Sri Lanka Journal of Marketing
University of Kelaniya - Sri Lanka

SLJM Vol 12 Issue 1: January-June 2026
ISSN 2719 – 2598 (Online)

RESEARCH ARTICLE

Exploring Disruptive Innovation Pathways for Commercializing Agricultural Research in Sri Lanka: A Review

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HOW TO CITE (APA 7TH)
Dahanayaka, L. A. K. C. (2026). Exploring disruptive innovation pathways for commercializing agricultural research in Sri Lanka: A review. *Sri Lanka Journal of Marketing, 12*(1), 180–201. https://doi.org/10.4038/sljmuok.v12i1.217

DOI: https://doi.org/10.4038/sljmuok.v12i1.217

Abstract

The commercialization of publicly funded agricultural research remains a persistent challenge in many developing economies, limiting the socio-economic returns of investments in research and development. This review examines the commercialization of agricultural research in Sri Lanka through the lens of disruptive innovation and knowledge capitalization, with particular attention to public research institutions. Drawing on indexed scholarly literature and secondary data from National Science and Technology Commission reports covering 2014–2022, the study reviews the performance of agricultural research institutions and identifies key institutional, systemic, and market-related barriers that constrain the transformation of scientific outputs into commercially viable innovations. The evidence indicates that although agricultural public research institutions account for a substantial share of research activity and public R&D investment, their outputs remain heavily concentrated on scholarly publications, while patents, technology transfers, product innovations, and commercialization outcomes remain comparatively limited. This reflects a pronounced "Valley of Death" between knowledge creation and market application. The review argues that disruptive innovation provides a relevant strategic pathway for addressing this gap by emphasizing affordability, accessibility, demand responsiveness, new market creation, and stronger engagement with underserved users. Successful commercialization therefore

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requires a shift from conventional linear technology-transfer models toward more collaborative, market-oriented, and user-driven innovation processes involving public research institutions, agribusinesses, farmers, entrepreneurs, and policymakers. The study contributes to the literature by positioning disruptive innovation as a framework for strengthening knowledge capitalization within Sri Lanka's agricultural innovation system and highlights directions for future empirical research.

Keywords: *Agricultural Research Commercialization, Disruptive Innovation, Knowledge Capitalization, Public Research Institutions, Valley of Death, Sri Lanka*

1. Introduction

Despite substantial public investment in research and development, many developing economies continue to struggle to translate scientific knowledge into tangible socio-economic value. One of the primary mechanisms intended to address this gap is technology transfer, which generally refers to the transmission of science-based inventions, most commonly through the licensing of patented technologies to firms (Chen et al., 2022; Kirchberger & Pohl, 2016). However, this formal conception on technology transfer provides only a partial understanding of the innovation and commercialization process (Bozeman, 2000; Bozeman & Crow, 1991; Hayter et al., 2020).

In advanced economies, universities and Public Research Institutions (PRIs) have long served as pivotal actors in knowledge transformation, driving technological progress and industrial competitiveness (Geiger & Sá, 2008; Kleinman & Vallas, 2001; Rasmussen et al., 2006; Rudenko et al., 2023). In contrast, many developing nations, including Sri Lanka, continue to underutilize their scientific capacities, resulting in weak translation of research into innovation-led development (Amaradasa & De Silva, 2001; Gosain, 2018; Mohamed et al., 2022; Niosi, 2010; Sharif & Baark, 2011). This constrains the socio-economic returns on public investment in research and highlights the need for more effective knowledge transformation and commercialization mechanisms.

Sri Lanka's economy is driven by agriculture, services, and industry, with agriculture remaining a key sector due to its strong linkages with the broader economy. Although approximately 26% of the national labor force is employed in agriculture-related activities, the sector's contribution to Gross Domestic Product (GDP) has declined significantly. Agriculture, forestry, and fisheries account for only 7.5% of GDP, reflecting a structural shift toward services and industry. This imbalance highlights the need for targeted research, development, and innovation to revitalize or transform the agricultural sector.

