether in innovation hubs, accelerators, or incubators, would be more successful in commercializing new products. Indeed, these types of innovation ecosystems can offer much more to MSMEs than just access to finance by providing networks, know-how, and opportunities for collaboration. In particular, the Horizon 2020 program of the European Union has been credited with facilitating a number of MSMEs' access to knowledge and partners, thereby strengthening their innovation capabilities (European Commission, 2021).

Theoretical Framework or Conceptual Model

A number of important theories of innovation are useful in highlighting how government funding impacts product innovation in MSMEs.

1. Schumpeterian Theory of Innovation: The theory of Joseph Schumpeter constitutes the basis from which one can explain the relationship between innovation and economic development. Actually, according to Schumpeter, innovation is the real engine of economic growth, while the entrepreneurs introduce the new products or processes in the market. This theory postulates that, in the context of MSMEs, government funding through grants or subsidies acts as a catalyst to innovation by helping firms overcome financial constraints. Government intervention allows MSMEs to take risks associated with developing new technologies or products without fearing financial insolvency. What Schumpeter's theory brings to the fore is a dynamic environment for firms to disrupt the existing markets, in which there is often an important role for government support (Klette, Møen, & Griliches, 2000).

2. Open Innovation Theory: Henry Chesbrough's open innovation theory, described in 2003, mentioned the idea that the possibility of external knowledge sources becoming more important has to be taken into account together with collaboration in creating an innovative process. Moreover, open innovation presumes the impossibility of organizations relying exclusively on their internal capabilities and resources, instead engaging in interactions with independent firms, educational institutions, and research institutions-also termed as customers. This can be further

facilitated by government funding that creates an ecosystem of innovation through the coming together of different value chain actors. For MSMEs, incubators, accelerators, or collaborative R&D grants from the government could provide the external resources and collaborations necessary to spur product innovation (Jin & Liu, 2024).

Table 6: Innovation Theories Relevant to MSMEs

Theory	Description	Application to MSMEs
Schumpeterian Innovation	Innovation drives economic growth through "creative destruction".	MSMEs innovate to disrupt markets and grow.
Absorptive Capacity	The ability of firms to recognize, assimilate, and apply new knowledge.	MSMEs must absorb external knowledge to innovate effectively.
Open Innovation	Innovation is driven by both internal and external ideas.	MSMEs benefit from collaborations with external entities like universities.

Relevant innovation theories, detailed in Table 6, frame the discussion on government support for MSME innovation.

Table 7: Conceptual Model of Government Funding Impact

Input	Process	Output
Government Grants	Research & Development (R&D)	Product Innovation
Loans & Subsidies	Idea Generation & Prototype Development	Market Expansion & Competitiveness
Tax Incentives	Collaboration with External Partners	Increased Product Offerings

The conceptual model in Table 7 demonstrates the pathways from funding inputs to innovation outcomes.

3. Absorptive Capacity Theory: The absorptive capacity defines the capability of a firm to recognize, absorb, and utilize new external knowledge. The absorptive capacity tends to be quite low in most MSMEs since they often cannot retain and apply the new technologies stemming from either resource or knowledge constraints. This funding can also be made available to enhance the recipient firm's absorptive capacity through training, research grants, or partnerships with academic institutions. Government support facilitates access to new knowledge, enabling MSMEs to incorporate innovation into their products and services and thereby enhancing their competitiveness in the marketplace (Chesbrough, 2003).

Models of Government Intervention:

There are several theoretical models that explain the role of government in fostering innovation and supporting MSMEs, ranging from market failure to government intervention.

1. Theory of Market Failure: The free market is said to fail in cases where the market allocation of resources is inefficient. This is usually brought about by asymmetry in information, negative and positive externalities, and monopoly power. For MSMEs and innovation, such failure may be in the form of too little private investment in R&D or innovation, given high risks and uncertain returns or because of a lack of access to capital. It may thus be fair to mention that government interventions in the form of grants, subsidies, or tax incentives can offset market failures in making MSMEs financially strong enough to afford such investments in product innovation. Indeed, such funds tend to lower innovation risks and encourage the venture into an area that holds immense social or economic value yet not immediately generating significant profits (Arundel & Geuna, 2004).

2. The Role of Government in Correcting Financing Gaps: This makes governments very instrumental in the financing gaps at the early stages of innovation that MSMEs face. These gaps usually come about because of the high risks that R&D investments may present, which private financial institutions would not be willing to finance without government guarantees. Government funding programs, therefore, help fill this gap by providing funding that is more accessible and comes with lower interest rates or favorable terms. For example, the U.S. Small Business Innovation Research (SBIR) program funds small businesses in order to stimulate technological innovation by supporting research and development of new products that fulfill specific national needs.

