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The Extent of Innovation in Philippine Business and Industry: Results of the 2021 PIDS Survey of Innovation Activities

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Abstract

The Oslo Manual, following ideas of Schumpeter, defines innovation as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations". With the advent of the Fourth Industrial Revolution (FIRe), governments have become even more cognizant of innovation as a major driver of economic performance, from output, to productivity, and to competitiveness. The Philippine government acknowledges its role in establishing and maintaining a conducive policy environment to encourage innovation and support the country's innovation ecosystem. Examining innovation and its relation to economic growth, the study involves the conduct and analysis of the 2021 PIDS Survey of Innovation Activities (PSIA). Unlike the first PSIA undertaken in 2015, and a pilot of the survey conducted in 2009, the 2021 PSIA provides a nationally representative reading of the entire Philippine business and industry. The survey suggests that as of 2021, a third (33.6%) of firms are innovation active, with innovation practiced more among medium and large establishments than micro- and small ones. Further, innovation is much more prevalent in Mindanao among major islands, and in ICT firms (and least in Agriculture). Aside from information on innovation activities, data on the use of digital platforms by Philippine businesses was also gathered in the 2021 PSA, in recognition of the expanding markets arising from rising digitalization and more rapid use of internet, even by micro, small and medium enterprises (MSMEs). The survey results of the 2021 PSIA are expected to be inputs on how government can be more successful in mainstreaming innovation in the country.

Keywords: innovation, product innovation, process innovation, organizational innovation, marketing innovation, micro, small and medium enterprises (MSMEs), Fourth Industrial Revolution, platform economy, digital platforms

Table of Contents

List of Tables

List of Figures

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1. Introduction

Following largely the definition of Schumpeter (1934), innovation has been defined in the Oslo Manual "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organization or external relations" (OECD / Eurostat 2005) With the advent of the Fourth Industrial Revolution (FIRe), governments have become even more cognizant of innovation as a major driver of economic performance, from output, to productivity, and to competitiveness. Firms also face new demands and emerging challenges that require innovation investments to remain competitive in the global market, especially amid the economic landscape resulting from the COVID-19 pandemic.

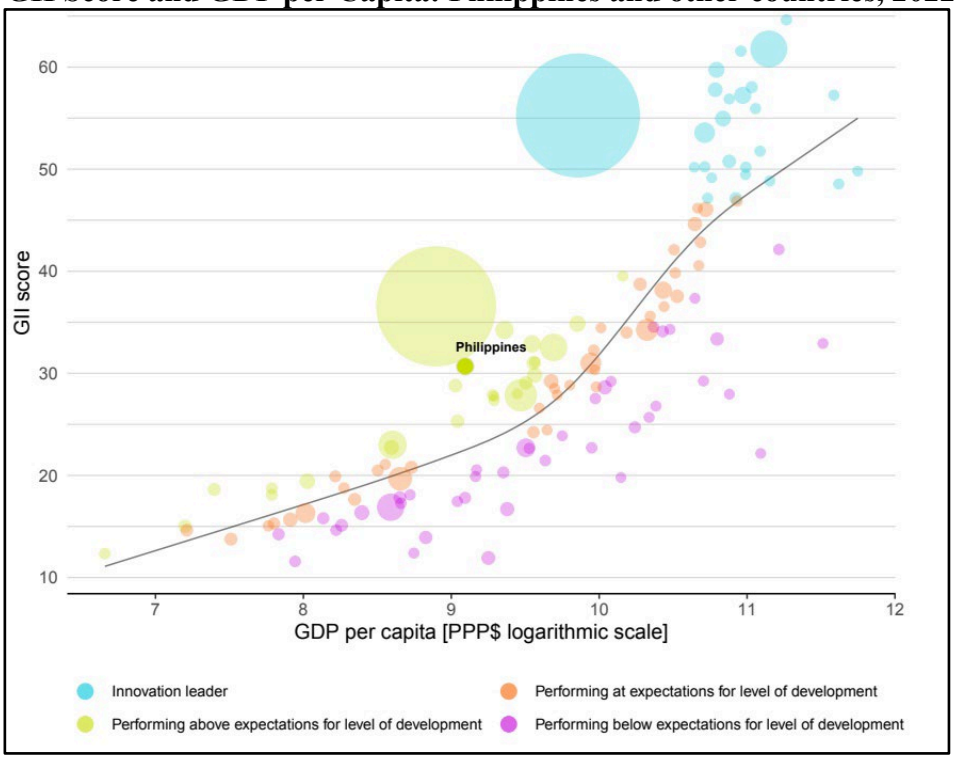
As early as the 1950s, technological progress has been known to be a determinant of sustained growth as well as persistently rising living standards (Solow, 1956; Swan, 1956). In recent times, innovation has become more visible in the policy arena. In 2015, 193 member states of the United Nations, including the Philippines, committed to the Sustainable Development Goals (SDGs), the successor agenda to the Millennium Development Goals. The SDGs is an ambitious set of 17 Global Goals to achieve inclusive and sustainable development by 2030. One of the 17 SDGs is SDG8 which seeks to "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (SDG 9)". Even in the country, innovation has entered the national development priorities and plans, particularly in the most recently crafted national development plan. The Philippine Development Plan (PDP) 2023-2028 (NEDA 2023) devotes an entire chapter on advancing research and development (R&D), technology, and innovation in recognition of their effects on economic growth and social progress. Four outcomes in the PDP are intended in the planning period: (a) basic R&D and knowledge creation strengthened; (b) market-driven and customer-centered R&D advanced; (c) technology adoption, utilization, and commercialization scaled up; and (d) innovation and entrepreneurship accelerated.

The Philippine government acknowledges its role in establishing and maintaining a conducive policy environment to support the country's innovation ecosystem. The Philippine Innovation Act (PIA), or Republic Act (RA) No. 11293, was signed into law on April 17, 2019 to guide the country's innovation goals and is expected to make the policy environment in the country conducive for more science, technology and innovation efforts. In addition, RA No. 11337, also known as The Innovative Startup Act, was signed into law nine days after the passage of PIA. By creating a legal and practical framework for supporting startup enterprises and businesses, this law provides a mechanism to strengthen, promote, and develop an innovative and entrepreneurial ecosystem and culture in the country.

[*] The first three authors are senior research fellows, the fourth and fifth authors are supervising research specialists, and the last three authors are research analysts at the Philippine Institute for Development Studies (PIDS). The views expressed here are the authors' own and do not necessarily reflect the positions of the organizations that the writers are associated with.

International assessments, particularly in the Global Innovation Index (GII), suggest that the country has an innovation performance that outpaces that of the average performance of countries in a similar level of development (**Figure 1**).

Figure 1. GII Score and GDP per Capita: Philippines and other countries, 2022



Source: WIPO (2022), Global Innovation Index 2022 Report

Further, in the 2022 GII[1] report, the Philippines ranks 59th among 132 economies, with the country doing well in yielding innovation outputs, despite low inputs (**Table 1**). The GII consists of roughly 80 indicators, grouped into innovation inputs and outputs to capture the multidimensional nature of innovation. The country has done well in yielding innovation outputs, despite the low inputs as suggested by the rankings. Relative to its GDP, the latest GII report also noted that the country's innovation performance is performing better for its level of development.

Table 1. Global Innovation Index Rankings: Philippines, 2019-2022

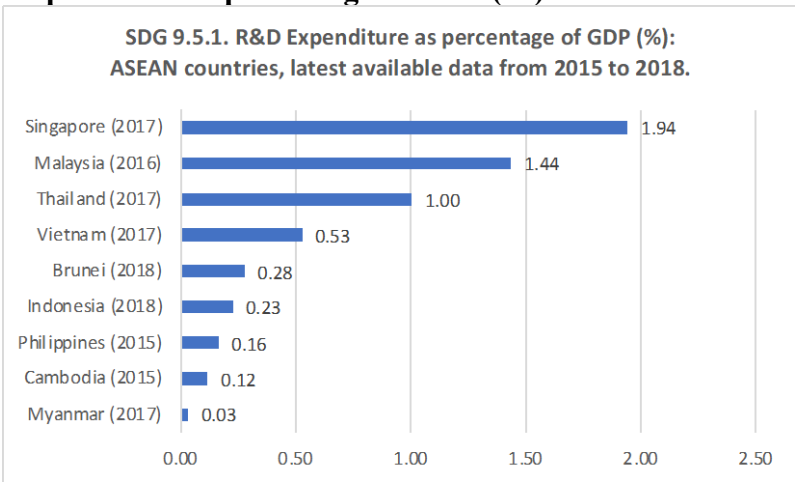
Year	GII Rankings		
	Overall	Innovation Inputs	Innovation outputs
2022	59	76	51
2021	51	72	40
2020	50	70	41
2019	54	76	42

Source: World Intellectual Property Organization (2022), Global Innovation Index 2022 Report

[1] The GII is a composite measure of innovation, composed of various indicators on seven pillars: institutions, human capital & research, infrastructure, market sophistication, business sophistication, knowledge & technology outputs and creative outputs. This report is published by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO), in partnership with other organizations and institutions. The index is based on data derived from several sources, including the International Telecommunication Union, the World Bank and the World Economic Forum.

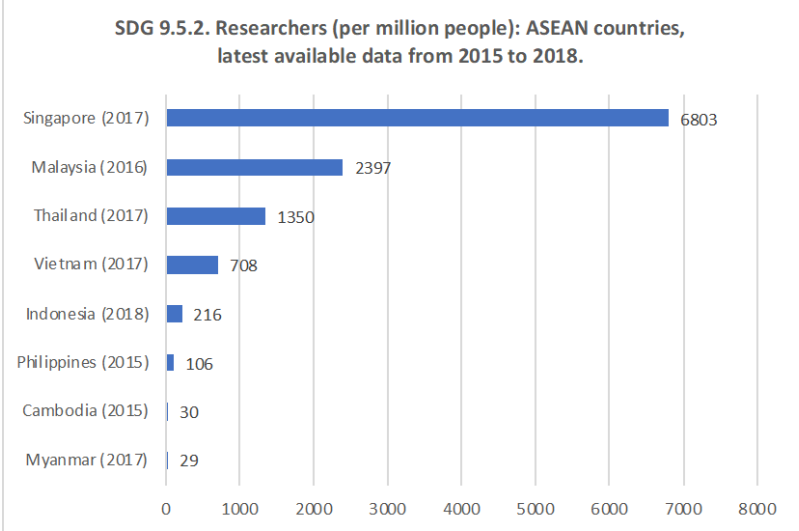
Innovation has been commonly measured through scientific and technological outputs such as indicators on R&D, as innovation is traditionally connoted with inventions. However, the Philippines consistently ranks third lowest among ASEAN member states in terms of R&D spending and number of researchers per million people. The country not only falls below the recommended UNESCO expenditures benchmark of 1 percent of GDP on R&D (UIS 2004) with many countries in the region outspending us, but also has a very low level of human capital that specializes in R&D work. This indicates the persistence of low prioritization in science, technology and innovation (STI) , as roughly the same statistics have been observed in previous decades (e.g., Cororaton 2002; Macapanpan 1999; Patalinhug 2003). Poor investment in STI puts economic development at risk with the emergence of technological disruptions brought about by FIRe, and by demands for resilience to the pandemic.

Figure 2. R&D Expenditure as percentage of GDP (%): ASEAN countries (SDG 9.5.1)



Source: UNESCO Institute of Statistics

Figure 3. Researchers (per million people): ASEAN countries (SDG 9.5.2)



Source: UNESCO Institute of Statistics

While these indicators suggest correlation between R&D and level of economic development, innovation focuses on value creation and goes beyond inventions and R&D. Innovation is "new, good ideas put to work"; it involves the creation, development, deployment, and economic utilization of new knowledge as new products, new products and new services (OECD/Eurostat, 2005). Innovation activities can be technological (i.e., product or process

innovations) or non-technological (e.g., new marketing and organizational innovations). While there is an overlap between these two concepts, innovation needs to be examined beyond R&D.

Moreover, approaches to investing in innovation between rich countries and developing countries also differ. Developed countries are more likely to engage in technological innovations; meanwhile their developing counterparts tend to be users of technology. Developing countries invest in innovation efforts far less than advanced economies despite the potential returns and possibilities to catch up because innovation requires a broad set of complementarities that are lacking. A report from the World Bank (Cicera and Maloney 2017) refers to this phenomenon as the "Innovation Paradox" . Developing countries often lack the physical and human capital both at the firm level and in government to reap the returns to innovation investments.

In the Philippines, results of the study by Llanto and del Prado (2015) suggest that innovation mediate good firm performance. Product and process innovations lead to increase in sales and profits as well as improve labor productivity. However, following the results of previous studies and surveys conducted on innovation activities, the 2015 SIA showed that less than half of firms innovate (Albert *et al*. 2018). Large firms spend ten times the average spending on innovation of all firms. In addition, firms with no employees with post-baccalaureate degrees are less likely to be innovators. Decline in innovation in the business process outsourcing (BPO) sector was also noted as a cause for concern. Further, Quimba *et al*., (2017) found that innovative firms prefer to conduct R&D by themselves or only in cooperation with those in their value chain. This suggests that collaboration within the innovation ecosystem remains limited and that crafting a national policy should veer away from the linear innovation mode.

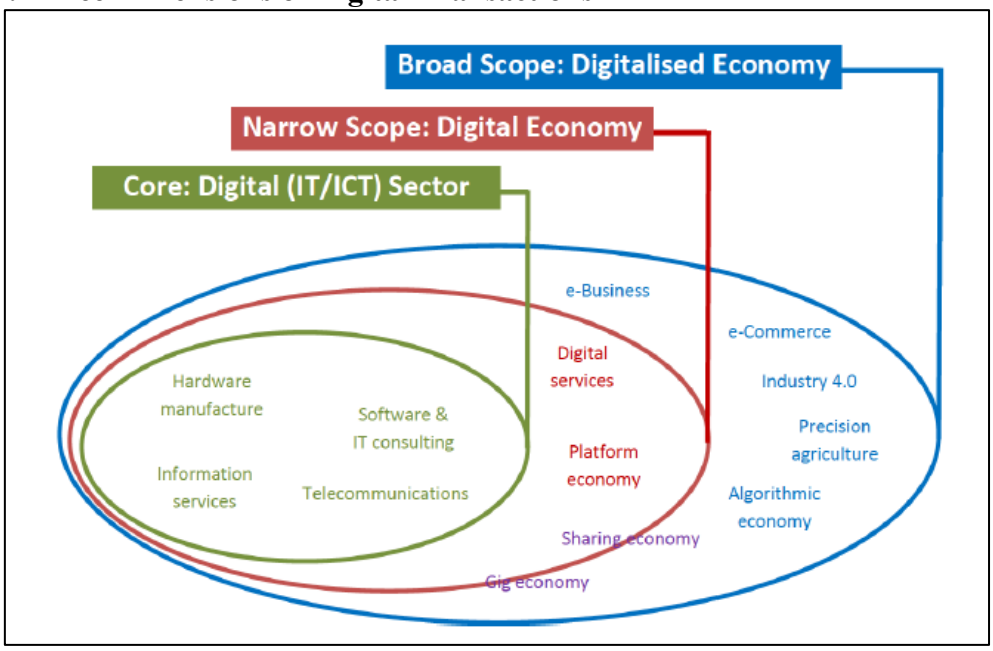
Serafica (2016) noted that support for innovation should not favor only one type of innovation output or activity. More studies are needed on innovation behavior that cover more industries to identify sectors for prioritization. Albert *et al*., (2018) also recommended that aside from increasing government support, programs that aim to foster innovation should be formulated in a way that is meaningful and impactful for innovators in close collaboration with other innovation actors within the ecosystem. Moreover, the STRIDE (2019) assessment on Philippine innovation ecosystem reported that procurement regulations remain a major barrier to innovation. R&D investments and mechanisms as well as opportunities for collaboration are also identified areas for improvement to enable R&D talent, awareness, and access. Increased investments toward innovation in education and programs need to be parallel investment on information dissemination of innovation policies and incentives to drive uptake by raising awareness about opportunities and reducing barriers to participation.

Further, digitalization, characterized by rapidly increasing diffusion of digital technology into social and economic activities, has also been radically transforming business activities and the labor market (World Bank 2019). Aside from the growing deluge of digital data, digitalization provides consumers opportunities to interact with suppliers of goods and services through the internet. Digitalization offers new (market) possibilities to businesses (and governments) and benefits to consumers, enabling 'innovative forms of production, consumption, collaboration and sharing through digital interactions' (OECD 2019).

IMF (2018) recommended that measuring the digital economy can aid in providing accurate economic and financial statistics which, in turn, helps policies and regulations remain updated of rapid digitalization that can either create more value to products and services, or further degrade existing inequalities. The United Nations Conference on Trade and Development

(UNCTAD) estimated the country's digital economy is 4.5% of GDP as of 2015 using the definition suggested by Bukht and Heeks (2017). Among national statistics offices, the digital economy and platform economy, however, are not commonly measured given the absence of commonly accepted definition of the "digital economy", the "digital sector", and even a "platform". Making use of a supply-use framework, the Philippine Statistics Authority (PSA) has reported the digital economy in the Philippines has grown on average by 13.3% (in constant prices) in the period 2012 to 2018; further, annual growth rates range from 11.2% to 15.3%. (World Bank 2020).