While scientific research is fundamental to generating novel knowledge, technologies, and innovative outputs, their societal and economic value is realized only when they are successfully introduced and adopted in the marketplace. Scientific advancement alone is therefore insufficient; effective diffusion and commercialization depend on strategic marketing capabilities that convert technical potential into user value, stimulate demand, and establish competitive positioning. In this context, disruptive innovation emerges from the close integration of scientific research and marketing, where science creates new technological possibilities and marketing aligns them with user needs to facilitate adoption. This synergy is essential for successful commercialization and for achieving sustained economic and societal impact, thereby providing a critical foundation for the analysis that follows.

In this context, agricultural public research institutions play a critical role, warranting focused scholarly and policy attention.

1.1. Background and Rationale for the Study

A meta-analysis of National Science and Technology Commission data covering the period 2014–2022 indicates that agricultural PRIs dominate Sri Lanka's research landscape in terms of institutional presence and the number of implemented projects, reflecting a strong policy commitment to agricultural research. However, despite the consistent production of a substantial volume of research outputs, the translation of these outputs into patents, licenses, and commercially viable innovations remains markedly limited. Scholarly publications

continue to dominate the output profile, while innovation-oriented and commercialization activities exhibit a declining trend over time.

This imbalance reflects an institutional orientation toward academic dissemination rather than market or societal application. The resulting gap between invention and innovation exemplifies the persistent "Valley of Death", where promising research fails to progress into viable economic or social outcomes (Auerswald & Branscomb, 2003; Dean et al., 2022; Jucevicius et al., 2016; Metcalfe et al., 2025; Pujotomo et al., 2023). This phenomenon underscores the urgent need to examine how knowledge generated within PRIs is mobilized, transformed, and capitalized.

In response to this long-standing challenge, recent national policy initiatives signal a strategic shift toward research commercialization in Sri Lanka. The 2026 national budget in Sri Lanka places significant emphasis on fostering research and development (R&D) activities with commercial potential allocating a total of Rs. 21 billion for R&D with Rs. 1.2 billion specifically earmarked for a national program to bring research to commercialization. Furthermore, an allocation of Rs. 1 billion from the 2025 national budget has been utilized for implementation of National Initiative for Research and Development Commercialization a gap funding to support the commercialization of near-complete research and development projects. Together, these initiatives demonstrate strong governmental commitment to promoting research commercialization and advancing an innovation-driven economy. Nevertheless, the persistence of weak commercialization outcomes despite enhanced policy and financial support raises critical questions regarding the effectiveness of existing innovation pathways within PRIs.

1.2. Objectives and Scope of the Review

Against this backdrop, this paper positions knowledge capitalization as a central analytical lens for understanding the disconnect between research production and socio-economic impact. Knowledge capitalization refers to the process through which knowledge is transformed into economically and socially valuable outcomes (Baycan & Stough, 2013; Etzkowitz & Viale, 2010; Rudenko et al., 2023). This process involves converting scientific

outputs such as research findings, prototypes, and technical know-how into intellectual property, marketable products, and industrial or societal solutions. As Rudenko et al. (2023) argue, effective knowledge capitalization maximizes the value of intellectual assets and amplifies the socio-economic impact of scientific institutions.

Despite its relevance, existing literature reveals limited application of knowledge-based theoretical frameworks to explain commercialization failures within public research institutions, particularly in developing-country contexts. These gaps underscore the need to investigate the institutional, organizational, and process-related mechanisms that hinder the transformation of publicly funded research into marketable innovations. Accordingly, this paper seeks to address the following overarching research question: Why do research ideas generated within public research institutions fail to translate into economically valuable innovations?

In response, the primary objective of this review is to explore innovation pathways toward knowledge capitalization within public agricultural research institutions in Sri Lanka.