3. The Entrepreneurial Ecosystems Theory: The entrepreneurial ecosystem refers to a network of interconnected organizations that include government agencies, universities, research institutions, venture capitalists, and MSMEs. This interconnectivity allows the parties involved to interact with one another to drive innovation and entrepreneurship forward. Such an ecosystem may well be facilitated by government intervention as a way to increase innovation within MSMEs. Innovation hubs, accelerators, and incubators aim at providing a platform to enhance collaboration across the ecosystem through links in services that address MSMEs' needs in resources, knowledge, and networking for innovative activity (Audretsch, 2014).

Example Conceptual Model: This might be utilized to explain how government funding can facilitate innovation in MSMEs. The model here is representative of the pathways from input to process and finally output.

Table 8: Model highlights the key stages in the innovation process

Input	Process	Output
Government Grants/Subsidies	R&D, Product Development, Market Exploration	Product Innovation, Enhanced Market Position
Loans with Favorable Terms	Technological Upgrades, Scaling Operations	Increased Competitiveness, Economic Growth
Tax Incentives	Capacity Building, Strategic Planning	Long-term Sustainability, Profitability
Innovation Ecosystems	Collaboration, Knowledge Exchange	Collaboration Networks, Market Expansion

The Table 8 shows the main stages in the innovation process and the role that government funding allows MSMEs to be able to innovate successfully. Government support at each stage facilitates the development and commercialization of new products, which in turn contributes to growth and sustainability of MSMEs.

Gap Analysis

While the literature provides valuable insights into the relationship between government funding and MSME innovation, several gaps remain:

1. Underexplored Regions: Much of the existing literature focuses on high-income countries in Europe and North America. There is limited research on the impact of government funding programs in developing regions, where MSMEs often face more severe resource constraints and where funding structures may differ significantly. For instance, there is little research on how government funding in sub-Saharan Africa or South Asia influences MSME innovation. Exploring these regions could provide valuable insights into how funding programs can be tailored to local contexts and challenges.

2. Types of MSMEs: Most studies group MSMEs into a single category, yet these enterprises are highly heterogeneous. Different types of MSMEs, including micro-enterprises, small businesses, and medium-sized firms, face distinct challenges and require different types of support. There is a need for more research on how government funding impacts these different sub-categories of MSMEs and whether the effectiveness of funding varies across business sizes or sectors (Binks, Ennew, & Reed, 2006)

3. Alternative Models of Funding: While traditional forms of government funding include grants and loans, which have been studied to a great extent, less attention has been given to crowdfunding, public-private partnerships, and venture capital support. This is increasingly the case in digital transformation processes in which technology also plays an important role for MSME innovation. How government funding interacts with these other models is a fruitful area of research that would create a fuller picture of the modern innovation landscape facing MSMEs.

4. Long-Term Effects: There is still considerable under research in the long-term impact of government funding on MSME innovation. Most of these studies emphasize the short-term outcomes in the form of product launches or technological improvements, but their long-term sustainability rarely gets a mention. Future research could delve into the stability of innovation outputs paid for through government programs and whether MSMEs would be able to sustain innovation after the depletion of initial government funding (Teece, 2007).

COMPARISON ACROSS REGIONS OR COUNTRIES

A comparison across regions or countries will, therefore, allow for a critical addition of depth and breadth to such analysis on government funding and its impact on product innovation in MSMEs. Different regions of the world vary

in their economic development, institutional support, access to resources, and regulatory environments-all factors that eventually determine the success of any government funding program. Understanding these differences provides a wealth of knowledge on how specific regional characteristics or policy variations may impact MSME innovation outcomes.

Table 9: Comparison of Government Funding Programs by Region

Region	Effectiveness of Funding Programs	Key Programs
Europe	Highly structured, focuses on R&D and market access.	Horizon 2020, EU Innovation Fund
North America	Mixed effectiveness, strong emphasis on innovation support.	SBIR (USA), Canada Innovation Program
Asia	Government funding is expanding, with focus on tech.	China's SME Innovation Fund, Japan's Innovation Promotion Program

Regional comparisons of government funding, as shown in Table 9, reveal the varying effectiveness across Europe, North America, and Asia.

Regional Variations: Effectiveness of Government Funding by Geographic Regions Government funding programs can also differ very much regarding the effectiveness of their level in various parts of the world. This perhaps is not surprising, seeing wide differences in various economic conditions, institutional capacity, and government priorities. The effects of Government Funding on MSMEs to Innovate in this section are assessed across three continents of the world: Europe, North America, and Asia.