Figure 4. Three Dimensions of Digital Transactions



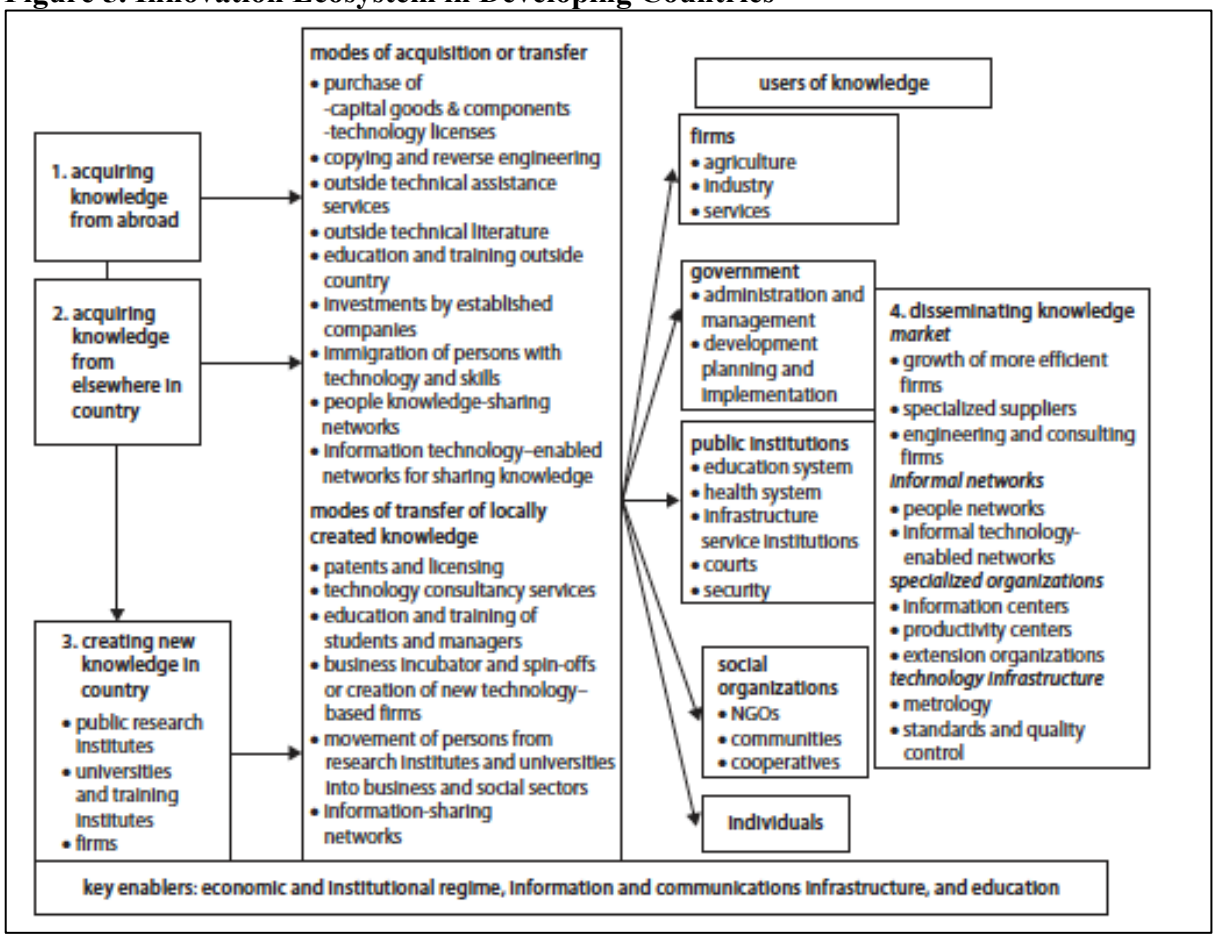
Source: Bukht and Heeks (2017)

While digital transactions can be an alternative approach to defining the digital economy, measuring the platform economy is cross- cross-sectoral & does not easily fit in classifications. Furthermore, transactions are not always financial in nature. There are also challenges in identifying where online platforms are physically located and that businesses are not the only actors in the platform economy (Albert 2019). At least three groups of actors are always active within the ecosystem of platforms, i.e., providers (supply side), users (demand side) and the digital platform (intermediary) itself. Measurements on the platform economy have wide policy implications—governments need to understand the dynamics of the platform economy given challenges on cross-border regulations and ambiguities on digital taxation (Bunn *et al*. 2020; World Bank 2020) while ensuring that consumer rights are protected.

As regards the innovation ecosystems in developing countries, the World Bank (2010) describes key enablers (Figure 5). Further, the World Bank proposes that governments help nurture the innovation policy environment making use of an analogy of a good gardener who:

- "prepares the ground" (i.e., building up the human resources needed to drive innovation forward);
- "fertilizes the soil" (i.e., boosting R&D and access to most up-to-date-information);
- "waters the plant" (i.e., assists innovators by providing financial support and other measures to incentivize innovation); and
- "removes weeds and pests" (i.e., removes regulatory, institutional, or competitive obstacles to innovation).

Figure 5. Innovation Ecosystem in Developing Countries



Source: World Bank (2010)

In this discussion paper, we examine innovation activities through the lens of the 2021 PSIA, which was conducted with the assistance of the PSA. The first and previous round of the PSIA was conducted in 2015, with a pilot conducted by the Department of Science and Technology (DOST) with the then National Statistics Office (NSO) in 2009. Moreover, the 2021 PSIA collected new information on use of digital platforms by Philippine businesses, recognizing that markets of all kinds are undergoing rapid digitalization with increasing use of the internet in the country.

Similar to the 2015 PSIA, the 2021 PSIA is aimed at collecting information on innovation activities of firms. The results of the PSIA provide meaningful insights on policy issues that will foster innovation in the country. Thus, this paper is organized as follows: the next section first presents the sampling scheme behind the 2021 PSIA, as well as profiles the establishments sampled. The third section describes innovation activities engaged by firms in the Philippines. The discussion also includes a description of wider forms of innovation. The fourth section then describes effects of innovation on firms, as well as the sources of information and cooperation for innovation activities. The fifth section discusses determinants of innovation, as well as barriers and bottlenecks to innovative behavior among firms. The section also examines factors driving or hindering innovation activities among establishments that were interviewed for both the 2021 PSIA and the 2015 PSIA. The sixth section looks at support for firms in conducting innovation activities. The next two sections are discussions on newly introduced modules in the PSIA: the seventh section describes the use of FIRe technologies among

Philippine firms while the seventh section discusses the use of digital platforms. The final section provides a summary of the key survey results and some main policy implications.

2. Sampling Scheme and Establishment Profile of the 2021 PSIA

The 2021 PSIA targeted a sample size of 11,500 establishments, including the nearly 1000 firms and 500 firms surveyed in the 2015 PSIA and the 2009 SIA, respectively. The previous survey rounds provided means to benchmark national performance in innovation, to describe determinants, barriers and bottlenecks to innovation. For this recent survey, the sample size is ten times more than the survey respondents in 2015 to get a nationally representative reading. This is extremely important as previous surveys purposively focused on sectors that innovation activity may be assumed to be strong, *e.g.,* Information and Communications Technology (ICT) and Business Process Management (BPM) sectors. By design, the sampled establishments in the 2021 PSIA mirror the sampling frame of all establishments in the country by major sector with 90 percent of targeted firms covering sectors that were not covered in the 2015 survey.

The major data items collected across different sectors in 2021 PSIA include: (1) general information about the establishments, including economic activity, legal organization, economic organization, and the like; (2) capital participation by nationality of the stockholder; (3) employment by sex; (4) educational background of workers; (5) product innovation; (6) process innovation; (7) on-going or abandoned innovation activities; (8) sources of information and cooperation for 6 innovation activity; (9) effects of innovation activity; (10) factors hampering innovation activity; (11) intellectual property protection; (12) organizational innovation; (13) marketing innovation; (14) public sector procurement and innovation ; (15) registration with investment promotion agencies; (16) knowledge management; and (17) government innovation-related policies. Aside from the major items identified earlier, information was also collected on activities in the use of internet platforms, whether the firms are buyers, sellers, advertisers, or own platforms, and the extent to which firms use frontier technologies of FIRe.

The 1,000 establishments surveyed in the 2015 SIA are included in the sample to form panel data. Results from the panel data allow for an examination of the change in the behavior, choices and innovative performance of these sampled firms. Further, insights can also be gained on the impact of some government policies and programs that were intended to stimulate innovation, as well as describe changes in innovative activities resulting from the FIRe, especially the use of internet platforms. To proxy the intensity of the learning processes in innovation, the survey also included items for firms to report their expenditures related to the innovation activities or the sales revenues from new products.

Among the targeted establishments for interview, the PSA received 11,552 questionnaires from its field offices, of which 10,489 establishments have provided good reporting and were included for tabulation of results (thus yielding an effective nonresponse rate of 90.8%), while 465 responses have validation issues and the remaining 598 establishments have been reported as closed, moved-out, or refused to accomplish the questionnaire. The distribution of the 10,489 responding establishments by major sector in 2021 PSIA and sub-sector categories in 2015 SIA is shown in Table 2.

Table 2. Distribution of Establishments by Industry: 2021 PSIA and 2015 SIA

Major Sectors (2021 PSIA)	Sub-Sectors in 2015 SIA					Total
	Food Manufacturing	Other Manufacturing	ICT	BPO	(NEW)	
Agriculture					457 (1.0%)	457 (1.0%)
Industry	928 (5.2%)	1,200 (3.8%)			728 (1.4%)	2,856 (10.4%)
Services			630 (0.9%)	287 (0.7%)	6,259 (87.0%)	7176 (13.9%)
Total	928 (5.2%)	1200 (3.8%)	630 (0.9%)	287 (0.7%)	7,444 (89.3%)	10,489 (100.0%)

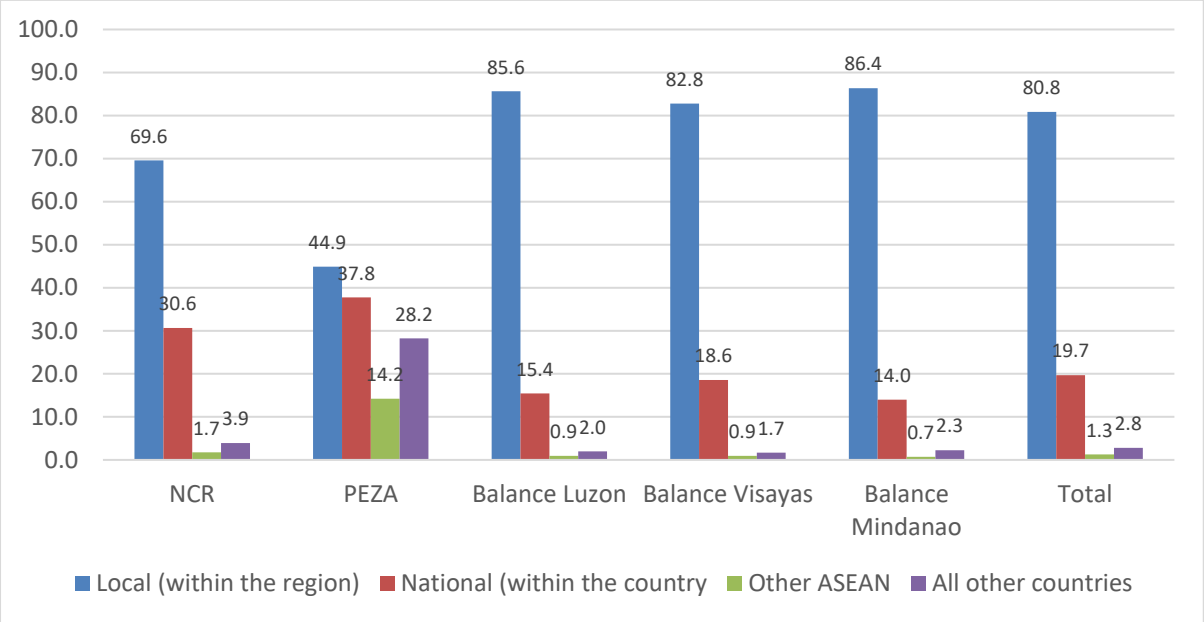
Note: Values in parentheses are weighted percentages.
Source: 2021 PSIA, PIDS

The distribution of sampled firms is, by design, proportionally allocated t across different industry groups and major island groups. The survey employed a stratified simple random sample design with the 3-digit PSIC[2] as the industry strata while the National Capital Region (NCR), Balance Luzon, Visayas, Mindanao, and PEZA zones serving as the geographic domains. Employment size was considered in drawing the sample establishments to represent micro-, small, medium, and large firms[3]. Further, the top 100 e-commerce companies[4] in the country have been targeted for interview. Due to the large sample size of the 2021 PSIA, PIDS engaged the services of the PSA given their extensive experience and expertise in conducting data collection among establishments. As in other establishment surveys, target respondents for the survey are the owners and managers of the sampled establishments. Reference period for the survey has been set for calendar year 2021 for most data. Like previous rounds of the survey, the 2021 PSIA has also been designed to be self-administered by the responding establishments.

A profile of the geographic markets of sampled firms by geographic domain (**Figure 6**) suggests that about four fifths of firms have local markets, two fifths have national markets, about 1.3% have markets in ASEAN and 2.8% have markets outside ASEAN. As expected, PEZA firms have the largest markets outside for ASEAN and all other countries.

[2] The Philippine Standard Industrial Classification (PSIC) is a detailed classification of industries prevailing in the country according to the kind of productive activities undertaken by establishments. The 2009 PSIC was patterned after the UN International Standard Industrial Classification (ISIC) Rev. 4, but with some modifications to reflect national situation and requirements (https://psa.gov.ph/content/philippine-standard-industrial-classification-psic)
[3] Micro=0-9 employees; Small=10-99 employees; Medium=100-199 employees; Large=200 or more employees
[4] https://beststartup.asia/101-top-philippines-e-commerce-companies-and-startups-of-2021/

Figure 6. Geographic Markets of Establishments (%) , by Geographic Domain



Source: 2021 PSIA, PIDS

As regards employment of firms, while it may seem that overall employment is more or less evenly distributed for both sexes, sex-disaggregated employment data by major sector suggests that Agriculture and Industry employ more men than women. However, the bulk of employment is in Services, which employed more women (Table 3). Most employed in firms are in the age group 25 to 34 years old, except for males in Agriculture establishments, which has the highest employment among those aged 35 to 44 (**Table 4**).

Table 3. Total Employment, by Sex and Major Sector

Sex	Agriculture	Industry	Services	Total
Male	120,875	1,007,419	4,027,107	5,155,401
Female	40,632	689,323	4,447,122	5,177,077
Both Sexes	161,506	1,696,742	8,474,229	10,332,478

Source: 2021 PSIA, PIDS

Table 4. Employment Distribution (%) among Age Groups, by Sex and Major Sector

Age	Sex	Agriculture	Industry	Services	Total
Below 18	Male	0.1	0.1	0.4	0.3
	Female	0.0	0.1	0.2	0.1
18-24 years	Male	11.4	12.4	15.4	14.7
	Female	12.1	16.9	17.7	17.6
25-34 years old	Male	28.5	35.3	44.2	42.1
	Female	28.1	41.1	48.2	47.1
35-44 years	Male	32.0	29.6	25.3	26.3
	Female	25.1	26.4	21.2	21.9
45-54 years	Male	19.5	16.9	11.0	12.3
	Female	22.2	12.1	9.5	10.0

Age	Sex	Agriculture	Industry	Services	Total
65-64 years	Male	8.0	5.2	3.3	3.8
	Female	11.3	3.1	2.8	2.9
65 years & over	Male	0.5	0.6	0.4	0.4
	Female	1.1	0.3	0.3	0.3

Source: 2021 PSIA, PIDS

With regard to educational attainment of employees, firms, on average, have a quarter of their employees with bachelor's degrees or higher. In Agriculture, the proportion is, however, only a fifth (19.4%) of males; compared to a fourth in industry (25.6%) and 22.9% in services. Among women in firms in Agriculture, 26.6% have bachelor's degrees or higher, while the comparable rate in Industry and Services is 20.3% and 24.3%, respectively. Likely, the skills of human resources is what may partly explain innovation in a firm or the lack of it.