1.3. Review Methodology

An extensive review of indexed scholarly literature was undertaken to construct coherent, theory-driven arguments and establish a strong conceptual foundation for the study. This review involved the systematic synthesis and integration of prior research findings, conceptual frameworks, and theoretical explanations to identify patterns, gaps, and emerging themes relevant to the research focus. The study adopted a deductive approach, with arguments and explanations grounded primarily in empirical evidence and insights from the existing literature. Accordingly, the literature review served as the principal research tool, enabling the development of informed, evidence-based reasoning. Building on this synthesis, the study examined and compared the identified mechanisms within the specific context of Sri Lanka, highlighting contextual distinctions and practical implications.

2. Literature Review

2.1. National Innovation Systems and the Role of Public Research Institutions

The concept of National Innovation Systems (NIS) provides a powerful framework for understanding how a country's institutional architecture supports the generation, diffusion, and application of innovation. Initially conceptualized by Freeman (1987) and further developed by Nelson (1993), the NIS framework emphasizes the interplay between government, academia, industry, and civil society in shaping national technological progress. Within this paradigm, innovation is not viewed as the isolated outcome of individual organizations but as a system-wide process shaped by institutional linkages, policy environments and collaborative dynamics. The framework recognizes that the ultimate productive outcomes of the research system are innovations that emerge through complex interactions among diverse actors and are mediated by both formal and informal channels (Godin, 2007). Accordingly, the effectiveness of a NIS is best assessed by examining how efficiently knowledge is produced, diffused, and utilized. Scholars therefore argue that conventional indicators emphasizing R&D inputs and innovation outputs provide an incomplete picture, and instead advocate for greater attention to the actual use and economic exploitation of knowledge (Godin, 2007). From this perspective, the functionality and maturity of the innovation system, together with the degree of integration among its actors, are critical determinants of national innovation performance.

PRIs play a central role in this ecosystem, particularly in developing countries. As major contributors to basic and applied research, PRIs are mandated to generate scientific knowledge and drive innovation in sectors vital for economic growth, such as agriculture, health, and environment. Their core activities — creating, discovering, utilizing, and diffusing knowledge — are fundamental to enhancing national productivity and transitioning toward knowledge-based economies (Ramin et al., 2013). Furthermore, PRIs are viewed not only as research performers but also as enablers of technological diffusion and knowledge exchange within the NIS (Etzkowitz & Klofsten, 2005; Mazzoleni, 2008).

In Sri Lanka, PRIs serve as the main public-sector entities conducting research and innovation to support the country's development agenda. These institutions receive funding primarily

from government sources such as the National Research Council (NRC) and the National Science Foundation (NSF), as well as from foreign donors (Girihagama et al., 2012). Their research efforts are concentrated in national universities, semi-government organizations, and ministerial R&D units. Currently, Sri Lanka hosts 17 universities and 43 national-level research institutions, all of which are expected to function as knowledge producers and brokers. In fulfilling this role, they are essential to strengthening evidence-based policymaking, fostering technological advancement, and supporting industrial development as the country positions itself as an emerging knowledge-driven economy.

Nonetheless, Sri Lanka's NIS faces several structural and systemic challenges. PRIs often operate in fragmented and isolated environments with limited inter-institutional collaboration (Martínez-Vela et al., 2016). Intarakumnerd (2018) points out that the relationship between PRIs and other sectors, particularly industry, should be horizontal, long-term, and built on mutual capability development. He further argues that governments should refrain from micro-managing PRIs and instead focus on creating enabling environments that foster innovation, including the emergence of new industries and disruptive technologies. As Hales (2001) and Loikkanen et al. (2011) note, public sector research organizations are often undervalued in national innovation strategies and receive insufficient institutional support for knowledge capitalization.