1. Europe has a relatively established framework to support the innovation of MSMEs through government grants and subsidies, R&D funding, and innovation ecosystems such as accelerators and incubators. The Horizon 2020 program of the European Union is one of the most prominent examples of regional support for innovation, with substantial funding for SMEs across its member states. The program zeroes in on high-tech sectors of green energy, ICT and biotechnology to enable MSMEs to scale up their innovations at the international level (Binks, Ennew, & Reed, 2006).

For instance, in Germany, government programs like ZIM- Central Innovation Program for SMEs-provide grants to SMEs for R&D projects, which fosters collaboration between small firms and research institutions. With Germany having a strong industrial base and with a considerable emphasis on technological innovation in manufacturing, such programs have been very successful. Similarly, Sweden and Finland have investments in technology-driven entrepreneurship through Venture Capital Programs and Innovation Grants; the rewards are witnessed with increasing innovative product growth.

However, there has been a certain challenge in Europe: not every EU member state is equally positioned in providing access and being effective; some regions experience considerably lower participation of government funding due to bureaucratic or capacity reasons that lie within their local SMEs.

2. In North America, government support for MSMEs is robust, especially in the United States and Canada, with Small Business Innovation Research grants and the Canadian Technology Innovation Fund offering critical support for R&D and the commercialization of innovations. Most of these initiatives would then have a high-growth sector orientation, such as clean technology, biotech, and advanced manufacturing. For example, the SBIR program in the U.S. has distributed over $50 billion since its creation and helped a significant number of MSMEs to commercialize their innovation (Klapper, Laeven, & Rajan, 2006)

However, there are peculiar challenges in the North American context, such as limited access to government funds by MSMEs in certain regions, especially for less economically developed areas of the U.S. and Canada. While the large firms already have well-developed government programs, smaller or rural businesses could be overwhelmed with complicated application procedures and disparities in regional support. Furthermore, while funding is majorly available, the MSMEs are usually outcompeted by bigger firms that have more resources to win government contracts and funding.

3. Asia: In Asia, the landscape for MSME innovation is varied from the high-tech sectors of countries like South Korea and Japan to the manufacturing-based economies of China and India. In South Korea, government programs such as K-TDP-which provide a scheme for financial subsidies, grants, and technological collaboration, among others-operate in an enabling environment targeting industries such as electronics and automobile manufacturing. It also

secures a source of funds toward MSME technology advancements in robotics, AI, and manufacturing automation, facilitated through Japan's Innovation Subsidy Program (O'Cass & Weerawardena, 2009).

In contrast, government funding in China is usually provided to large-scale industrial clusters, and SOEs are the ones that tend to benefit disproportionately from funding. Sometimes, SMEs in China face more stringent regulations and higher competition for government grants, despite the general support of the government for innovation.

Table 10: Impact of Policies on MSME Innovation by Country

Country	Government Policy Focus	Impact on Innovation
Germany	Strong focus on Industry 4.0 and sustainability.	Significant improvement in product development.
India	Tax incentives for tech startups and MSMEs.	Increased adoption of new technologies.
UK	Support for digital transformation and R&D.	Enhanced innovation in tech startups and SMEs.

Country-specific policies, their focus, and impacts on MSME innovation are summarized in Table 10, highlighting differences between Germany, India, and the UK.

The government of India has introduced a raft of initiatives; for example, the Startup India Scheme, which includes the provision of grants and tax concessions to incentivize innovation among MSMEs. Most of such programs face implementation challenges in various ways, with bureaucratic inefficiency and regional disparities in access to finance being particular issues for technology startups based in smaller cities. Despite such challenges, the schemes including Technology Development Board and National Manufacturing Innovation Programme have enabled more and more MSMEs to develop innovative products and enlarge the market reach.

Policy Differences: How Policies Shape MSME Innovation Performance

The formulation of policies creates a difference in the performance and outcomes of any government funding programs. Every country has different policies in its own unique ways to motivate innovations in MSMEs. Consequently, such conditions may create vast differences in government funding outcomes. Further, we will go into policy comparisons across three countries which exhibit different policy environments: the UK, India, and Germany.

1. There are different funds provided by the government of the UK for innovation within MSMEs, such as the Innovate UK program. Innovate UK provides grants for product development and R&D in business growth across many industries, including digital technology, healthcare, and clean energy. The UK government also provides R&D tax credits, which let MSMEs deduct a portion of their R&D expenditure.

One of the main elements of the UK's policy approach is represented by integration between government and private investors. In particular, with regard to financing for high-tech startups, even if this opened several financing possibilities to the UK, it still shows a problem concerning regional gaps in innovation due to the limited capability of MSMEs in economically less-developed regions to receive governmental support, often because of local infrastructural and expertise shortages (World Bank, 2020).