Table 5. Employment Share (%) by Highest Educational Attainment, by Sex and Major Sector

Highest Educational Attainment	Sex	Agriculture	Industry	Services	Total
At most Primary	Male	26.7	13.5	8.6	10.7
	Female	10.1	10.7	8.6	9.1
At most secondary	Male	30.8	31.3	15.1	18.1
	Female	17.5	35.0	11.5	14.7
Post-secondary non-tertiary or Short-cycle tertiary education	Male	19.8	29.9	16.6	18.5
	Female	14.3	20.3	12.3	13.4
Bachelor level education	Male	9.4	18.2	15.3	15.5
	Female	8.5	12.5	17.0	16.6
Masters or doctoral level education	Male	9.9	7.4	7.7	7.7
	Female	18.1	7.8	7.2	7.4

Source: 2021 PSIA, PIDS

3. Innovation Activity in Philippine Business and Industry

The 2021 PSIA surveyed establishments to probe on their innovative activities, the level of effort employed, and the achievement of new or improved products and/or processes. Following the 2015 SIA (Albert *et al*, 2018), in this report establishments are defined as innovation-active if they are:

(a) product innovators that introduced new or significantly improved products, i.e., goods and/or services;
(b) process innovators that introduced (i) new or significantly improved methods of manufacturing or producing goods or services; (ii) new or significantly improved logistics, delivery or distribution methods for inputs, goods, and services; (iii) new or significantly improved supporting activities for processes, such as maintenance systems or operations for purchasing, accounting, or computing;
(c) engaged in innovation projects either not yet complete or abandoned; and/or

(d) engaged in expenditure of innovation activities for (i) internal or outsourced R&D; (ii) training; (iii) acquisition of external knowledge machinery, equipment or software linked to innovation activities; (iv) market introduction of innovations; and (v) other preparations to implement innovations.

Tables 6 to 8 summarize key statistics on innovation activity in 2021 by size of establishment, industry, and area. In general, about a third (33.6%) of firms are innovation active in 2021 (**Table 6**). Almost two-fifths (39.8%) of large firms are innovation active , compared to a third (32.4%) of micro, small and medium establishments (**MSMEs**) . Across the Philippines, more firms are process innovators (27.3%) compared to product innovators (21.8%). Among establishments that had process innovations, more than one-fifth (21.8%) were developed within the establishment enterprise alone. Roughly, 5.8% have had activities to develop a product or process innovations that had to be abandoned in 2021. On the other hand, around 15% of the surveyed firms had ongoing innovation activities.

As firms get larger, it is more likely to innovate. Average expenditures in innovation also rise with the size of establishments. In 2021, large firms spent PHP 13.2 million on innovation, around 10.3 times larger than the average spending of all firms (PHP 1.28 million). A substantial difference in the expenditures of small and medium firms can also be observed, with average annual spending PHP 1.6 million and PHP 12.4 million respectively. In relation to total sales, micro-enterprises spent on average PHP 805,0000 which represents 4.7% of their total gross sales. With the exception of medium-sized firms, majority of establishments received minimal public support for its innovations (less than 1%). Wider forms of innovation were practiced by three-eighths (37.1%) of firms . More than half of medium firms (54%) and close to half of large firms (47.8%) were found to be engaged in organization innovation.

Additionally, less than three-eighths (36.3%) of the firms have marketing innovations . In terms of firm size, large firms (38%) were more likely to conduct marketing innovation than micro-enterprises (35.5%). One fourth of firms are aware of government innovation policy (25.8%) with more firms being aware of public policies on innovation among micro- and small-sized establishments.

More than two-fifths (42.5%) of firms practiced knowledge management, especially medium (58.8%) and large (64.4%) firms. Examples of knowledge management practices include a written knowledge management policy, having incentives for employees to share knowledge within the company, dedicating resources to monitor and obtain knowledge from various sources, capability of bring in external experts from universities, research institutes, or other establishments to participate in project teams as needed and regularly updating internal databases or manuals of good work practices, lessons learned or expert advice.

Table 6. Key statistics on innovation activity by size of establishments

Innovation Activity	**Proportion (%)**				
	Micro	**Small**	**Medium**	**Large**	**All Firms**
Innovation active	32.4	36.4	39.6	39.8	33.6
Product innovators	21.1	23.7	22.2	24.9	21.8
Share with new-to-market products	12.1	13.4	11.0	14.1	12.5
Process innovations	26.8	28.8	29.3	31.3	27.3

Innovation Activity	Proportion (%)				
	Micro	Small	Medium	Large	All Firms
Share of those that developed process innovation within the establishment enterprise	21.2	23.5	22.6	23.7	21.8
Both product and process innovators	15.2	17.2	14.5	18.6	15.7
Either product or process innovator	31.0	34.0	36.2	36.3	31.9
Ongoing innovation activities	13.1	16.5	17.5	22.4	14.1
Abandoned innovation activities	5.3	7.2	5.6	6.2	5.8
Innovation-related expenditure	6.3	10.3	10.6	15.6	7.5
Memo Notes:					
Average annual expenditures for innovation activities (in '000 PHP)	804.7	1,561.0	12,429.9	13,162.4	1,282.6
Proportion of expenditure on innovation from total gross sales	4.7	4.7	2.3	4.1	4.7
Public financial support for innovation	0.9	1.4	0.5	0.9	1.0
Innovation cooperation	26.2	25.6	24.2	31.4	26.1
Organizational innovations	35.3	40.9	54.0	47.8	37.1
Average percentage of employees affected by establishment's organizational innovations	39.7	38.2	36.0	34.9	39.1
Marketing innovators	35.5	38.8	34.6	38.0	36.3
With knowledge management practices	97.6	98.1	97.3	98.7	97.8
Aware of any government innovation policy or intervention	25.5	27.1	22.4	23.3	25.8

Source: 2021 PSIA, PIDS

Across industries, establishments in the ICT industry were the most innovation-active, with a rate of 38 percent (Table 7). Additionally, the ICT industry had the highest average spending on innovation activities in 2021 accounting for PHP 7.9 million. Distantly following are non-manufacturing and other manufacturing which spent PHP 2.4 million and PHP 1.9 million, respectively.

In terms of marketing innovation, around three-eighths (36.4%) of those engaged in the ICT industry were marketing innovators. This is the highest rate among the industries. In comparison, 31.0 percent for other manufacturing firms report having marketing innovation while 29.2 percent of BPO firms have marketing innovations . The agriculture sector reports the lowest proportion of firms with marketing innovations at 17 percent.

Table 7. Key statistics on innovation activity by industry

Innovation Activity	Proportion (%)							
	Agriculture	**Food Mfg.**	**Other Mfg.**	**Non-Mfg. Industry**	**ICT**	**BPOs**	**Other Services**	**All Industries**
Innovation active	23.2	32.8	32.9	29.3	38.4	31.1	33.8	33.6
Product innovators	14.8	19.3	21.6	17.8	24.1	16.9	22.1	21.8
Share with new-to-market products	6.2	10.0	12.3	6.1	11.9	8.0	12.8	12.5
Process innovations	17.3	26.6	26.3	21.7	30.2	23.9	27.6	27.3
Share of those that developed process innovation within the establishment enterprise	12.9	23.8	22.6	16.1	23.7	18.7	21.8	21.8
Both product and process innovators	10.7	13.7	16.0	12.2	16.8	11.2	15.9	15.7
Either product or process innovator	20.8	30.4	30.9	26.6	34.7	28.6	32.2	31.9
Ongoing innovation activities	10.0	12.3	15.7	13.0	19.9	14.8	14.2	14.1
Abandoned innovation activities	3.7	5.1	6.7	3.2	6.4	4.8	5.9	5.8
Innovation-related expenditure	5.3	7.4	9.4	9.3	14.7	9.4	7.3	7.5
Memo Notes:								
Average annual expenditures for innovation activities (in '000 PHP)	403.9	863.6	1936.7	2350.3	7892.6	454.9	1207.2	1282.6
Proportion of expenditure on innovation from total gross sales	3.6	6.9	5.5	2.9	6.7	4.8	4.5	4.7
Public financial support for innovation	3.2	0.5	0.6	1.6	1.0	0.4	1.0	1.0

Innovation cooperation	22.8	14.6	19.1	31.2	28.8	28.6	27.0	26.1
Organizational innovations	28.3	28.0	32.6	37.2	40.9	43.4	37.9	37.1
Memo Notes:								
Average percentage of employees affected by establishment's organizational innovations	35.4	34.1	36.7	40.5	36.5	35.7	39.5	39.1
Marketing innovators	17.5	27.1	31.0	20.0	36.4	29.2	37.6	36.3
With knowledge management practices	96.6	96.6	97.6	97.3	98.1	99.1	97.8	97.8
Aware of any government innovation policy or intervention	23.9	25.7	20.5	26.3	24.9	23.1	26.1	25.8

Note: Mfg. = manufacturing, ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Among major areas in the country, Mindanao (41.1%) and Visayas (36.1%) have the biggest share of firms that were innovation-active (Table 8). Firms in Visayas and Mindanao have consistently outranked firms in Luzon (NCR and Balance Luzon) in terms of product innovation, process innovation, and having on-going innovation.

Table 8. Key statistics on innovation activity by area

Innovation Activity	**Proportion (%)**				
	NCR	**Balance Luzon**	**Visayas**	**Mindanao**	**All Areas**
Innovation active	30.2	30.9	36.1	41.1	33.6
Product innovators	18.7	20.7	23.6	26.6	21.8
Share with new-to-market products	11.7	11.5	13.4	14.5	12.5
Process innovations	24.5	24.8	31.5	32.6	27.3
Share of those that developed process innovation within the establishment enterprise	19.9	19.1	24.3	27.5	21.8
Both product and process innovators	14.1	14.5	16.8	19.3	15.7
Either product or process innovator	28.7	29.6	33.4	39.4	31.9
Ongoing innovation activities	12.8	13.2	15.3	16.7	14.1

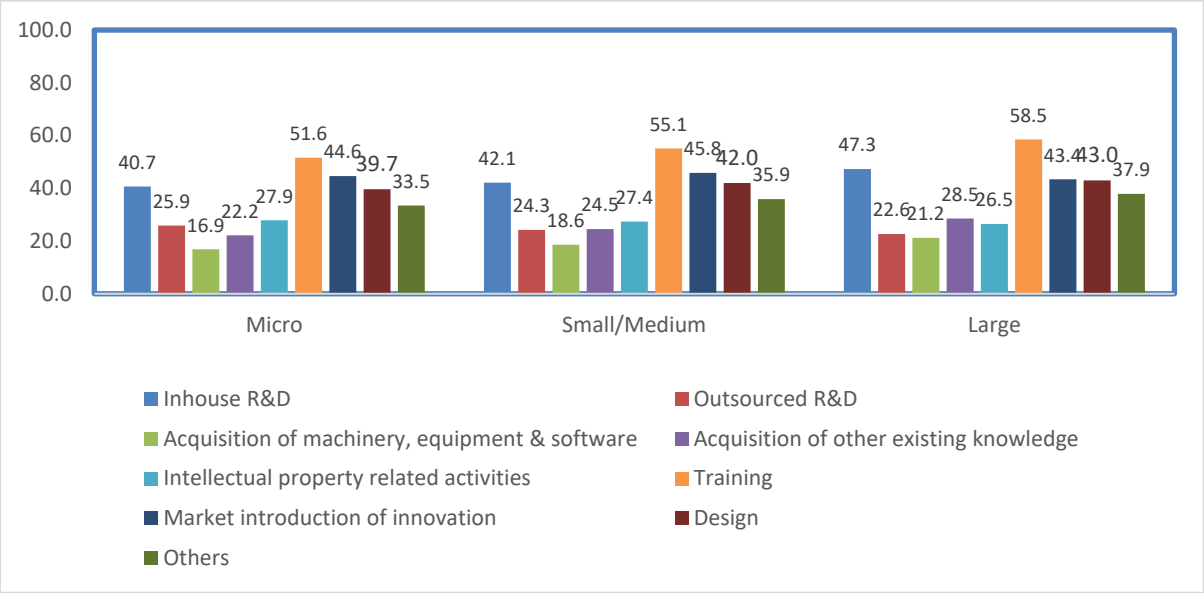
Innovation Activity	Proportion (%)				
	NCR	Balance Luzon	Visayas	Mindanao	All Areas
Abandoned innovation activities	5.3	5.4	5.5	7.8	5.8
Innovation-related expenditure	6.2	8.1	7.2	7.8	7.5
Memo Notes:					
Average annual expenditures for innovation activities (in '000 PHP)	1,483.0	1,603.6	1,491.4	88.7	1,282.6
Proportion of expenditure on innovation from total gross sales	3.8	5.4	4.3	4.6	4.7
Public financial support for innovation	1.0	0.6	1.1	1.7	1.0
Innovation cooperation	27.6	30.2	20.7	23.0	26.1
Organizational innovations	37.6	33.1	42.0	40.1	37.1
Average percentage of employees affected by establishment's organizational innovations	40.3	40.4	38.4	36.0	39.1
Marketing innovators	36.1	34.0	39.9	37.9	36.3
With knowledge management practices	99.6	96.5	97.6	98.2	97.8
Aware of any government innovation policy or intervention	18.8	28.1	27.2	29.1	25.8

Source: 2021 PSIA, PIDS

However, Mindanao had the least average expenditure at PHP 88,700. In comparison Balance Luzon (i.e., Luzon without NCR) has the highest with PhP 1.60 Mn followed by Visayas with average expenditure of PhP 1.49 Mn. Meanwhile, NCR and Balance Luzon also have the least proportion of firms that have received public financial support for innovation in 2021 (1.0% and 0.6% respectively). Firms in Mindanao report the highest proportion of establishments aware of government innovation or intervention while NCR firms had the least proportion of establishments at 18.8 percent.

Among firms that had innovation-related expenditure in 2021, the most commonly reported activities were spending on training activities for the development and/or introduction of new products or processes (Figure 7). This was followed by investments in in-house R& D. Large firms invested the most in training (58.5%) and close to half undertook in-house R&D (47.3%). More than two-fifths of large firms spent on market introduction of innovation (43.4%) and on design activities (43%).

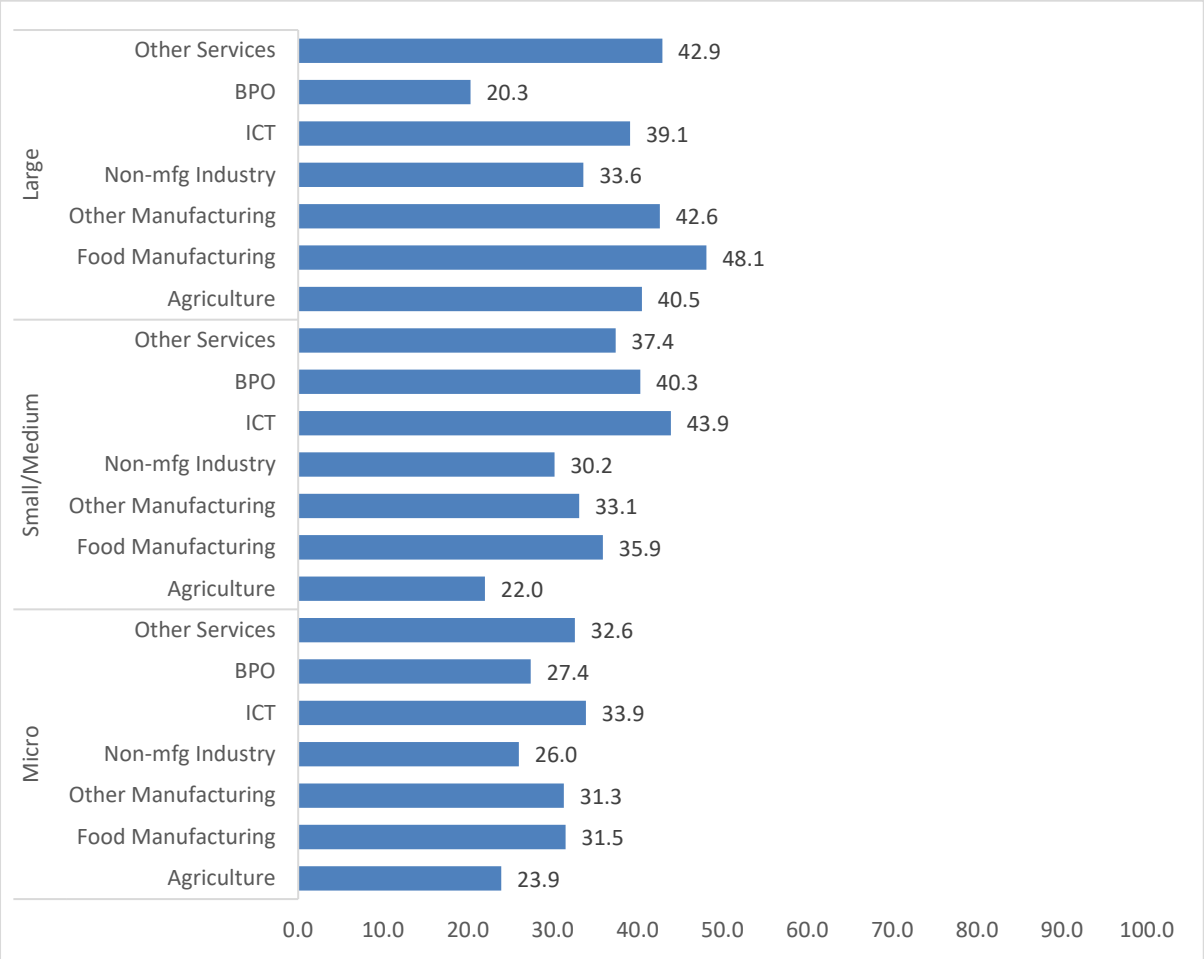
Figure 7. Proportion (%) of establishments that spent on various innovation- related activities, by activity and size of establishment



Source: 2021 PSIA, PIDS

Figure 8 depicts variation in the share of firms that were innovation active across industry groups. With the exception ICT and BPO industries, large firms tend to be more innovation active compared to smaller firms. In food and other manufacturing, nearly half of large firms were innovation active while only a third of micro-enterprises were innovation active. For the ICT and BPO sectors, there are more small and medium-sized establishments that are innovation active firms than large or micro firms.