2.2. Disruptive Innovation: Theoretical Foundations

Disruptive innovation has emerged as a significant theoretical lens within innovation studies, evolving alongside the earlier distinctions between breakthrough and incremental innovation (Kikkawa, 2023). The concept was originally introduced by Christensen (1997) in *The Innovator's Dilemma*, where it was initially discussed in terms of "disruptive technologies." Over time, this idea developed into a broader framework widely applied across innovation, entrepreneurship, strategic management, and technology policy research.

As the practical relevance of disruptive innovation has evolved, a common misconception has persisted namely, that disruption is driven solely by technological advancement. While technology often acts as a critical enabler, disruptive innovations can also emerge from novel

business models, value propositions, or transformed customer experiences (Christensen et al., 2018). Accordingly, disruptive innovation has been extensively conceptualized as the development of simpler, more affordable, and user-friendly alternatives to existing products or services that enable firms to access previously underserved or unexplored markets (Agarwal et al., 2017).

Subsequent work by Christensen identified emerging markets as particularly conducive environments for such innovations (Christensen et al., 2018). A central distinction within this framework is between sustaining innovations, which enhance existing technologies for established markets, and disruptive innovations, which initially offer inferior but more accessible solutions to niche or low-end market segments and gradually evolve to challenge and reshape mainstream markets (Christensen et al., 2015). Building on this foundation, later scholarship emphasizes that disruptive innovation fundamentally alters conventional market structures by transforming business models, consumer expectations, and mechanisms of value delivery (Suseno, 2018). Collectively, these perspectives highlight that disruptive innovation is not merely a technological phenomenon but a transformative process.

The intellectual roots of this theory can be traced to Schumpeter's (1942) notion of creative destruction, which framed innovation as a driving force of economic transformation through the continuous displacement of older technologies. However, whereas Schumpeter addressed innovation at the macroeconomic level, Christensen's framework focuses more closely on firm-level strategic decision making, particularly the tendency of dominant organizations to overlook emerging low-end innovations. Abernathy and Utterback (1978) further support this perspective by demonstrating that long-term innovation success is often determined not by initial technological superiority but by adaptability and the eventual establishment of a dominant design. Taken together, these perspectives position disruptive innovation as a critical lens for understanding how new technologies and organizational practices can reshape industries and challenge existing institutional hierarchies.

Disruptive innovation is not a novel phenomenon; it has shaped industries for centuries and has repeatedly demonstrated its profound and far-reaching impact on business models and market structures (Christensen et al., 2018). Central to the emergence of disruptive innovation

is the dynamic management of knowledge within firms. In particular, the continuous replenishment of the knowledge base plays a critical role, as organizational ambidexterity enables the integration of entirely new knowledge through exploratory activities with existing technological competencies through exploitation (March, 1991). This deliberate intertwining of old and new knowledge is fundamental to the development of disruptive products, which often originate in simple, low-end, or niche applications before progressively moving upmarket.

Within this context, recent studies emphasize that firms in emerging economies can foster disruptive innovation by continuously renewing and recombining their knowledge resources. Drawing on the knowledge-based view, Oliveira (2025) demonstrates that ambidextrous capabilities drive disruptive innovation through the mediating role of organizational learning, while institutional support conditions the strength of this relationship. Together, these insights underscore that disruptive innovation is inherently a knowledge-driven process, shaped by firms' abilities to generate, integrate, and apply knowledge within supportive innovation systems.

2.3. Disruptive Innovation and the Commercialization of Agricultural Research

Disruptive innovation has been widely examined across diverse industries (Si et al., 2020); however, its implications for the agribusiness sector remain relatively underexplored. This gap is notable given the scale, complexity, and societal importance of agribusiness. A careful analysis of disruptive innovation is therefore essential for understanding how transformative innovations may reshape agribusiness systems and influence the commercialization of agricultural research (Rahat Khan, 2023).