2. The Indian government has been keen on developing innovation through startups in particular, using initiatives related to Startup India and the Atal Innovation Mission. These provide funding, tax breaks, and incubator support. Its policies also go for youth entrepreneurship and technology-driven innovation. However, bureaucratic red tape, the lack of an entrepreneurial culture in some regions, and limited access to venture capital have hindered success. Moreover, innovation in traditional sectors, such as agriculture and manufacturing, is underfinanced, which overall diminishes the impact of government support.

3. In Germany, which is a country with a very long tradition of industrial innovation, policies stimulating MSMEs in innovative development are fully entrenched in the model of the German Mittelstand. National programs, such as the ZIM-Central Innovation Program for SMEs and the ERP Innovation Program, provided financial and technical support for SMEs across various industries. There is great underlining for cooperation between SMEs and research institutions. Germany's policies promote great success in long-term industrial transformation and technical expertise. Still, some small firms find it hard, like in the case of any other European nation, when an application process seems too complicated or is part of an international collaboration (U.S. Small Business Administration, 2021).

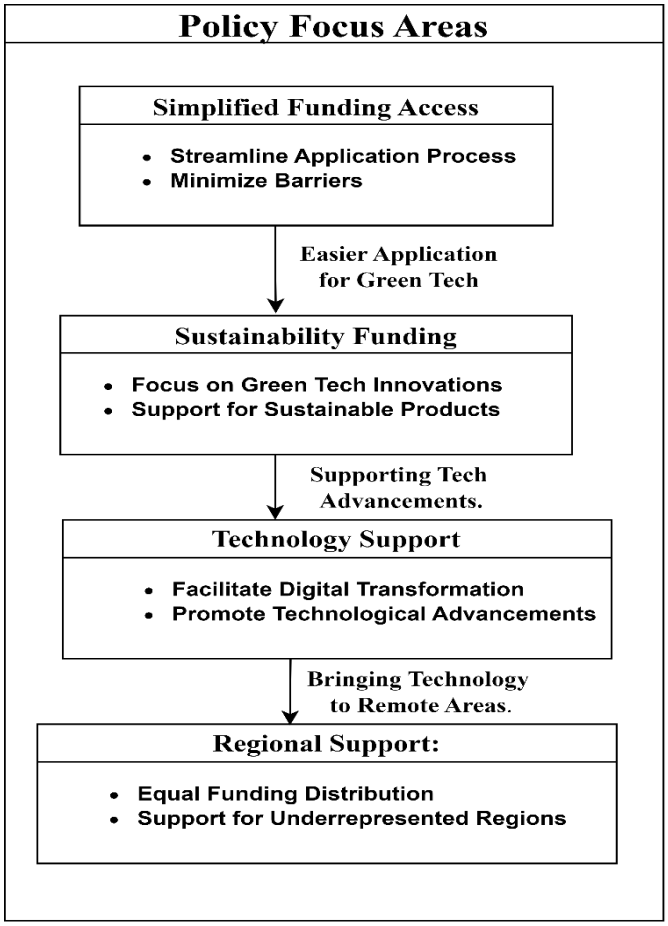

Fig 4: Cross-Sectoral Comparisons of Government Funding for MSMEs

Sectoral differences in the utilization and effectiveness of government funding are highlighted in Figure 4, comparing technology-focused MSMEs with traditional manufacturing firms.

Cross Sectoral Comparisons: Government Funding for Different MSME Types

Government funding alone could have different impacts on innovation depending on the sector in which the MSME is engaged. Comparing support across regions for different types of MSMEs, such as tech startups versus traditional manufacturing firms, may help identify particular challenges and successes of sectors.

1. Tech Startups vs. Traditional Manufacturing Firms: It is common for technology startups to benefit greatly from government funding associated with R&D, technology commercialization, and venture capital. In comparison with other regions of the world, North America and Europe may have more accessible government grants or incubators, therefore fostering rapid cycles of innovation and high growth. Most technology startups can have lower capital needs than traditional manufacturing companies, but this industry requires very sophisticated research, digital infrastructure, and specialized knowledge (Czarnitzki & Kraft, 2004).

Traditional manufacturing MSMEs, on the other hand, get to enjoy the benefits of process optimization, technology adoption, and efficiency in production promoted by the governments of Germany, for instance, and India. These firms tend to be more capital-intensive and often have harder access to the resources relevant for innovation, even though there are programs available for funding them as well (Arora, Ahmad, Kumar, & Singh, 2025).

2. Regional and Sectoral Differences: Whereas most government funding in Asia still goes toward scale-up of manufacturing and quality improvement, traditional industries are some of the largest recipients; in contrast, much more substantial R&D funding may be invested in the development of new software, digital products, or AI technologies by tech startups in Silicon Valley or South Korea.