Figure 8. Proportion (%) of establishments that are innovation-active by industry and by size of establishment



Note: Mfg. = manufacturing, ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

In 2021, a third (33.1%) of innovation-active firms filed for intellectual property rights (IPRs), particularly in registering a trademark and design (**Table 9**). The filing of IPRs was three to eight times higher among innovation-active establishments than among firms that did not innovate.

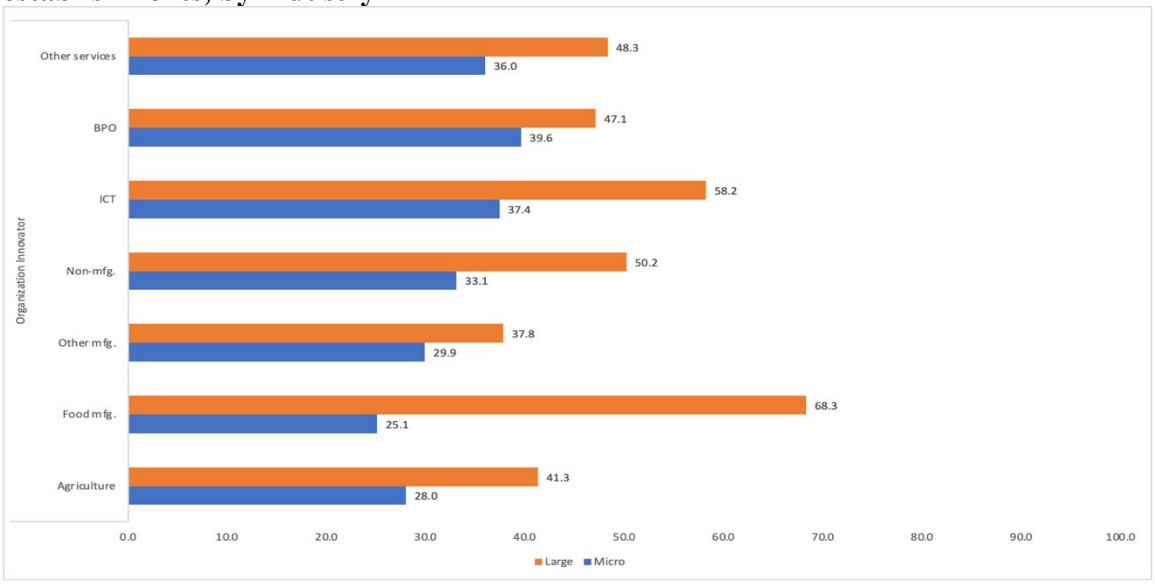
Table 9. Proportion (%) of establishments that filed for Intellectual Property Rights, by innovation activity status

Intellectual Property Rights	Proportion (%)		
	Innovators	Non-innovators	All Firms
Applied for patent	80.6	19.4	19.7
Registered trademark	77.1	22.9	28.7
Claimed copyright	82.4	17.6	17.5
Registered utility model	81.5	18.5	18.7
Registered design	81.6	18.4	20.2
Claimed brand name	88.4	11.6	14.4
At least one form of Intellectual Property Right	78.0	22.0	33.1

Source: 2021 PSIA, PIDS

Apart from the use and development of innovative products and processes, innovation comprises the implementation of organizational innovation. This includes new organizational approaches to business practices, workplace organization, external relations, etc. Innovation also includes marketing innovation such as the implementation of novel marketing methods in the changes in product design or packaging, product promotion, or pricing. A greater share of large firms in comparison to micro-enterprises engage in organizational innovations (**Figure 9**). In terms of sectors, large food manufacturing firms and large ICT firms tend to have the most number of organization innovators while MSMEs in the services sector (ICT, BPO and Other services) tend to have the most organization innovators.

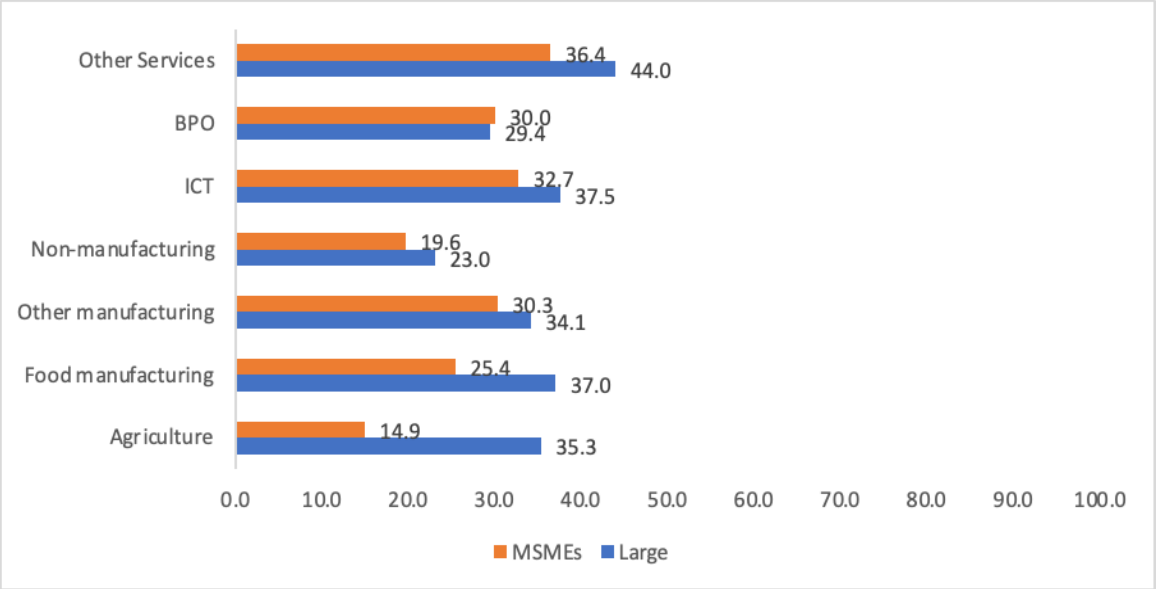
Figure 9. Proportion of organizational innovation among MSMEs and large establishments, by industry



Note: ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Around three-eighths of large firms in ICT (37.5%) and food manufacturing (37%) were engaged in marketing innovation (**Figure 10**). On the other hand, MSMEs in the food manufacturing sector had lower marketing innovation. (25.4%)

Figure 10. Proportion of marketing innovation among MSMEs and large establishments by industry



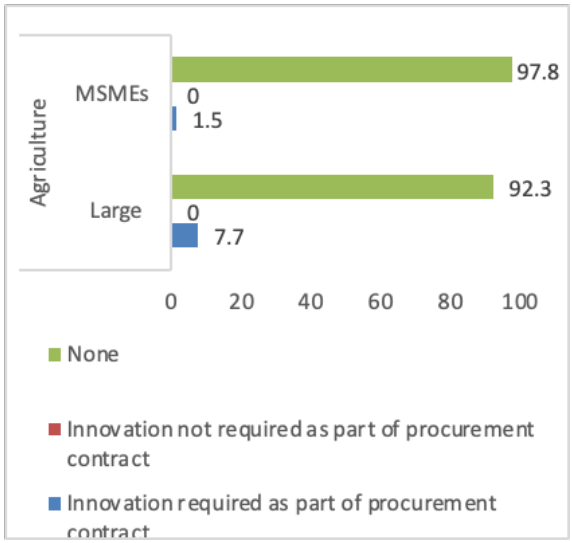
Note: MSMEs = micro, small, and medium enterprises; ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Several establishments have also reported undertaking innovation (i.e., product, process, marketing, or organizational) as part of a procurement contract to provide goods and services to a public sector entity. Only 3.5% of establishments undertook (product, process, marketing or organizational) innovation as part of a procurement contract to provide goods and services to a public-sector organization, of which about half (46.0%) did so as the innovation was required from the procurement contract. Regulatory barriers are the biggest reported challenge in providing innovative goods and services to the public procuring entity, with nearly 40 percent of firms reporting challenges on regulatory barriers. Around a quarter of firms also reported difficulties from unavailability of the good or service in the local market (27.8%) and inability to meet the technical specifications in the contract (23.8%).

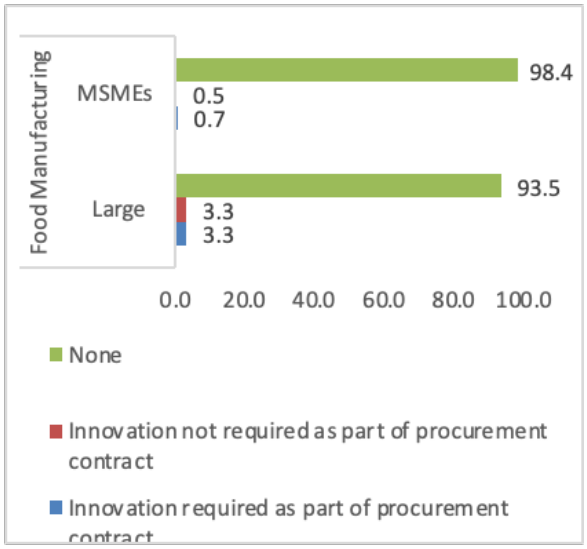
Among food and other manufacturing establishments, 3% of large firms have reported engaging in innovation as part of a government procurement contract while less than 1% have undertaken such activities among MSMEs (**Figure 11**). Among ICT firms, there is minimal difference in MSMEs who have engaged in innovation activities as a requirement of the procurement contract (1.7%) and those that were not required (1.2%).

Figure 11. Proportion of MSMEs and large establishments that undertook innovation activities as part of a procurement contract to provide goods or services to a public sector organization, by industry

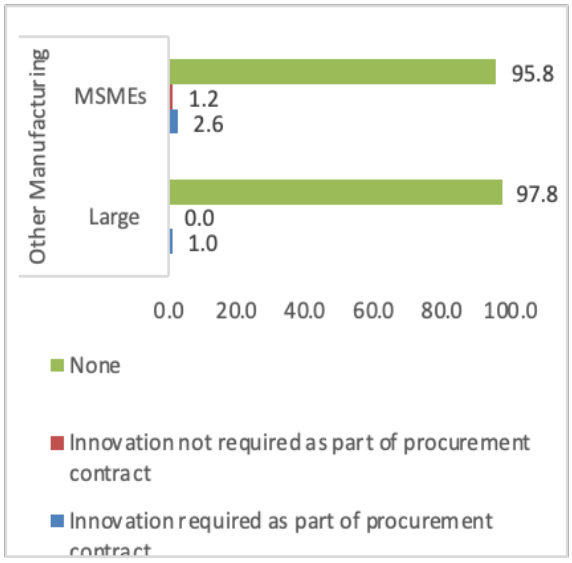
(a) Agriculture



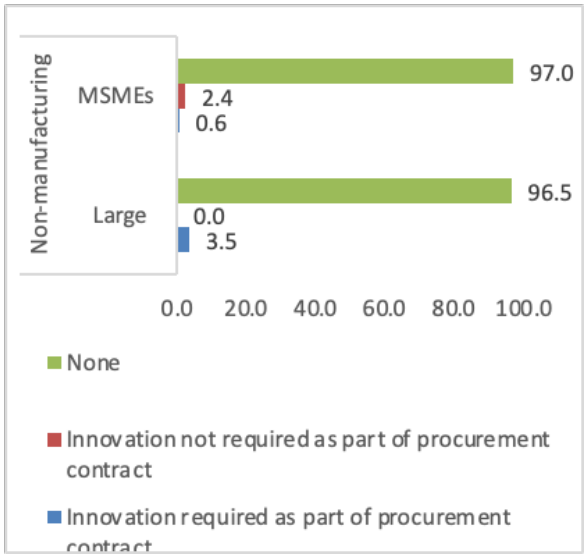
(b) Food Manufacturing



(c) Other manufacturing

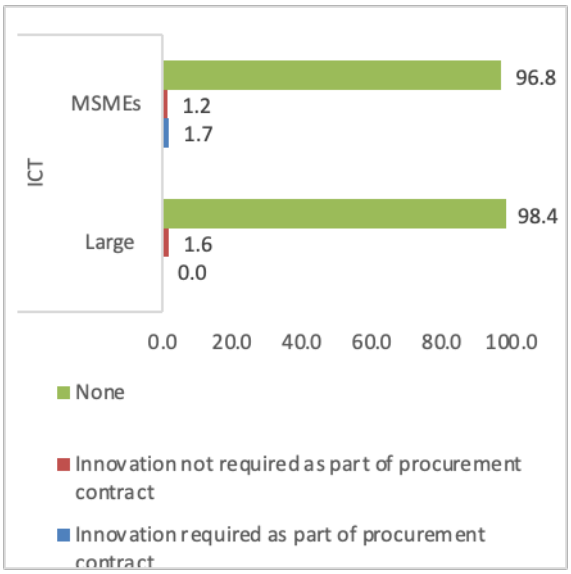


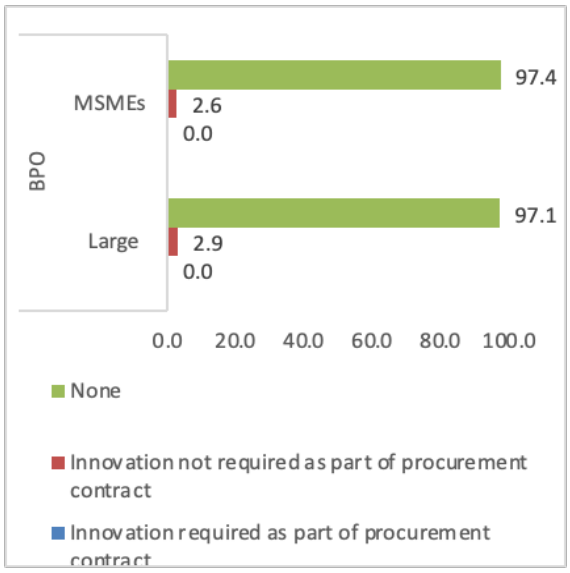
(d) Non-manufacturing



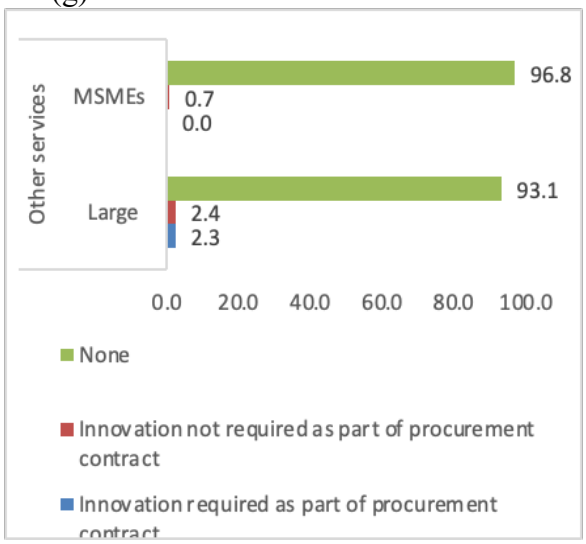
(e) ICT

(f) BPO





(g) Other Services



Note: MSMEs = micro, small, and medium enterprises; ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

4. Effects and Sources of Innovation

Similar to the earlier rounds, the 2021 PSIA gathered information on the perceived effects of innovation on firms. Respondents were asked to rank various potential effects of innovation on a scale ranging from 'not relevant' (4), to 'low' (3), 'medium' (2), and 'high' (1). Table 10 reports the percentages of innovation-active firms that answered 'high' in each potential outcome associated with product and process innovation. Meanwhile, the perceived effects of organizational innovation and marketing innovation are presented in Tables 11 and 12, respectively.

Table 10 shows that, overall, product-oriented effects were more often highly rated (24-40%) than process-oriented effects (17-32%). The perception of product and process innovation effects also varied across industries and firm sizes. In the agriculture sector, large firms

exhibited higher percentages of establishments that gave a 'high' rating on all product- and process-oriented effects, compared to MSMEs. The disparity becomes more apparent when looking at the figures of agriculture MSMEs, as they registered zero percentages in most process-oriented effects; innovators among agriculture MSMEs mostly perceived the significance of innovation in increasing the range of goods or services (17.2%). Meanwhile, 25.3% of small and medium innovating firms in the sector noted substantial effects on reducing environmental impacts or improving health and safety, while 19% rated 'high' the effects on improving the quality of goods or services.

Large firms in the industry sector also registered the highest proportions in all product- and process-oriented effects, except entering new markets or increasing market share. Improving the quality of goods and services also seems to be the most evident effect of innovation among industry firms regardless of size–large firms registered a proportion of 46.4%, while 38.2% and 37.7% of micro and small/medium firms, respectively, rated the effect as 'high.'