As contemporary agriculture has evolved, it has come to rely on a declining proportion of individuals directly engaged in farming, alongside an expanding network of supporting industries and services. Agribusiness now encompasses the entire agri-food value chain, including primary production, seed development and distribution, agrochemical inputs (such as fertilizers, pesticides, and herbicides), agricultural machinery, food processing, and downstream marketing activities (Şimşek, 2025). This integrated structure highlights the

increasing interdependence between technological innovation, institutional arrangements, and market mechanisms in modern agricultural systems.

Given its breadth, the agribusiness industry directly or indirectly affects nearly every individual worldwide. Historically, disruptive innovations — most notably the industrialization and mechanization of farming — have fundamentally transformed agribusiness, contributing not only to dramatic productivity gains but also to broader socio-economic changes (Aletdinova, 2016), including the emergence of the modern middle class. Similarly, future disruptive innovations are likely to generate profound impacts, extending beyond agriculture itself to influence global economic structures, food security, and livelihoods. Because food is a universal necessity and agribusiness constitutes the primary system through which it is produced and distributed, any disruptive change within this sector carries far-reaching global consequences.

Disruptive innovation provides a useful lens for explaining how agricultural products and services evolve, particularly in contexts where affordability, accessibility, and simplicity are central to adoption. As noted by Agarwal et al. (2017), disruptive innovations are typically characterized by simple, low-cost, small-scale, and easy-to-use products or services designed to meet the needs of unserved or underserved markets, while also creating opportunities to generate new revenue streams by opening entirely new market segments. This perspective emphasizes three core components: (1) disruptive innovation has the potential to transform or reshape existing markets, (2) it often relies on cost-efficient models that reduce market entry barriers, and (3) it leverages technology to deliver improved products or services that differ fundamentally from conventional offerings (Si & Chen, 2020). In this way, disruptive innovation serves as a strategic approach for transforming agricultural practices, extending market reach, and addressing unmet needs across agrarian economies.

Christensen's framework further explains that disruptive innovations introduce naval value propositions for consumers who were previously unable to access existing goods or services due to high cost, operational complexity, or limited availability. As these simpler and more affordable offerings enter the market, they gradually attract new consumer groups whose preferences and expectations differ from those traditionally targeted by established firms.

Over time, such innovations can alter market dynamics, redefine performance benchmarks, and challenge established actors within the agribusiness ecosystem.

In summary, the literature suggests that disruptive innovation offers a powerful conceptual framework for understanding how agricultural research outputs can be translated into commercially viable, market-oriented solutions. By emphasizing affordability, accessibility, and new value creation, disruptive innovation provides critical insights into overcoming structural barriers to commercialization, particularly within complex agribusiness systems and underserved markets. This perspective is therefore highly relevant for examining alternative commercialization pathways in agricultural research, especially in developing-country contexts such as Sri Lanka.

2.4. Agricultural research commercialization in sri lanka: an institutional perspective

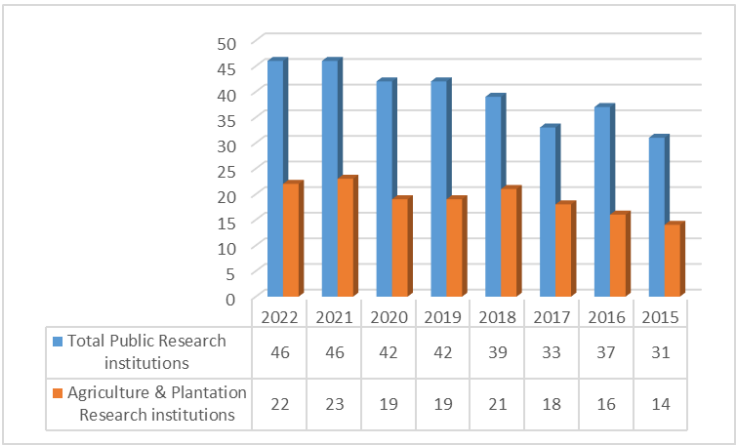
2.4.1. The "Valley of Death" in Agricultural Research Commercialization

The "Valley of Death" (VoD) is a widely used metaphor to describe the persistent gap between academic research and practical application (Dean et al., 2022). This gap reflects a broader structural challenge in which promising research fails to reach viable market applications (Auerswald & Branscomb, 2003; Dean et al., 2022; Jucevicius et al., 2016; Metcalfe et al., 2025; Pujotomo et al., 2023).