POLICY RECOMMENDATIONS

The findings from this review have identified a number of ways in which existing government funding programs can be improved to better achieve desired outcomes for MSMEs. These improvements address the gaps and inefficiencies identified across regions and sectors.

The impediment most important to this barrier to the participation of MSMEs involves complicated application processes. Most MSMEs find working their way through the paperwork's and eligibility criteria to be daunting. This issue pertains especially to small enterprises that enjoy an extremely small number of resources for administration. Governments are able to simplify application procedures by cutting unnecessary bureaucratic red tape. For example, online platforms can be created to ease the application process and allow applicants to track the progress of their applications in real time. Besides, governments should clearly spell out the eligibility criteria and the required documentation so that MSMEs can better their preparation.

It is recommended that governments move towards complete digitization using electronic tools and e-governance platforms characterized by simplicity, handholding through the process, and ease of verification of eligibility criteria. This, in turn, would minimize the administrative burden for MSMEs, therefore leading to greater involvement in this direction by even smaller firms in emerging markets.

2. Increase Funding for Collaborative Innovation: Most MSMEs benefit more from collaborative innovation, where small businesses can be in partnership with larger firms, research institutions, or universities. However, most of the programs put a strong emphasis on grants for product development by an individual entity instead of nurturing collaborative ecosystems. Matching grants or funding for joint ventures that pair MSMEs with universities, research labs, or other companies will incentivize the collaborations. This would enable small firms to have access to more skills, resources, and finance (UK Government, 2021).

Recommendation: Governments are thus encouraged to implement or scale up programs specifically funding collaborative innovation, such as public-private partnerships, research consortia, or regional innovation networks. Such incentives will enable MSMEs to share risks and use advanced technology in the process of accelerating innovation.

3. Improved Regional and Sectoral Targeting: A majority of government funding programs are not targeted by region or sector, thus resulting in inequity in the distribution of innovation resources. Normally, MSMEs located in underdeveloped or rural areas face disadvantages in terms of proximity to innovation hubs, specialized expertise, and funding. In this regard, governments can devise programs that distribute funding on the basis of needs at the regional or sector level. For example, regional development funds can be utilized to increase innovation in poorer regions, whereas other funds would be specifically provided for particular sectors like agriculture, manufacturing, or renewable energy.

Recommendation: Government funding initiatives should be so designed to incorporate regional quotas or sectoral priorities in order not to leave MSMEs in disadvantaged areas or less-capitalized sectors behind. This may be in the form of targeted grants, tax incentives, or innovation hubs for specific regions or industries.

4. Non-Financial Support and Advisory Services: Besides financial support, many MSMEs have a need for nonfinancial support, including advisory services, mentoring, or access to networks. Business development services can be integrated into governments' existing funding programs to support MSMEs in issues related to innovation strategy, market access, and scaling-up. This would certainly be helpful for MSMEs with problems in converting innovation into commercial success ("National Incubation Centre (NIC)," 2021).

Recommendation: Government agencies are encouraged to further expand their services to include business advisory programs which will help the MSMEs in developing innovation roadmaps, feasibility studies, and linking them to potential investors, customers, or collaborators.

New Initiatives: Recommendations for New Funding Mechanisms

1. Innovation Vouchers and Micro-Grants: A majority of the MSMEs do not have the initial capital to undertake R&D or product development. Innovation vouchers can be a new form of support that would let the MSMEs access small grants with which they can collaborate with universities, research centers, or private R&D firms. Such vouchers can

be used to cover services such as prototype development, testing, or market research, thus providing low-cost entry points to innovation for MSMEs.

Recommendation: Innovation Vouchers are small, easily accessible grants that MSMEs can use to buy R&D services or collaborate with external innovation partners, scaling their innovation capacity without the associated high upfront costs.

2. Risk-Shared Funding Programs: Generally, MSMEs have limited access to funding for projects perceived as high-risk innovative projects in the biotechnology, clean energy, and advanced manufacturing fields. New risk-sharing mechanisms could be devised by governments where funding for high-risk innovation projects is provided with the government sharing partially in case the innovation fails. The incentive here would be that private investors will finance projects they would have otherwise shied away from because of perceived risk.

Recommendation: It would be worthy to consider the establishment of risk-shared funding programs, cofinancing high-risk projects with private investors, in which both the public and private sectors share potential rewards and risks of innovation. That could include partnerships with venture capital firms or angel investors.

3. Innovation Bonds: One such innovative policy could be the issuance of Innovation Bonds, where bonds are issued by either governments or development banks to raise funds specifically for innovation-focused projects in MSMEs. These would be targeted at long-term research and development programs in areas such as green technology or digital transformation.