Looking at the industry subsectors, large firms have higher percentages of 'high' responses, except in certain outcomes. In food manufacturing, large firms (26.6%) have a lower percentage then micro (40.1%) and small/medium firms (52.9%) in terms of improving the quality of goods and services. In other manufacturing and non-manufacturing industries, MSMEs exhibited higher percentages of 'high' rating on the impact of innovation on access to new markets or increasing market share. Among industry MSMEs, improved quality of goods and services was the top-rated product-oriented effect, with the percentage share of 'high' rating ranging from 31-52%. This is followed closely by increasing range of goods or services for micro-firms and some process-oriented effects for small/medium firms. Other notable effects among large firms include increasing range of goods/services (38.8%) and entering new markets (38.8%) in food manufacturing, improving quality of goods/services (48.7%) in other manufacturing, and positive impact on company culture (54.6%) in non-manufacturing industries.

The trends exhibited by the proportions among services firms were also similar, as large firms led in several outcome categories, except for entering new markets, reducing environmental impacts, meeting regulatory requirements, and positive impact on company culture. Thirty-one percent of micro firms in the ICT sector gave a 'high' rating on improving quality of goods/services, while the proportion of small/medium and large firms stood at 43.3% and 63.2%, respectively. The aforementioned effect was also the highest rated among MSMEs in the BPO sector—half of the micro firms and 45.6% of small/medium firms perceived that innovation substantially improves the quality of goods/services. Meanwhile, for large BPO firms, increasing the range of goods and services was the more prominent effect of product innovation, with half of the establishments giving a 'high' rating. Improving the quality of goods/services was also the most important effect among micro (41.4%) and small/medium (42.4%) in other services sectors, while 37.2% of large firms highly perceived the impact of innovation on meeting regulatory requirements.

The 'high' perception of all establishments on the effects of organizational innovation ranged from 23% (reduced time to respond) to 43% (improved quality of goods). Compared to product- and process-oriented effects, small and medium firms exhibited the highest proportions of 'high' perception in most outcomes. Increased public awareness of the company/product/service was the top effect among large firms (54.1%), while improved quality of goods/services and improved communication or information sharing were the most highly rated by micro (40.1%) and small/medium (46.9%) firms, respectively. Similar to

product- and process-oriented effects, large firms in agriculture exhibited greater proportions of 'high' ratings than MSMEs (**Table 11**).

In the industry sector, micro and/or small/medium firms registered higher percentages than large establishments in terms of improving employee satisfaction, improving communication or information sharing, and increasing public awareness. Improving the quality of goods/services was the top effect among manufacturing industries. At least half of food manufacturing firms, regardless of the size, gave a 'high' rating on the said outcome. On the other hand, the proportion of high rating among micro, small/medium, and large firms in other manufacturing sectors stood at 36.1%, 55.5%, and 51.7%, respectively. In non-manufacturing industries, the effects with the greatest proportion of high perception varied across sizes—improving the quality of goods/services was highly rated by 40.6% of micro firms, around half of small/medium firms gave a 'high' rating on improving communication, and 53.3% of large firms highly perceived the effect on increasing public awareness.

Certain trends in the perception of services firms could be observed in the generated percentages for the organizational innovation effects. Overall, the most often highly rated effects were improving the quality of goods/services and increasing communication or information sharing. Among ICT firms, improved quality had the highest proportions among micro firms (42.1%), while increased communication was highly perceived by 46.7% of small/medium firms and 65.1% of large firms. In the BPO sector, 52.9% of micro firms 72.7% of large firms noted the significant effects on increasing communication, while 44.8% of small/medium establishments gave a 'high' rating on improved goods/services quality. Around half of firms in other services highly perceived the effect of organization innovation on improving goods/services quality.

In terms of marketing innovation effects, large firms had greater percentages of high perception across all outcomes (**Table 12**). This trend is more evident in the agriculture sector, where the proportion of large firms that gave a 'high' rating ranged from 56-78%. In contrast, the highest proportion among micro firms was in terms of sales growth (27.2%), while 44.2% of small/medium firms gave a 'high' rating on improved customer satisfaction. The same could be observed in the services sector, although the differences in proportions were relatively less. However, a closer look at the subsectors reveals that, for some outcomes, MSMEs had greater proportions of 'high' rating than large firms. For instance, the percentage of 'high' responses of small/medium BPO firms stood at 62.7% for expanded market reach; this is higher than the 52.6% registered by large firms.

Results in the industry sector, on the other hand, show that some outcomes are more often highly rated by small and medium firms than large firms. This is mainly driven by the proportions generated in non-manufacturing industries, as small/medium firms had higher proportions of 'high' ratings across all marketing innovation effects (37-60%, as opposed to 24-53% of large firms). Meanwhile, the opposite could be observed in the manufacturing sectors, except for increased market leadership/concentration in other manufacturing.

Table 10. Proportion (%) of innovation-active establishments that rated effects of product and process innovation as 'high', by major sector and size of firm

	Perceived Effects of Organizational Innovation	Agriculture				Industry				Services				Total			
		Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms
Product-oriented Effects	Increased range of goods or services	17.2	12.8	54.5	17.7	27.2	30.6	40.2	29.7	35.7	38.3	39.6	36.7	33.6	34.2	41.0	34.1
	Entered new markets or increased market share	5.7	15.9	27.3	13.8	16.5	24.9	20.2	20.9	25.5	28.8	27.6	26.6	23.3	26.7	24.3	24.6
	Improved quality of goods or services	5.7	19.0	81.8	20.4	38.2	37.7	46.4	38.4	40.7	42.8	45.0	41.4	39.6	39.7	48.3	39.9
Process-oriented effects	Improved flexibility of production or service provision	0.0	9.6	54.5	10.5	26.5	32.2	41.4	30.2	33.1	33.5	37.1	33.3	31.1	31.9	40.3	31.8
	Increased capacity of production or service provision	0.0	6.3	54.5	8.5	25.3	31.8	38.5	29.3	29.8	33.4	37.7	31.2	28.4	31.5	39.2	30.0
	Reduced labor costs per unit output	0.0	9.4	54.5	10.4	12.5	20.5	27.3	17.4	17.3	20.4	21.5	18.5	16.0	19.9	26.5	17.9
	Reduced materials and energy per unit output	0.0	6.3	81.8	10.9	13.6	17.6	26.5	16.4	16.1	20.0	23.1	17.6	15.3	18.5	28.8	17.0
Other effects	Reduced environmental impacts or improved health and safety	11.4	25.3	54.5	23.6	20.5	31.9	41.2	27.4	28.7	29.4	27.9	28.9	26.7	30.1	35.7	28.3
	Met regulatory requirements	5.7	18.8	54.5	17.9	20.5	33.9	41.3	28.4	32.3	34.1	31.2	32.9	29.4	33.3	37.4	31.2
	Increasing collaboration with other institutions or agencies	0.0	13.0	27.3	10.2	13.1	20.1	23.4	17.2	19.6	23.1	28.9	20.9	17.9	21.5	26.3	19.6
	Competitive advantage over other competitors in the industry	5.7	6.5	27.3	8.1	15.7	22.6	37.8	20.5	27.5	31.2	40.3	29.0	24.6	26.9	38.2	26.0
	Positive impact on company culture (e.g. innovation mind setting)	5.7	9.4	27.3	9.8	15.9	26.9	46.4	23.2	30.3	34.6	34.0	31.8	26.9	30.5	39.1	28.7
	Increased profitability and maximized return on investment (ROI)	0.0	6.3	27.3	6.2	18.5	27.4	35.1	23.9	24.7	30.8	36.9	27.0	22.9	28.3	35.4	25.5

Note: Mi = micro; Sm = small; Md = medium; Lg = large; ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Table 11. Proportion (%) of organizational innovators that rate effects of organizational innovation as 'high' by major sector and size of firm

Perceived Effects of Organizational Innovation	Agriculture				Industry				Services				Total			
	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms
Reduced time to respond to customer or supplier needs	9.2	11.6	19.3	11.4	22.4	16.6	31.3	21.1	16.4	25.3	34.7	22.8	20.9	23.2	28.7	23.3
Improved quality of goods or services	25.9	30.6	38.6	29.8	54.0	51.5	54.0	53.3	37.4	57.3	53.3	49.9	40.1	43.9	43.2	42.9
Reduced costs per unit output	6.1	19.6	38.6	17.0	24.1	19.6	50.4	23.8	8.7	32.0	32.6	23.7	12.1	25.0	36.0	23.1
Improved employee satisfaction and/or lower employee turnover	12.2	26.6	38.6	23.4	34.4	34.5	30.2	34.3	20.1	31.8	35.8	27.9	29.9	36.5	32.5	34.6
Improved communication or information sharing	21.4	29.3	38.6	27.7	46.5	35.4	42.9	43.2	23.2	37.4	40.5	32.6	28.4	46.9	43.3	42.2
Increased public's awareness of the company/product/service	29.0	26.5	38.6	27.9	45.4	40.5	35.5	43.6	23.8	38.8	38.9	33.5	31.5	40.1	54.1	39.6
Increased ability to develop new products or processes	19.8	19.7	38.6	20.8	31.3	32.9	35.5	31.9	24.3	39.4	37.8	33.9	20.1	29.3	25.3	26.7
Others	0.0	0.0	-	0.0	8.9	17.4	0.0	10.2	5.0	10.2	69.6	7.7	6.0	11.1	41.2	8.2

Note: Mi = micro; Sm = small; Md = medium; Lg = large; ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Table 12. Proportion (%) of market innovators that rate effects of market innovation as 'high' by major sector and size of firm

Perceived Effects of Market Innovation	Agriculture				Industry				Services				Total			
	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms
Sales growth for its goods and services	27.2	32.1	56.2	32.7	24.8	38.9	44.1	32.4	37.2	42.0	54.5	38.9	35.0	40.5	50.0	37.3
Increase in product/service exports	17.3	18.1	56.2	20.8	15.7	28.1	28.9	22.2	24.9	26.7	40.0	25.7	23.2	26.7	36.0	24.8
Increased visibility of products or business	22.3	23.9	78.1	27.6	22.3	35.2	39.5	29.3	33.6	37.9	50.0	35.2	31.6	36.4	47.1	33.6
Expanded market reach (whether local or global)	7.8	16.1	78.1	18.9	18.6	28.9	27.3	23.9	27.4	33.1	46.4	29.4	25.7	31.0	39.8	27.9
Strengthened relationships with customers	22.3	34.2	78.1	34.6	34.0	47.9	48.6	41.3	45.0	47.6	59.0	46.0	42.9	47.1	55.6	44.7
Improved customer satisfaction	17.3	44.2	78.1	40.0	39.6	51.6	50.6	45.8	47.5	49.9	59.8	48.4	45.9	50.2	56.8	47.6
Identified more specific sectors for target market	12.3	28.4	56.2	26.5	24.1	37.3	33.4	30.8	34.3	38.1	43.5	35.6	32.4	37.4	39.8	34.3
Increased market share	12.3	24.2	56.2	23.7	17.4	28.2	32.8	23.3	26.5	31.0	42.6	28.1	24.8	29.8	39.1	26.9
Increased market leadership/market concentration	12.3	22.1	56.2	22.2	23.1	29.5	32.1	26.6	29.0	32.2	44.5	30.2	27.8	30.9	39.7	29.2
Others	67.2	0.0	-	38.9	24.3	0.0	-	16.5	5.0	27.7	25.1	12.8	11.4	20.8	25.1	14.7

Note: Mi = micro; Sm = small; Md = medium; Lg = large; ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Engaging in innovation activities is a complex process that requires efficient consolidation of various inputs. Firms could acquire valuable information on successfully adopting innovation from several sources. Sources of technology and innovation-related knowledge and information could be internal (i.e., from within the establishment itself or from other establishments within the enterprise) or external. The latter could be further categorized as follows:

- Market: suppliers, customers, competitors or other businesses, consultants, commercial laboratories, or private R&D institutes
- Institutional: higher education institutions, government, or public research institutes
- Other sources: funders, infrastructures, innovation hubs, regulatory bodies, conferences, trade fairs, exhibitions, journals and other publications, professional and industry associations

Establishments were asked to rank the different information sources, according to the degree of their contribution to new and/or existing innovation projects, on a scale from 'not used' (4) to 'high importance' (1). **Table 13** shows the proportion of firms that responded 'high' in each potential source. Overall, acquiring innovation-related information was mainly internal or market-driven. Clients and customers were the top-rated source, with 33.7% of firms noting the high importance of these sources. Internal sources, meanwhile, highly contributed to the innovation projects of 30.9% of the firms. Across firm sizes, large firms exhibited the highest proportions in all sources, except funders and innovation hubs. Internal sources were the main sources of innovation-related information for large firms (43.6%) and small/medium (34.9%). Most micro firms, however, highly rated clients or customers are information sources (33.7%).

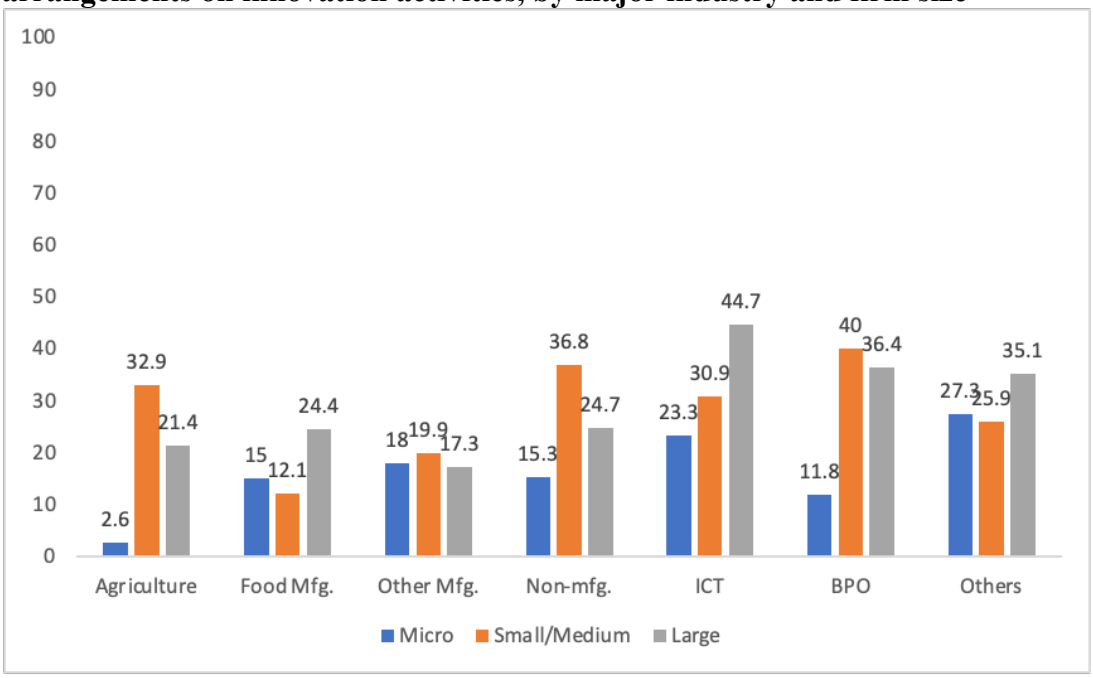
Table 13. Proportion (%) of establishments rating information sources as of 'high' importance, by size of establishment

Information Source		Proportion (%)			
		Micro	Small/ Medium	Large	All firms
1. Internal source	a. Within the establishment or enterprise	28.8	34.9	43.6	30.9
2. Market source	a. Suppliers of equipment, materials, components, or software	20.2	26.0	30.2	22.2
	b. Clients or customer	33.7	33.5	38.7	33.7
	c. Competitors or other enterprise in your sector	21.8	20.0	22.5	21.3
	d. Consultants, commercial laboratories, or private R&D institutes	12.9	13.3	20.7	13.2
3. Institutional source	a. Universities or other higher education institutions	7.6	9.1	10.8	8.1
	b. Government or public research institutes	6.8	10.7	10.7	8.1
4. Other sources	a. Funders (e.g. grant providers, venture capital, investors, etc.)	10.4	11.5	11.2	10.7
	b. Infrastructure (e.g. Fablabs/living labs, incubators, shared facility/co-working spaces, etc.)	6.8	8.3	11.0	7.3
	c. Innovation hubs (e.g. technology business incubators, startup accelerators, innovation communities, etc.)	7.3	9.3	8.6	7.9
	d. Regulatory bodies (e.g. regulatory sandboxes, LGU)	6.2	8.0	17.2	7.0
	e. Conferences, trade fairs, exhibitions	9.3	10.3	14.4	9.7
	f. Scientific journals and trade/technical publications	6.4	7.1	14.2	6.8
	g. Professional and industry associations	9.0	9.4	13.1	9.2

Source: 2021 PSIA, PIDS

As shown in **Figure 12,** around one-fourth (25.2%) of innovation-active firms engaged in cooperation with other establishments or non-commercial institutions on their respective innovation activities. Large firms had a higher percentage of collaborative firms (29.5%) than micro (24%) and small/medium firms (26.6%). However, sectoral figures show that small/medium firms registered higher percentages in agriculture, other manufacturing, non-manufacturing industries, and BPO sectors than large firms. These firms had the highest proportion of innovation-collaborative firms in BPO (40.0%) and non-manufacturing industries (36.8%). The high proportion of large firms in ICT (44.7%) and other services (35.1%) might have substantially driven their overall figures.