A meta-analysis was conducted by the researcher using available data from the National Science & Technology Commission (NASTEC) regarding the innovation performance of public research institutions in Sri Lanka. The data for this analysis was sourced from the Science & Technology Status Reports spanning from 2014 to 2022.

Figure 1

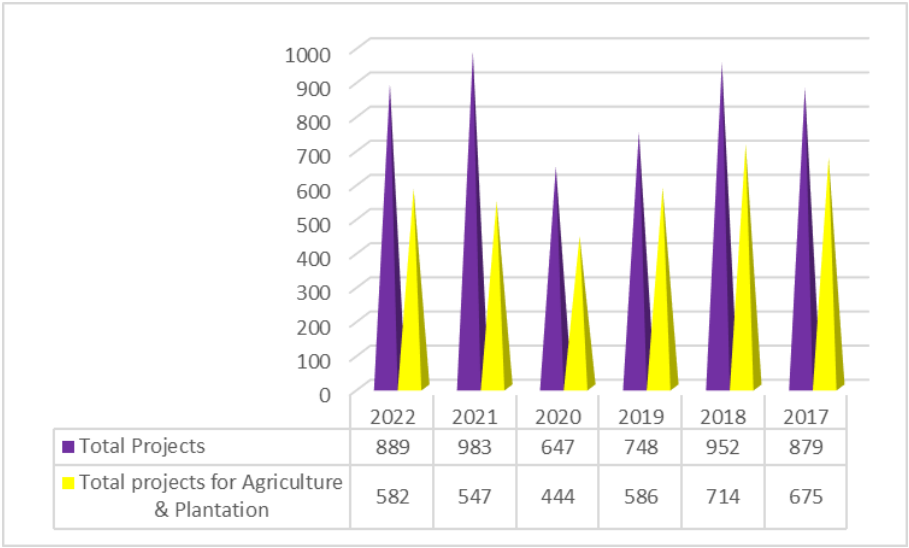
Total vs. Agriculture & Plantation Research Institute



Note. Data from NASTEC Status Reports (2014–2017).

Figure 2

Total Projects vs. Total Projects for Agriculture & Plantation Research Institute



Note. Data from NASTEC Status Reports (2014–2017).

Figures 1 and 2 demonstrate that the Agriculture & Plantation sector has a higher number of research institutes and a greater number of implemented projects compared to other sectors,

indicating a significant focus on research and development within this domain. Sri Lanka, as a developing country, has an economy primarily driven by agriculture, services, and industry. Agriculture, a versatile sector, is closely interconnected with both the services and industrial sectors. The Data Bulletin of the Department of Economic Research, published by the Central Bank of Sri Lanka (2025), reports that 26% of the national labor force is engaged in agriculture-related occupations. Despite this substantial employment share, the sector's contribution to GDP has been steadily declining over time. According to the Report on Socio-Economic Statistics of Sri Lanka (Central Bank of Sri Lanka, 2024), also issued by the Central Bank of Sri Lanka, the combined contribution of agriculture, forestry, and fisheries to Sri Lanka's GDP accounted for only 7.5%, underscoring the sector's gradual contraction within the national economy. This trend reflects a shift in the economy, where services and industry are increasingly taking precedence, and underscores the need for policies that can revitalize the agricultural sector or facilitate its transformation within the broader economic landscape.