Recommendation: Innovation Bonds could be issued and bought by institutional investors, with the proceeds utilized to finance MSME innovation projects. The bonds could be repaid through returns generated by the commercialization of the innovations funded.

4. Global Innovation Challenge Fund: It would be great to see governments design Global Innovation Challenge Funds targeted toward specific global challenges in areas like climate change, healthcare accessibility, or sustainable agriculture. MSMEs dealing with genuinely innovative solutions for such global problems may be submitted for funding, creating some form of international competition for the best innovative solutions.

Recommendation: Establishment of Global Innovation Challenge Funds by governments is highly desirable, which should incentivize innovation in solving global challenges, while encouraging MSMEs to develop scalable solutions that can have worldwide impact.

Implications for Policymakers

1. Inclusive Attention: Policy makers should ensure that government facilities reach all MSMEs and are not confined to only relatively technologically advanced or those located in urban centres. This may be attained by targeting less privileged areas, gender equity, and participation of minority groups-owned MSMEs. Ensuring diversified enterprise participation will fully realize the overall economic impact of government interventions.

The policy recommendation will be to pursue inclusive policies that will actively involve small businesses from less favoured regions, female entrepreneurs, and minorities through diversifying innovation funding.

2. There should be a long-term vision for innovation among MSMEs, according to which the government will allocate funding, and the strategy is in line with the broader goals of economic development. It should cover everything, from financing innovation ecosystems and capacity building to linking with international markets. For instance, in regions at an early stage of innovation environment development, enabling infrastructure such as technology parks, innovation hubs, and training programs can be created by the governments.

Recommendation: The actual policy maker is encouraged to offer a wide-reaching innovation strategy containing both the immediate financial supports, as well as long-term investing in infrastructure and education, access of MSMEs to the international markets.

3. Effectiveness: Evaluation and Monitoring-Finally, policymakers have to study the effectiveness of the programs of funding governments routinely and in precise ways in its impact upon the innovation within MSME. This impact assessment would track the commercialization resultant of these innovations among other areas; created jobs due to the said innovations, general economic growth of this innovation, brought by the MSMEs themselves.

Recommendation: Policymakers should establish a robust evaluation mechanism for assessing the long-term impact of government funding on innovation. This would help to continuously refine programs toward the needs of MSMEs and the maximization of economic benefits.

LIMITATIONS OF THE REVIEW

Scope of Included Studies:

1. Geographical Focus: The review will mainly draw on case studies and studies from developed countries and emerging economies, focusing on regions such as Europe, North America, and parts of Asia. While this may provide valuable insights into how government funding affects MSME innovation in these regions, it may not be fully representative of the nuances of government funding programs in low-income or least-developed countries. These are areas that might have particular problems with access to finance, infrastructure, or government capacity, which could make funding programs less effective.

Limitation: Most of the case studies included in this review originate from countries that have relatively well-established innovation ecosystems, which may not be applicable in countries with less developed infrastructures or institutional support.

2. Types of MSMEs and Industries: The review mainly draws on case studies from technology-focused MSMEs (e.g., software firms, biotech companies, and renewable energy businesses) as well as industries that traditionally benefit from government funding, such as manufacturing and agriculture. MSMEs in service sectors (e.g., hospitality, retail, or education) have been underrepresented. Additionally, micro-sized enterprises, which often face even greater barriers to accessing government funding, may have been less explored in the selected literature.

Limitation: The lack of industry and sector diversity in the reviewed case studies means that the findings may not fully reflect the experiences of MSMEs in more traditional or non-technology-driven industries.

3. Study Types Excluded: The focus of this review is primarily on empirical studies, more so those studies that include quantitative data or at least detailed case studies of government funding programs. Exclusions included theoretical papers, literature reviews, or policy analyses that may give broader perspectives on the role of government in innovating MSMEs. Non-peer-reviewed sources of data, such as government reports and industry white papers that might have practical perspectives, were not comprehensively included.

Limitation: The exclusion of grey literature and theoretical studies may have limited the range of perspectives considered in the review. Further, the focus on empirical studies means that the review may not fully address the theoretical underpinnings of government funding in innovation, which could be relevant for a more holistic understanding.

Research Gaps

1. Longitudinal Studies: There is also a lacuna in the existing literature in regard to the conduct of more longitudinal studies that would track, over a fairly longer period, the effect which government funding has on product innovation. Cross-sectional designs adopted in many studies that have tested the relationship between government funding and innovation in MSMEs are not suitable for determining the after-effects of long-term funding-for example, sustained results in innovation or change stages in the time development course of MSMEs.