Figure 12. Proportion (%) of innovation-active establishments with cooperation arrangements on innovation activities, by major industry and firm size



Note: Mfg. = manufacturing, ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Among collaborative firms, most had engagements at the national level, with 77% having engaged with clients or customers from the private sectors (Figure 12). Other establishments within its enterprise (75%) and suppliers of equipment and materials (74.8%) that are located within the Philippines. The figures also indicate that firms were least likely to cooperate with entities located within ASEAN. Overall, the most frequent partners were private sector clients (83%), suppliers (82.5%) and other establishments within the enterprise (82.5%). In contrast, universities, or higher education institutions (63%) and government or public research institutions were the least likely to be partnered by innovation-active firms (**Table 14**).

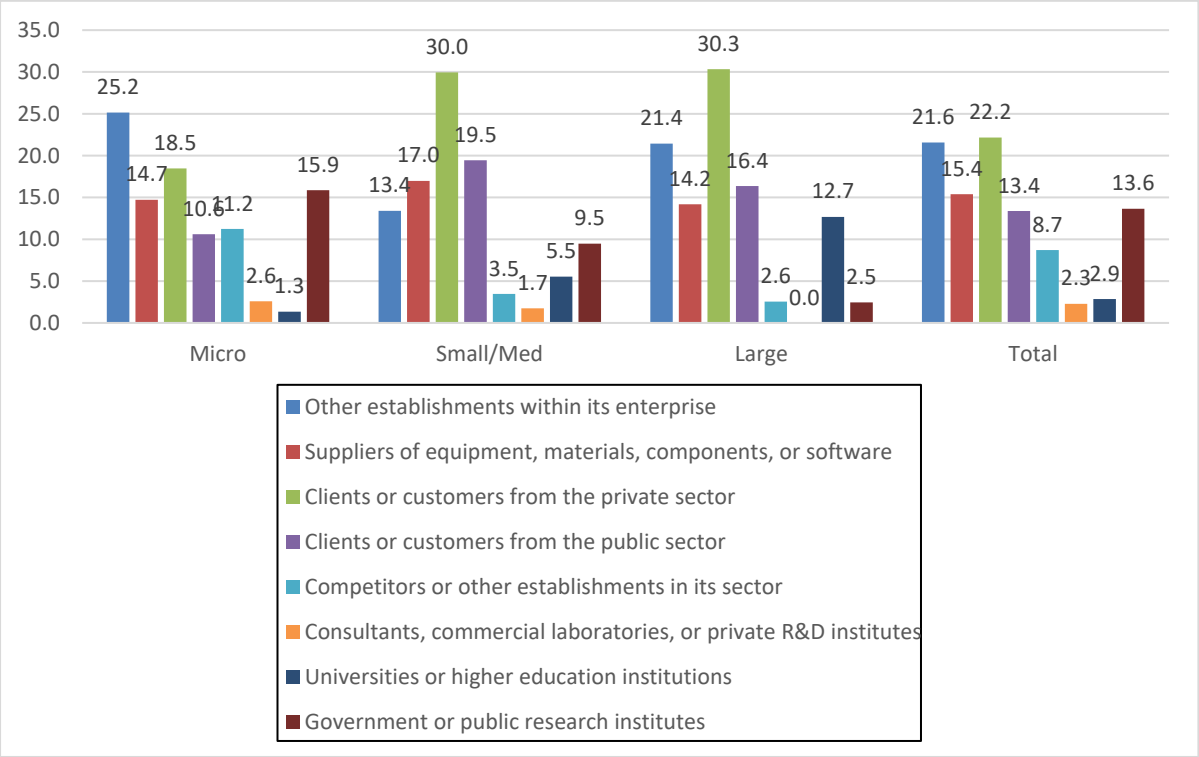
Table 14. Proportion (%) of innovation active and collaborative firms by cooperation partners

Type of Cooperation Partner	Proportion (%)			
	Philippines	Other ASEAN	All Other Countries	All Countries
Other establishments within its enterprise	75.0	6.4	8.8	82.5
Suppliers of equipment, materials, components, or software	74.8	7.1	9.6	82.5
Clients or customers from the private sector	77.0	4.7	8.1	83.0
Clients or customers from the public sector	72.5	2.6	3.0	74.4
Competitors or other establishments in its sector	67.5	1.3	2.1	70.3
Consultants, commercial laboratories, or private R&D institutes	64.7	1.3	2.4	66.7
Universities or higher education institutions	62.0	0.2	1.1	63.0
Government or public research institutes	63.5	0.4	0.9	64.3

Note: Other ASEAN= other countries within ASEAN region
Source: 2021 PSIA, PIDS

Clients in the private sector and other establishments within the enterprise were found to be the most valuable cooperation partners for by innovation-active firms, with 22.2% and 21.6% of firms noting private sector clients and internal partners, respectively, as most valuable. Among large firms, clients accounted for 30.3% of the establishments, while internal partners covered 21.4%. While 30% of small/medium firms found private sector clients as the most valuable partners, public sector clients were the second-most cited cooperation partners (19.5%). Meanwhile, among micro firms, internal partners were most valuable, cited by around one-fourth (25.2%) of the firms, while 18.5% found private sector clients as the top cooperation partners (**Figure 13**).

Figure 13. Cooperation partner found most valuable for innovation (innovation-active, collaborative establishments only)



Note: R&D = research and development
Source: 2021 PSIA, PIDS

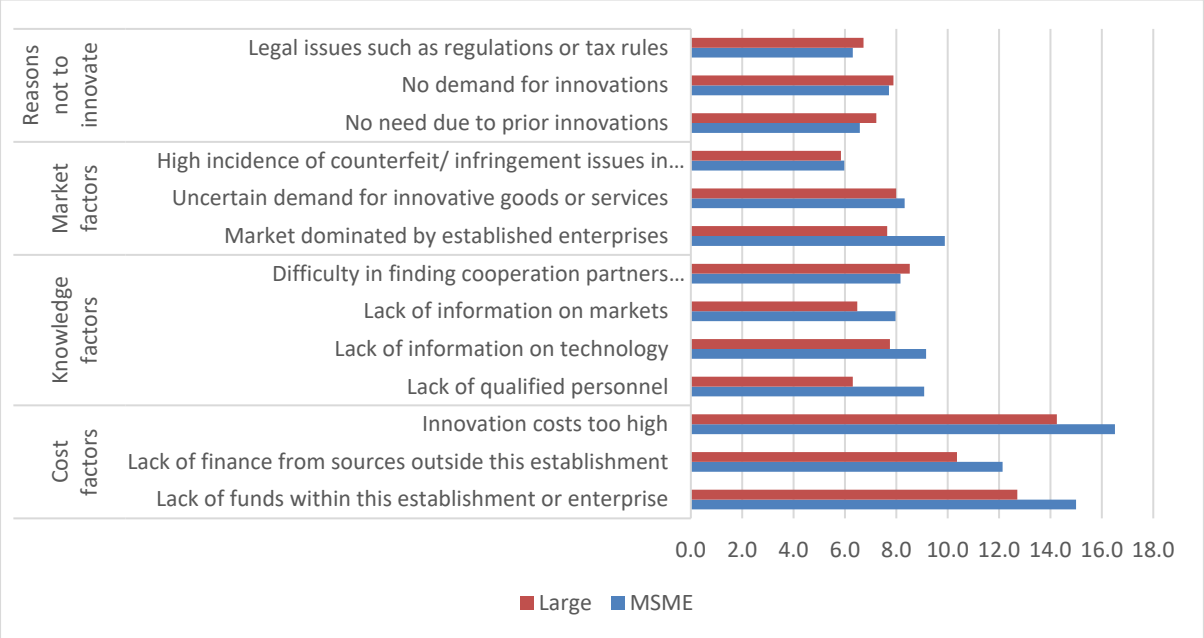
5. Factors influencing and/or preventing innovation

The 2021 PSIA asked establishments, both innovators and non-innovators, to assess the importance of various factors in hampering innovation activities or influencing the decision to innovate. They were asked to rate the degree of importance as High, Medium, Low, or Not experienced. Figures 14 to 16 show the results of responses that considered the factor of "high" importance.

As in the 2015 SIA, cost factors were the most common set of issues rated by the establishments as significant barriers to innovation. Specifically, 16.5% of establishments considered the prohibitive cost of innovation of high importance. This is followed by the lack of funds within the establishment and from outside sources at 15.0% and 12.2%, respectively.

The proportion of MSMEs was greater than that of large enterprises that rated the different barriers to innovation as highly important, except in a few cases where the differences are small (i.e. less than a percentage point) (**Figure 14**). However, the difference in perception by large firms and MSMEs on the importance of the factors changes depending on whether the firm was innovation active or not. See **Figure 15** and **Figure 16**.

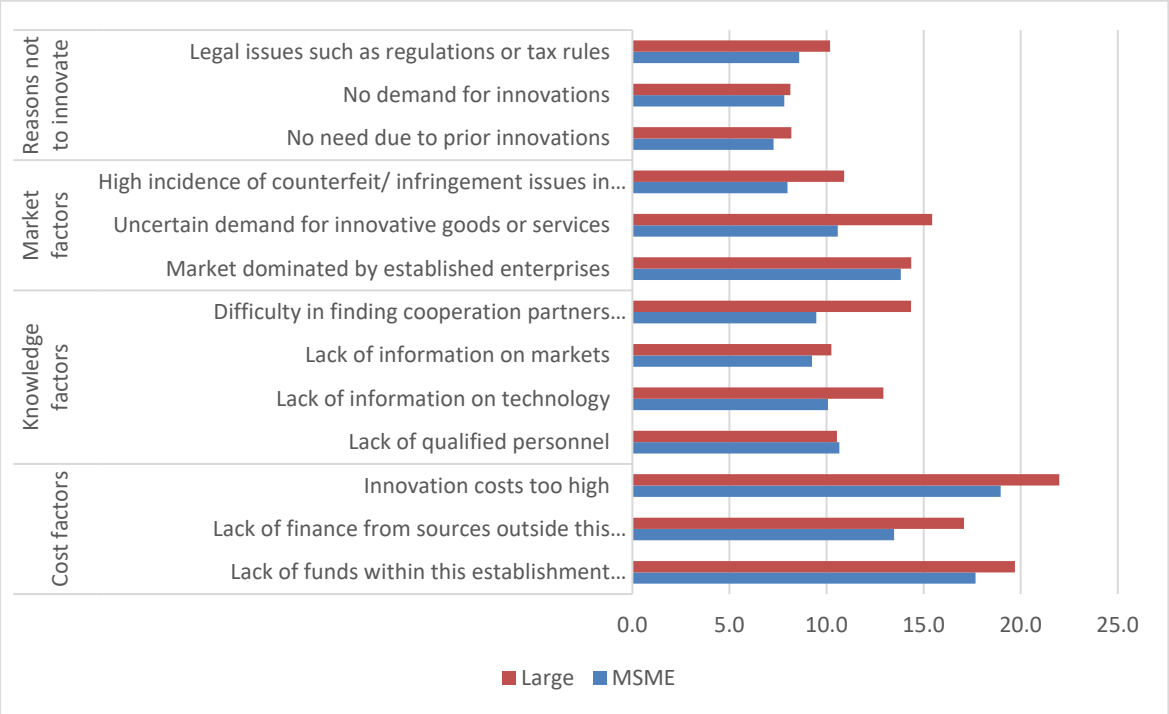
Figure 14. Proportion (%) of establishments that regarded the importance of barriers to innovation as "high", by size of establishment



Source: 2021 PSIA, PIDS

For those that were innovation active during the period, a greater percentage of Large establishments than that of MSMEs consider the barriers of high importance, except for one knowledge factor, the lack of qualified personnel, although the difference is very small (**Figure 15**).

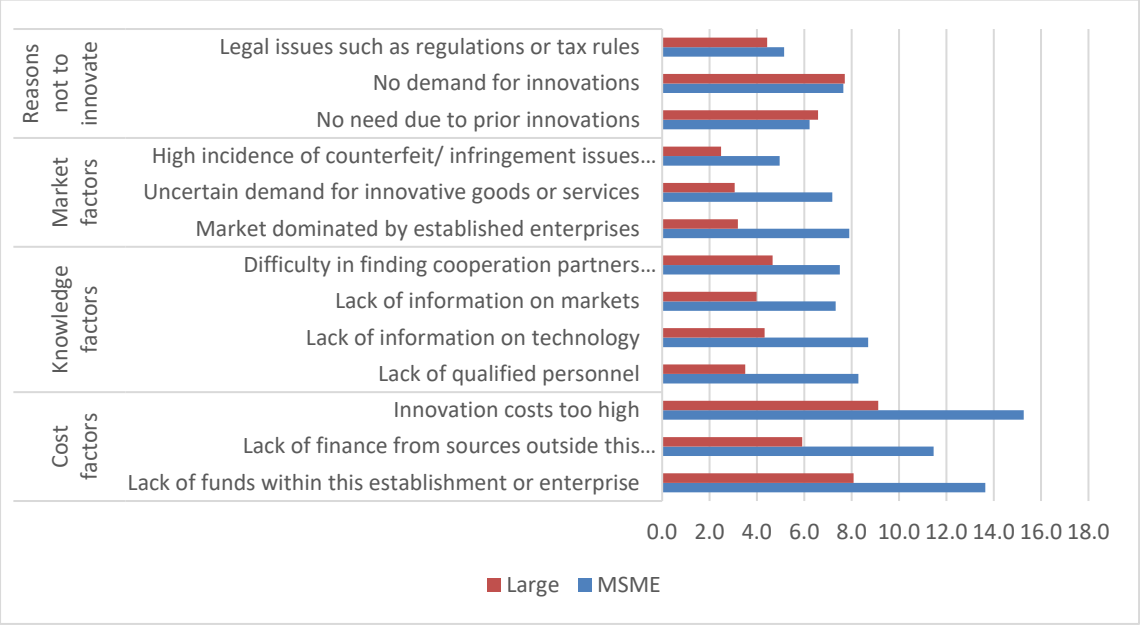
Figure 15. Proportion (%) of innovation active establishments that regarded the importance of barriers to innovation as "high", by size of establishment



Source: 2021 PSIA, PIDS

For firms that were not innovation active during the period, the pattern is reversed as the proportion of MSMEs was higher for all factors, except for two issues (no demand and prior innovations), but by a small margin only (**Figure 16**).