Table 1

Inventions, Innovation and Commercialization Within the Agriculture Research Institutions Between 2014-2022

Year	Total Publications	Inventions			Innovation	Commercialization	
		Product	Process	Technology Transferred	No of Patents	Product	Process
2022	524	38	14	29	0	1	6
2021	515	36	88	38	4	12	21
2020	359	28	13	16	2	7	0
2019	390	19	8	14	3	15	0
2018	689	21	12	41	3	30	3
2017	395	21	24	33	0	31	9
2016	303	NA	NA	15	0	18	16
2015	277	22	51	NA	2	14	NA
2014	713	24	16	NA	7	NA	NA

Note. Data from NASTEC Status Reports (2014–2022).

Table 1 illustrates data on publications, inventions, innovations, and commercialization outcomes within Sri Lanka's agricultural research institutions from 2014 to 2022. The data

indicate that while many research institutions in the country have successfully developed products, processes, and technologies as part of their research outputs, the number of patents and commercially viable products or processes remains relatively low. In contrast, publications consistently represent the highest number of outcomes each year compared to other science and technology outputs. This gap between invention and commercialization points to challenges in translating research achievements into marketable innovations. Notably, there is a declining trend in both innovation and commercialization activities from 2014 to 2022. These discrepancies highlight the need for further investigation into the knowledge capitalization processes at public research institutions in Sri Lanka.

2.5. Disruptive Innovation Pathways for Commercializing Agricultural Research in Sri Lanka

The secondary data further reveal that agricultural and plantation research institutions in Sri Lanka have successfully generated a wide range of scientific outputs, including products, processes, and technologies. This indicates that the core challenge lies not in knowledge creation but in the downstream processes required to transform scientific knowledge into market-responsive innovations. Although national budgetary provisions increasingly allocate funds to research and commercialization activities, the effectiveness of these investments in bridging the commercialization gap remains limited.

Institutionally, Sri Lanka has taken steps to strengthen the national innovation ecosystem. The National Innovation Agency (NIA), established under Parliamentary Act No. 22 of 2019 and operating under the Ministry of Science and Technology, was mandated to coordinate ministries, research institutions, and the private sector to support innovations from idea generation to market entry. This role was previously performed by the Coordinating Secretariat for Science, Technology, and Innovation (COSTI), which ceased operations in December 2021 and was later re-established following a Cabinet decision in March 2021. Despite these institutional arrangements, policy and implementation efforts have tended to prioritize the industrial and services sectors, with comparatively less strategic emphasis placed on agriculture and agribusiness innovation.

Funding data further illustrate this imbalance. In 2022, total R&D funding amounted to Rs. 4,429.47 million, with the agriculture and veterinary sciences sector receiving the largest share (Rs. 2,488.72 million) and achieving a utilization rate of approximately 83%. Out of the total allocated to public research institutions, agriculture and veterinary research accounted for over 50% of total funding. However, this substantial allocation has not translated into proportionate commercialization outcomes, reinforcing the argument that financial resources alone are insufficient to overcome structural and market-related barriers.

In this context, disruptive innovation offers a promising pathway for enhancing the commercialization of agricultural research in Sri Lanka. A disruptive innovation approach emphasizes demand responsiveness, affordability, and accessibility, making it particularly relevant for agriculture-based markets characterized by fragmented demand, resource constraints, and heterogeneous user needs. For public research institutions, this necessitates a stronger orientation toward marketing research outputs, increased sensitivity to changing technologies and customer preferences, and the ability to anticipate future market trends.

Accordingly, agricultural PRIs must move beyond traditional linear research models and adopt strategies centered on collaborative innovation, strategic partnerships with the private sector, and early engagement with end-users. By focusing on products, processes, or methods that introduce novel features aligned with unmet market needs, disruptive innovation can help reduce commercialization risks and improve market acceptance. In this sense, disruptive innovation provides not only a technological pathway but also an institutional and strategic framework through which public agricultural research can more effectively cross the "Valley of Death" and achieve sustainable commercialization outcomes.