Limitation: The review does not deeply analyze the long-term impact of government funding on MSME innovation, since there is a lack of longitudinal data that would allow drawing conclusions about the sustained impact of financial support on innovation outcomes.

2. Regional and Sectoral Variability: The literature reviewed lacks sufficient exploration of the regional variability in the success of government funding programs. Although some cross-country comparisons were made, there is limited data on how specific local conditions (such as regulatory environments, access to resources, or the availability of skilled labor) influence the success or failure of these programs. Similarly, there is a dearth of research on sector-specific challenges and opportunities in accessing government support.

Limitation: The absence of detailed regional or sectoral analyses limits the applicability of the findings to countries or sectors that have distinct economic, political, or institutional contexts.

3. Impact on MSME Types: This review also highlights the gap in literature regarding the impact of government funding on different types of MSMEs (e.g., micro-enterprises versus small enterprises). Micro-enterprises, which make up the majority of MSMEs in many developing economies, often face unique challenges in accessing government funding. These challenges, such as limited administrative capacity or lack of formal business structures, are not sufficiently explored in the existing studies.

Limitation: The limited focus on different types of MSMEs, especially micro-enterprises, means that the findings of this review may not be fully representative of the diversity within the MSME sector. Further research is needed to examine how government funding programs can be tailored to meet the specific needs of micro-enterprises versus small and medium-sized businesses.

4. Evaluation of Program Effectiveness: Another gap in the literature is the evaluation of the effectiveness of government funding programs, specifically in terms of measurable outcomes like increased product sales, market expansion, or job creation. While there are some studies on the perceived benefits of government funding, there is a lack of rigorous evaluations that quantitatively measure the success of innovation programs.

Limitation: The review identifies a gap in studies that quantitatively assess the outcomes of government funding programs, such as changes in MSME revenue, productivity, or long-term innovation trajectories.

5. Impact of COVID-19 and Other External Shocks: The ongoing COVID-19 pandemic has significantly altered the landscape for MSMEs, particularly regarding government support programs. However, much of the research included in this review predates the pandemic or focuses on pre-existing funding programs without fully accounting for the disruptions caused by global crises. This leaves a gap in understanding how government funding programs are adapting to current challenges or the specific needs that arose in the wake of such crises.

Limitation: The review does not comprehensively explore how global events like the COVID-19 pandemic or other economic disruptions (e.g., climate change or economic recessions) have influenced government funding programs for MSMEs, nor does it explore the adaptive measures taken by governments to support innovation in the face of such shocks.

FUTURE RESEARCH DIRECTIONS

Underexplored Areas:

1. Emerging and Low-Income Economies: One key area where further research is needed is the impact of government funding on MSME innovation in emerging and low-income economies. Much of the existing literature focuses on developed countries, where innovation ecosystems and government support structures are often more robust. However, MSMEs in sub-Saharan Africa, South Asia, and other low-income regions face distinct barriers to innovation, such as poor infrastructure, limited access to finance, and lack of institutional support. Fewer financial resources are normally available to support innovative programs within the government circles of such economies; the nature of their funding arrangements could also be quite unlike that which obtains in the wealthier parts of the world. Further research will be required regarding how government funding could better be designed and adapted to the unique needs of MSMEs in such areas, and also in mapping successful models for the provision of innovation support.

It is recommended that research on challenges in the access to government funding by the MSMEs in these regions be done, the effectiveness of the currently existing funding model, and any necessary adaptation of these programs so as to bring in effectiveness.

2. Microenterprises: Whereas the review has placed much emphasis on the role of government funding to MSMEs as a whole, the majority of MSMEs throughout the world are micro-enterprises-in other words, businesses with less than 10 employees. Research into the impact of government funding on the very smallest businesses is relatively at a premium. Microenterprises often lack sufficient administrative capacity to access these programs and may have more limited access to funds compared to their small or medium-sized firm counterparts (Department of Energy, 2020).

Suggestion: Future research could be done regarding how government funding programs are adapted to respond to the specific needs and challenges of micro-enterprises, through barriers to access, administrative loads, and restrictions on eligibility.

3. Cross-Border Innovation Programs: The cross-border approach is a growing and significant trend in the global landscape for innovation. Government support has begun to emerge through international partnerships in creating innovation and growth across borders. Little is known about the impact on international government funding programs or, for example, pan-EU initiatives, ASEAN, and the World Bank.

Recommendation: It is recommended that studies be conducted to identify how government funding mechanisms support international cooperation for the innovation of MSMEs. This will involve understanding how MSMEs access funding for collaborative projects with foreign businesses or research institutions and how different countries' policies interact to influence innovation outcomes.