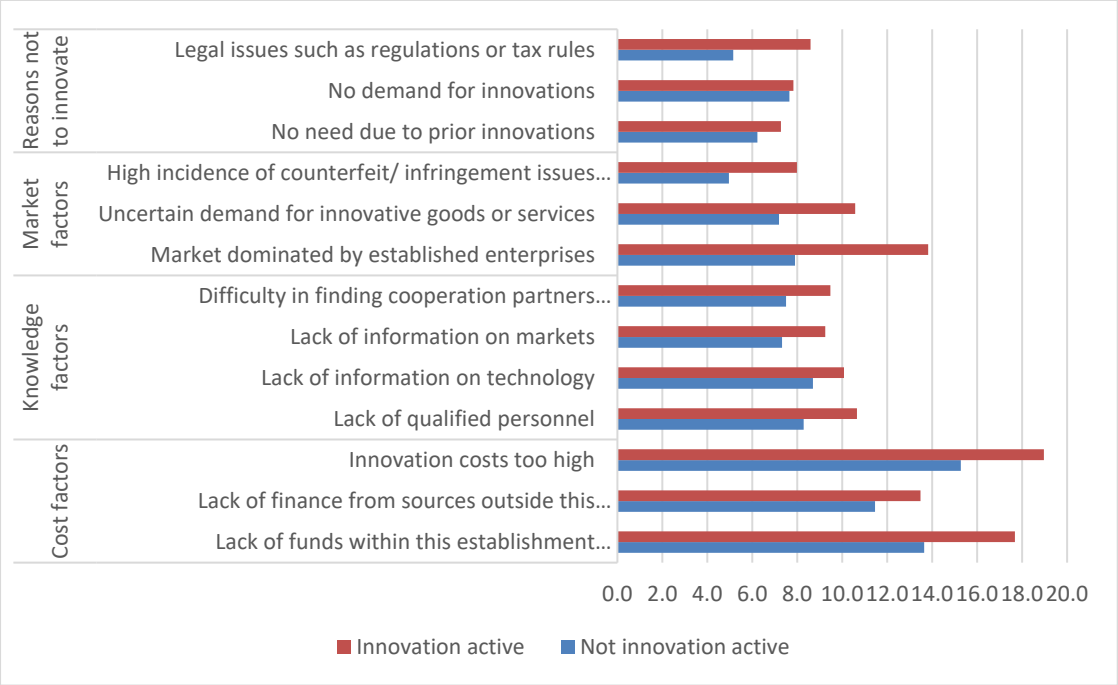
Figure 16. Proportion (%) of non-innovation active establishments that regarded the importance of barriers to innovation as "high", by size of establishment



Source: 2021 PSIA, PIDS

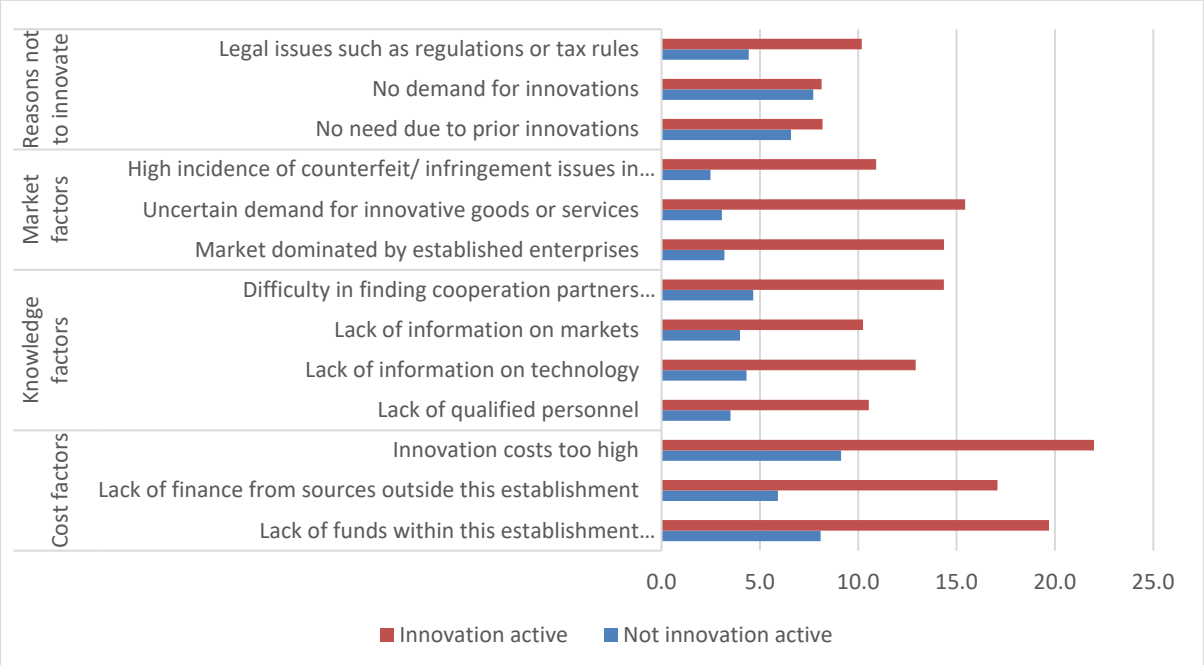
Regardless of size, a bigger percentage of innovation active firms compared to the non-innovation active firms rated the importance of the various factors as high (**Figure 17** and **Figure 18**).

Figure 17. Proportion (%) among MSMEs that regarded the importance of barriers to innovation as "high", by innovation status



Source: 2021 PSIA, PIDS

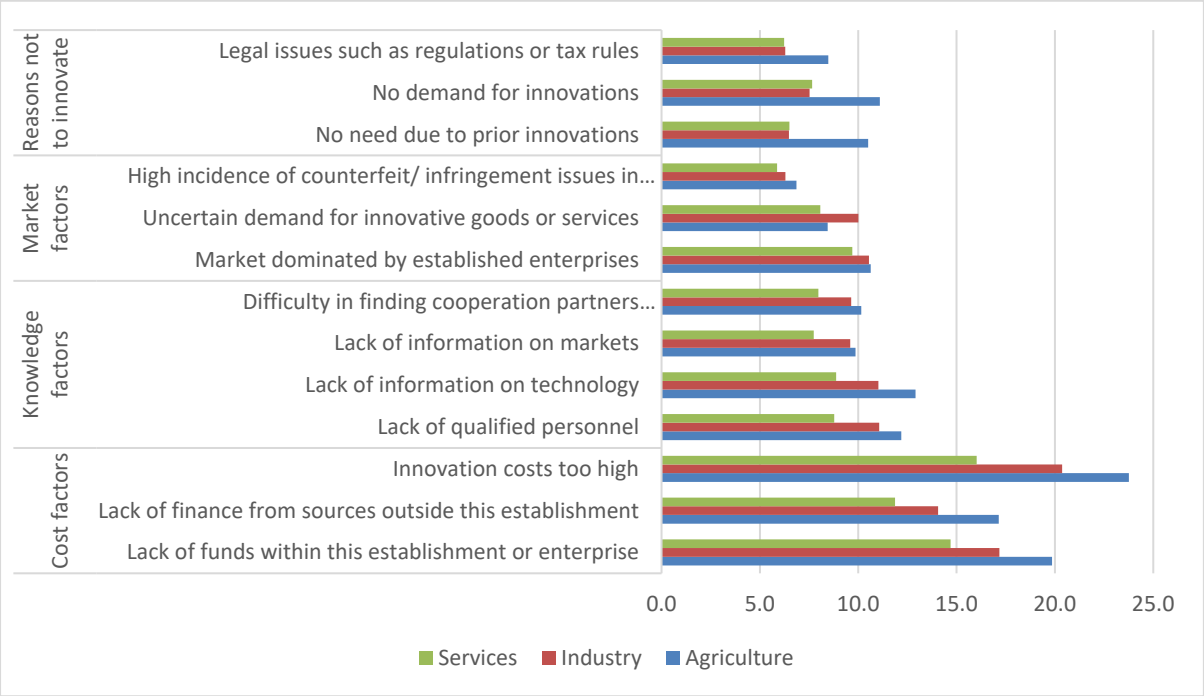
Figure 18. Proportion (%) of Large establishments that regarded the importance of barriers to innovation as "high", by innovation status



Source: 2021 PSIA, PIDS

Compared to other sectors, a larger proportion of establishments in Agriculture regarded the importance of the different barriers as high. This was the general pattern except for one factor, uncertain demand for innovative goods or services, where Industry had a slight lead (**Figure 19**).

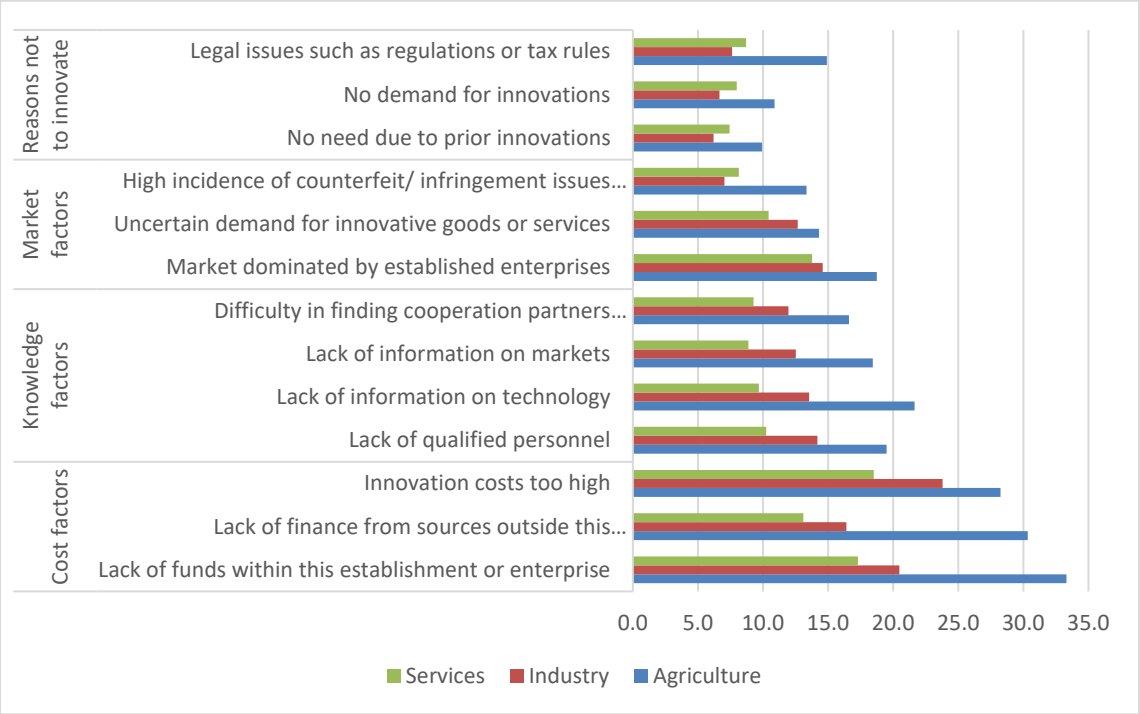
Figure 19. Proportion (%) of establishments that regarded the importance of barriers to innovation as "high", by sector



Source: 2021 PSIA, PIDS

For establishments that were innovation active during the period, Agriculture had the biggest proportion of establishments that regarded the importance of each of the factors as high. The cost factors were deemed especially significant among innovation active firms in the Agriculture sector compared to the other sectors (**Figure 20**).

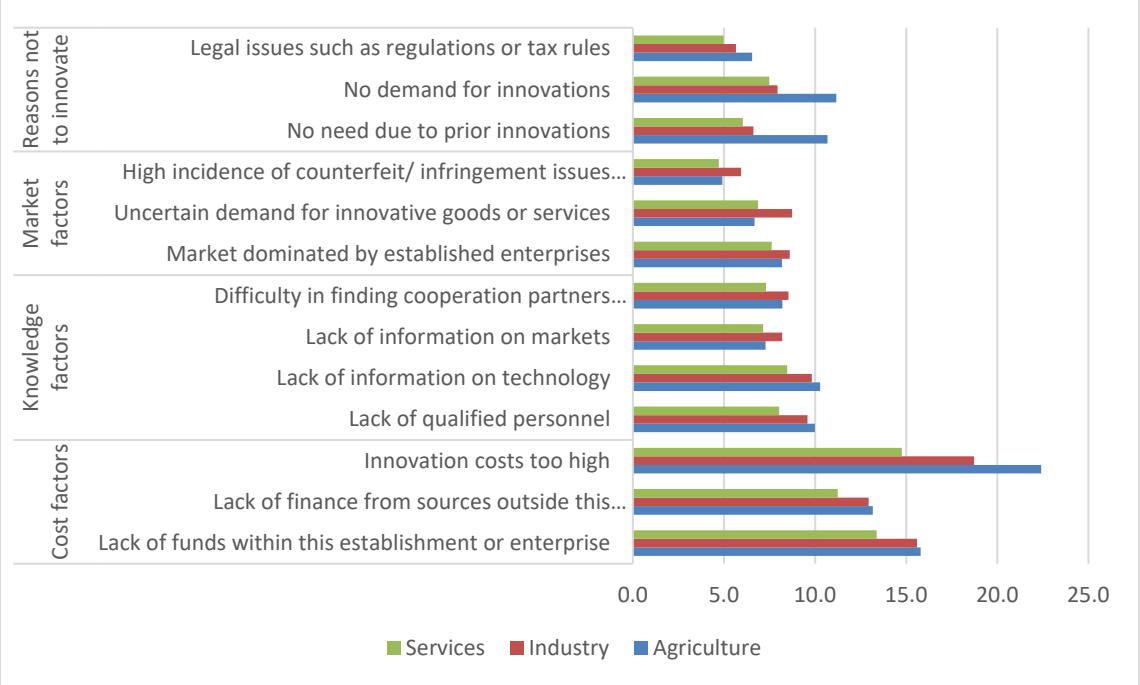
Figure 20. Proportion (%) of innovation active establishments that regarded the importance of barriers to innovation as "high", by sector



Source: 2021 PSIA, PIDS

For those that were not innovation active during the period, the Industry sector had the biggest proportion of firms that rated the importance of all three market factors and two knowledge factors as high, while Agriculture took the lead with the rest of the barriers, particularly in terms of innovation cost (**Figure 21**).

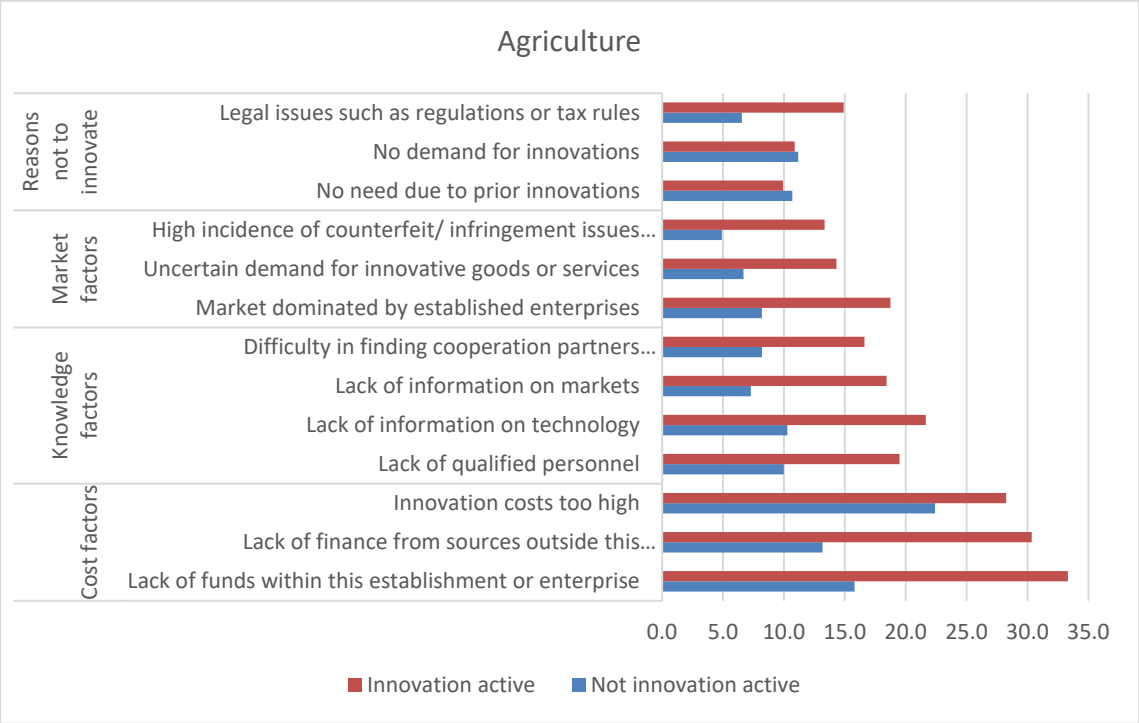
Figure 21. Proportion (%) of non-innovation active establishments that regarded the importance of barriers to innovation as "high", by sector



Source: 2021 PSIA, PIDS

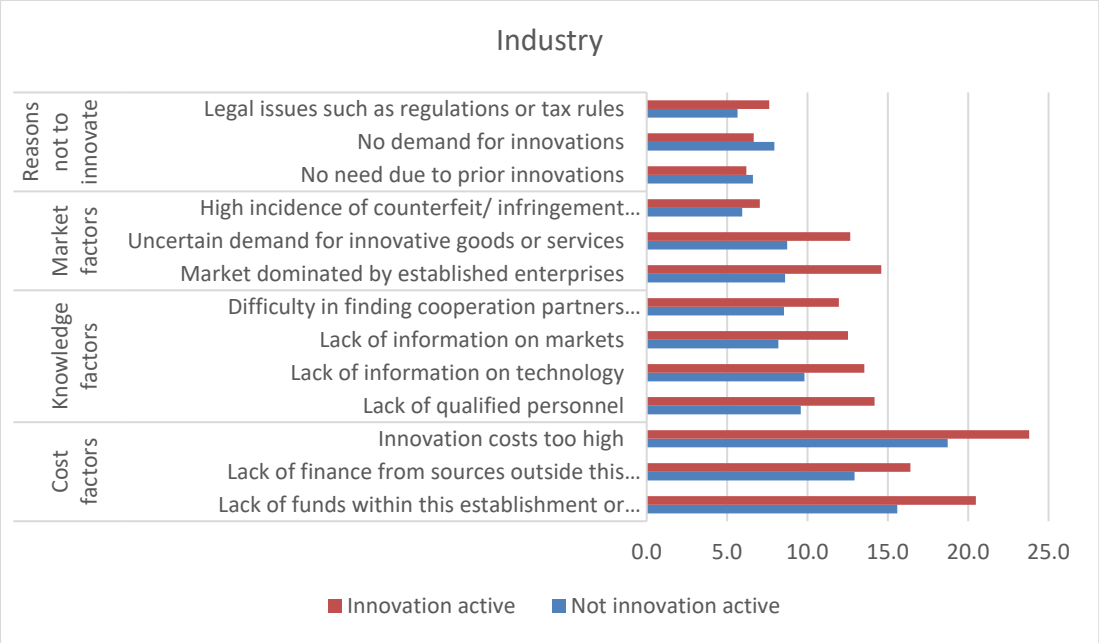
Regardless of sector, a bigger proportion of innovation active firms compared to the non-innovation active firms rated the importance of the various barriers to innovation as high. The few exceptions were for two factors (no demand and prior innovations) in both Agriculture and Industry. See **Figures 22-24**.