2.6. Institutional Gaps, Market Barriers, and Commercialization Potential

The commercialization of agricultural research has become a critical policy and development priority in many advanced economies, where sustained institutional interventions and strong innovation ecosystems have enabled the successful translation of scientific knowledge into marketable solutions. Recognizing the strategic importance of agriculture for national economic growth and rural livelihood development, successive governments in Sri Lanka

have also introduced initiatives aimed at strengthening agricultural innovation. The current policy emphasis reflects an increasing awareness of the sector's dual role in contributing to national GDP and enhancing socio-economic outcomes in rural communities.

Despite this policy recognition, Sri Lanka continues to face persistent institutional and market-related barriers in converting publicly funded research into commercially viable innovations. A key indicator of these constraints is the country's low Gross Expenditure on Research and Development (GERD), which remains at approximately 0.11% of GDP. This level is substantially lower than that of advanced economies such as Japan, Germany, and the Republic of Korea, where R&D expenditure has consistently exceeded 3% of GDP. Such limited investment highlights structural weaknesses in building science-based technological capabilities and sustaining effective innovation-to-market pathways.

In this context, recent government commitments toward strengthening R&D and innovation are particularly noteworthy. The introduction of the Research and Development Commercialization Approach, a new strategic framework implemented under the Presidential Secretariat, reflects an effort to accelerate high-impact, market-oriented research projects and improve the translation of publicly funded research into commercial outcomes. While this initiative signals a positive policy shift, its effectiveness depends on how well institutional practices within PRIs are aligned with market realities and entrepreneurial objectives.

A key institutional gap lies in the misalignment between knowledge creation within PRIs and the practical requirements of farmers, agribusinesses, and emerging agri-entrepreneurs. Although Sri Lankan PRIs possess substantial human capital and intellectual capacity, scientific knowledge generation often remains weakly connected to market demand and commercialization pathways. Addressing this gap requires a transition from predominantly linear models of knowledge transfer toward more dynamic, interactive knowledge flows that integrate researchers, producers, firms, and end-users throughout the innovation process.

To enhance commercialization potential, agricultural research must increasingly incorporate business and market considerations at early stages of the research cycle. This includes the development of appropriate business models, demand-driven product and process

innovations, and technologies aligned with industry needs and agricultural input markets. Achieving this shift also necessitates stronger cross-sectoral coordination, whereby agriculture, industry, and services are integrated within a unified R&D and innovation platform. Such an approach can help reduce market barriers, improve knowledge capitalization, and create enabling conditions for the successful commercialization of agricultural research outputs.

3. Conclusions

The findings of this review highlight that the challenge of agricultural research commercialization in Sri Lanka is not merely one of knowledge generation, but rather of knowledge capitalization. While public research institutions demonstrate strong research capacity and output, institutional rigidities, weak market orientation, and fragmented innovation linkages contribute to a pronounced "Valley of Death" between research and commercialization. In this context, disruptive innovation emerges as a promising strategic pathway for reconfiguring agricultural research commercialization by emphasizing affordability, accessibility, demand responsiveness, and new market creation.

By adopting disruptive innovation principles, agricultural public research institutions can move beyond linear technology transfer models and engage more effectively with farmers, agribusinesses, and private-sector actors. Such an approach has the potential to enhance market acceptance, reduce commercialization risks, and generate inclusive economic value, particularly in resource-constrained and underserved markets characteristic of developing-country contexts. Finally, this review highlights the need for further empirical investigation to deepen understanding of how disruptive innovation pathways can be operationalized within public agricultural research systems. Future research adopting a qualitative approach within an interpretivist paradigm would be particularly valuable for capturing the meanings, experiences, and institutional practices shaping commercialization processes. Insights derived from such studies would not only inform policy and institutional reform in Sri Lanka but also offer transferable lessons for other emerging economies seeking to strengthen the commercialization of agricultural research.

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