Long-Term Impact Studies

1. Innovation Outcomes and Longitudinal Studies: Among the major gaps in the literature reviewed is that on longitudinal studies, which can actually assess the long-term impact of government funding on innovation and growth of MSMEs. While many studies have focused on short-run outcomes, such as the introduction of new products or access to new markets, less is known about the longer-term sustainability of such innovations and their contribution to MSME growth. Long-term studies are required to comprehend whether government funding programs lead to sustained innovation, improved productivity, or market leadership for MSMEs in the long term. The results of such a study could be extremely useful in terms of actual returns on investment by both the government and the MSMEs.

This leads to a call for future research to consider a longitudinal approach toward MSMEs that received government funding for long periods. Future research in this study could also test how funding will have influenced the ability of these enterprises to cope with business cyclicality, manage the lifecycle of products, and change market positioning for several years from the date of initial funding.

2. Sustainability of Funding: More than the type of immediate and short-term benefits of innovation are realized, in fact, work should be invested in whether government-funded innovations are continued over the longer term. Considering MSMEs having received government assistance, do they continue without further external stimulus? Or rather, do the MSME firms become dependent for ongoing R&D on that public funding given to them previously?

Recommendation: Long-term assessments of sustainability regarding funding are needed to show if the MSMEs can continue innovation on their own without external aid and how government funds affect the self-sufficiency and market competitiveness of the firms supported.

Sector-Specific Research

1. Technology Start-ups and Digital Innovation: Government funding plays a critical role in supporting technology-based innovation. In industries such as software development, AI, and blockchain technology, for example, government support can facilitate R&D and early product development. However, research focusing specifically on the technology sector and its interaction with government funding programs is still at its inception.

Recommendations are for further studies investigating how government funding can be done more effectively to support tech startups in general but especially in nascent technologies: AI, blockchain, IoT, to name a few. The work could be specific evidence-based programs on the promotion of digital innovations, assessment of their effectiveness, and identification of best practices.

2. Green and Sustainable Innovation: Green innovation, of late, has become the focus area for economies under tremendous pressure to meet environmental obligations. Governments all over the world have begun to fund sustainable product development, renewable energy, and circular economy initiatives within MSMEs. But how government funding affects green innovation in MSMEs and what kind of outcomes this funding produces is not well researched.

Recommendation: Future studies should focus on the impact of government funding on green innovation in MSMEs, focusing on industries like renewable energy, sustainable agriculture, green manufacturing, and eco-friendly products. These could evaluate how MSMEs in those sectors apply government support through innovation to respond to climate change and environmental degradation.

3. Manufacturing and Industry-specific Innovation: Manufacturing is one of the core areas where MSME activity can be witnessed, more so in emerging economies. Many governments support manufacturing innovation with grants

available for process improvement, automation, and product diversification. Nevertheless, much fewer studies have assessed the impact of government funding on manufacturing MSMEs compared to the technology or green innovation sectors.

This can be further explored in the case of the MSMEs operating in the manufacturing sectors, such as automotive, electronics, and food production, with respect to utilizing government funding in improving efficiency, cost reduction, and product design innovation. The utilisation of government funding regarding strengthening of industrial clusters and sectoral innovation ecosystems can also be explored.

CONCLUSION

This review underlines the crucial role that government funding plays in fostering product innovation in MSMEs. MSMEs, crucial for the growth of most economies and source of employment for the people, face a plethora of challenges that hinder them from leading innovation because of limited access to finance, expertise, and markets. In this respect, government funding schemes, like grants, loans, and subsidies, have turned out to be vital instruments to surmount these barriers by enabling MSMEs to invest in research and development, develop new products, and expand into new markets. The key findings of this review reveal that despite the fact that government funding has brought significant innovation outcomes, MSMEs still face serious barriers to access these resources.

Complex application processes, eligibility restrictions, and regional imbalances are indeed challenges that face such programs regularly. There is an evident demand for more targeting through funding schemes to meet the various needs of many different types of MSMEs, particularly microenterprises and startups, with better access to government support programs. Case studies featured in this paper demonstrate how sometimes government funding catalyses innovation, and at other times, MSMEs find the system difficult to navigate. What is important is that, now, simplification of application procedures and the use of outcome-based funding models are highly relevant, with increased collaboration among MSMEs/larger enterprises, with government support. Policies should thus be designed in a way to enable green innovation and digital transformation, since this is increasingly an essential area for their future growth.

Ensuring that funding programs of the government make any difference requires a shift in policy to increase accessibility, transparency, and efficiency in funding. Other studies are also necessary to establish how government funding affects innovation by MSMEs in the long run, especially towards green technologies and digital innovation. Further, future studies must also dwell on the regional differences in impacts of such programs.

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