Figure 22. Proportion (%) of establishments in the Agriculture sector that regarded the importance of barriers to innovation as "high", by innovation status



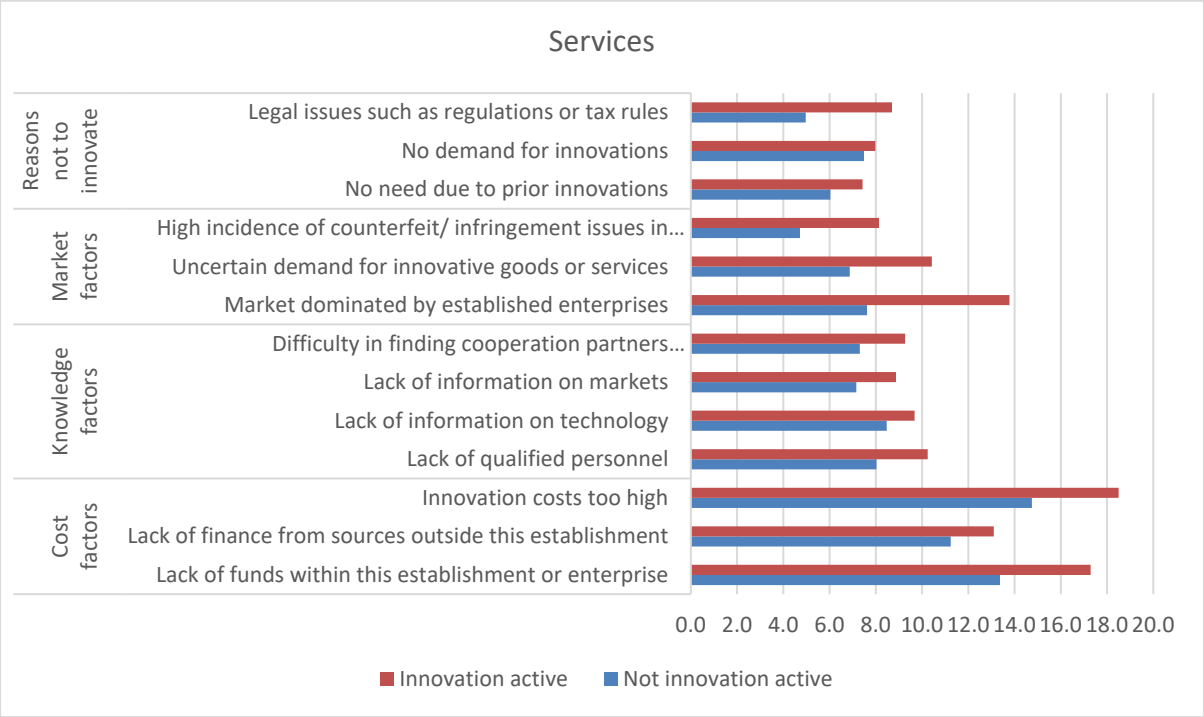
Source: 2021 PSIA, PIDS

Figure 23. Proportion (%) of establishments in the Industry sector that regarded the importance of barriers to innovation as "high", by innovation status



Source: 2021 PSIA, PIDS

Figure 24. Proportion (%) of establishments in the Services sector that regarded the importance of barriers to innovation as "high", by innovation status



Source: 2021 PSIA, PIDS

To identify determinants of innovation but netting out effects, we made use of cross-section econometric model, particularly a logit regression[5] model. The variables examined in the logistic model to explain how likely firms are product innovators, process innovators, organizational innovators, marketing innovators, and technological innovators, in general, include: gross sales; age of firm; share of employees with a post baccalaureate degree; export orientation (in particular, whether or not the firm has geographic market in ASEAN or other countries); foreign ownership (whether or not the firm has foreign capital participation); interaction of export orientation and foreign ownership; share of female employment; location of the firm; sector (i.e., agriculture, food manufacturing, other manufacturing, non-manufacturing industry, ICT, BPO, or other services); and, engagement in knowledge management practices.

[5] A logistic regression model is used to explain or predict a binary outcome from a set of p explanatory variables $x_1, x_2, \ldots, x_p$ that may be binary, continuous, or a mix of any of these. In this survey report, three logistic regression models are described. For each of the models, the dependent variable is dichotomous – whether a firm is a product innovator or not, whether a firm is a process innovator or not, and whether a firm is innovation active or not, and with probability of a firm being a product innovator, a process innovator or innovation active as θ.

In a logistic regression model, the log odds is a linear function of the p explanatory variables:

$$\log\left(\frac{\theta(x)}{1-\theta(x)}\right) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_p x_p$$

where the odds is the ratio of the chance of a firm is a product innovator (or process innovator or innovation active) to the chance it is not; α is the constant (intercept) of the logit equation and β_i is the coefficient of explanatory variable x_i.

If an explanatory variable is categorical or discrete with say k categories, then this variable will be represented by k-1 indicator variables representing the categories, with the "omitted" category serving as the base category to compare the other categories with.

Table 15. Determinants of innovation, by innovation activity

Variable	Innovation Active	Product Innovation	Process Innovation	Organizational Innovation	Marketing Innovation
Log(Firm Size)	0.156***	0.191***	0.128***	0.178***	0.135***
Age of Firm	0.004***	0.006***	0.004***	0.002***	0.007***
Share of employees with a post baccalaureate degree	0.315***	0.459***	0.219***	0.642***	0.046
Local Market Share	-0.351***	-0.271***	-0.439***	-0.300***	-0.398***
Foreign Ownership	0.001*	0.000	0.002***	-0.003***	0.001**
Share of Female Employment	0.131***	0.107***	0.06***	0.093***	-0.187***
Geo-domains					
NCR	-0.321***	-0.034	-0.227***	0.046	-0.264***
Balance Luzon	-0.082***	0.225***	-0.003	0.033	-0.188***
Visayas	0.090***	0.274***	0.187***	0.332***	-0.042
Mindanao	0.370***	0.537***	0.389***	0.307***	0.011
PEZA	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Sectors					
Agriculture	-0.730***	-0.664***	-0.718***	-0.595***	-1.286***
Food Manufacturing	0.145***	-0.062***	0.133***	-0.275***	-0.329***
Other Manufacturing	-0.152***	-0.112***	-0.213***	-0.347***	-0.46***
Non-manufacturing Industry	-0.451***	-0.546***	-0.551***	-0.324***	-1.386***
ICT	0.061	-0.056	-0.106***	-0.087*	-0.323***
BPO	-0.526***	-0.699***	-0.675***	0.062	-0.951***
Other Services	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Knowledge Management	1.276***	1.136***	1.403***	1.805***	1.627***
Constant	-9.709***	-13.303***	-10.398***	-5.958***	-15.287***
Number of Observations	8,733	8,708	8,474	7,420	8,583
LR $chi^2(17)$	32,764.9	21,609.3	33,135.7	48,741.1	48,480.8
Prob > chi^2	0.000	0.000	0.000	0.000	0.000
Pseudo R^2	0.087	0.070	0.099	0.149	0.128
Log likelihood	-172,692.5	-144,013.1	-151,520.5	-139,008.9	-165,873.9

Source: PIDS (2023)
Note: *=0.10 level of significance (LOS); **=0.05 LOS; ***=0.01 LOS

The results of the econometric model suggest that in general, the practice of knowledge management practices in establishments is a good determinant of innovation activity, process innovation, product innovation and wider forms of innovation. Human resources also matter—the share of employees with post baccalaureate degrees has a positive significant effect for innovation activity, product innovation, process innovation and organizational innovation.

A gender disparity indicator, namely, the share of women employees to total employment, also often contribute to explaining innovative behavior. Age of the firm also matters, older establishments are, all things being equal, more likely to be innovation active than younger ones. Meanwhile, foreign ownership matters on innovation activity, process innovation, organizational innovation, and marketing innovation. Export orientation is having a negative on process, organizational and marketing orientation. While bigger foreign capital participation seems to have a positive effect on process innovation and wider forms of innovation.

Regarding location, firms in NCR are less likely to be innovation active, process innovators, or marketing innovators. All other things being equal, Firms in Agriculture, Other Manufacturing, and Industries other than Manufacturing are less likely to be innovation active, product innovators, process innovators, org innovators, or marketing innovators.

Meanwhile, there were 618 observations in the 2021 PSIA that were previously captured in the 2015 SIA. As shown in **Table 16**, the panel firms were less innovation active in 2021 compared to six years prior. Among the MSMEs there was a reduction in innovation activity across the different types of innovation. The same pattern can be observed for large firms except in marketing innovation.

Table 16. Selected innovation statistics for panel establishments, by year

	Proportion (%)					
	2015			2021		
Innovation Activity	MSME	Large	All firms	MSME	Large	All firms
Innovation active	46.2	58.3	52.2	34.5	34.9	34.6
Product innovators	34.2	41.7	37.9	23.3	22.8	23.1
Process innovators	34.2	44.3	39.2	24.9	28.2	25.7
Organizational innovators	42.7	53.9	48.3	34.4	44.0	36.7
Marketing innovators	43.6	31.3	37.5	33.0	31.5	32.7

Source: PIDS (2023)

The proportion of panel establishments that were innovation active declined across all industries in 2021 compared to 2015. By type of innovation, the proportion of product and marketing innovators were highest in food manufacturing in 2021, the same as it was in 2015. In terms of process and organization innovation however, service industries had a higher proportion of innovators in 2021 whereas the Other manufacturing subsector led in 2015 (**Table 17**).

Table 17. Selected innovation statistics for panel establishments, by sector

	Proportion (%)									
	2015					2021				
Innovation Activity	Food Mfg	Other Mfg	ICT	BPO	All firms	Food Mfg	Other Mfg	ICT	BPO	All firms
Innovation active	55.4	54.5	45.2	35.3	52.2	39.2	33.2	35.1	24.1	34.4
Product innovators	41.9	38.2	38.7	17.6	37.9	24.4	22.6	23.1	10.3	22.4
Process innovators	40.5	41.8	38.7	17.6	39.2	25.0	24.8	27.9	24.1	25.4
Organizational innovators	44.6	56.4	38.7	29.4	48.3	36.8	33.7	40.6	52.9	36.3
Marketing innovators	51.4	31.8	32.3	23.5	37.5	37.8	29.1	34.3	27.6	31.9

Source: PIDS (2023)
Note: Mfg = Manufacturing; ICT = information and communications technology; BPO = business process outsourcing

There was a reduction in innovation behavior among panel establishments in the manufacturing industries in 2021 compared to 2015. For the panel establishments in the service industries, there was an increase in innovation activity in the BPO sector in terms of process, organizational and marketing innovation (**Table 18**). This development was in stark contrast to the 2015 SIA results when organizational innovation in the BPO sector experienced the biggest decline (in % points) among all industries and innovation activities compared to 2009 (Albert *et al*. 2018). The significant increase in the proportion of BPO panel establishments that engaged in organizational innovation could have been a response to the lockdowns and work from home arrangements instituted in 2021 particularly in industries where such measures were feasible. Although this needs to be validated, it would reflect how innovation enables enterprises to be resilient in the face of disruptions.

Table 18. Change in proportion of establishments in 2015 and in 2021 (in % points)

Innovation Activity	**Food Manufacturing**	**Other Manufacturing**	**ICT**	**BPO**	**All firms**
Innovation active	-16.2	-21.3	-10.1	-11.2	-17.8
Product innovators	-17.5	-15.6	-15.6	-7.3	-15.5
Process innovators	-15.5	-17.0	-10.8	6.5	-13.8
Organizational innovators	-7.8	-22.7	1.9	23.5	-12.0
Marketing innovators	-13.6	-2.7	2.0	4.1	-5.6

Note: ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Furthermore, **Table 19** shows the results of a panel logistic random effects model to explain innovative behavior of 616 firms sampled in both rounds of 2021 PSIA and 2015 SIA. Similar to the results of the cross-section logit regression, knowledge management practices remain a significant factor that explains innovative behavior, whether for innovation active firms, product innovators, process innovators, organizational innovators and marketing innovators. Meanwhile, size is a positive determinant for innovation active firms. Firms with foreign capital participation were less likely to be product innovators and marketing innovators. Across sectors, establishments in both food and other manufacturing sectors are more likely to be innovation active and process innovators, while ICT firms are also likely to be innovation active, *ceteris paribus*.

Table 19. Regression Results on Likely Factors that Explain Innovative Behavior Among Panel Firms

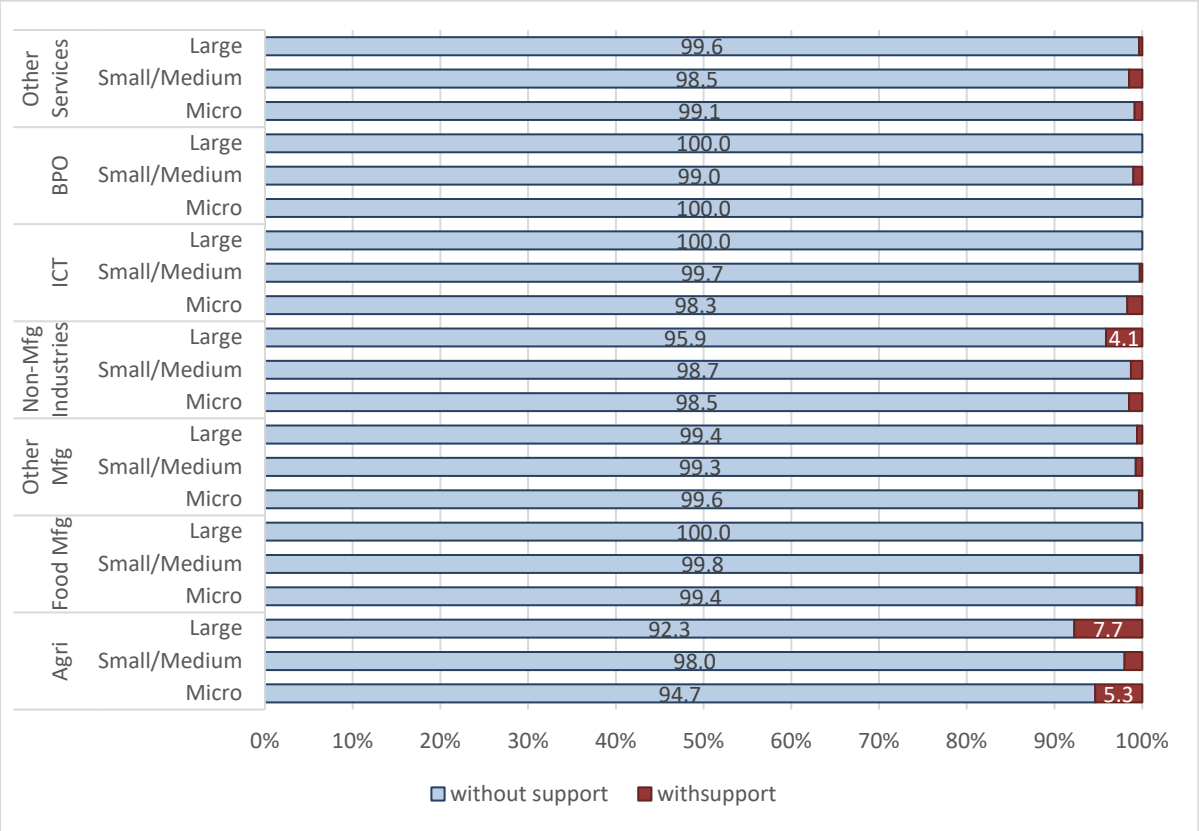
Variable	Innovation Active	Product Innovator	Process Innovator	Organizational Innovator	Marketing Innovator
Age	0.002	-0.103	0.035	-0.079	-0.042
Employment size (in logarithm form)	0.157**	0.072	0.088	0.03	-0.054
Geographic market is solely local market	-0.062	-0.164	0.132	-0.34	0.065
Share of foreign capital participation	-0.005	-0.013**	-0.003	0.001	-0.009**
Share of female employment	-0.112	0.483	-0.091	-0.618	0.191
Firm in PEZA (or not)	-3.476	206.661	-70.478	155.83	82.869
Industry Group					
Food Manufacturing	1.174*	0.413	1.069*	1.142	0.057
Other Manufacturing	1.177*	0.591	1.235**	1.25	0.1
ICT	1.316*	0.506	0.899	1.078	0.092
BPO	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Knowledge management	1.942***	1.91***	1.444***	2.799***	1.505***
Constant	-2.669***	-2.799**	-2.83***	-2.554**	-0.847
Number of panel observations	616	616	616	616	616

Note: (i) Authors' calculation on microdata of 2015 Survey of Innovation Activities, Philippine Institute for Development Studies and 2009 Survey of Innovation Activities, Department of Science and Technology. (ii) body of data are regression coefficients of panel logistic regression fixed effects models. (iii) * = significant at 0.10; **= significant at 0.05 level; ***=significant at 0.01 level. (iv) ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

6. Support for Innovation

Similar to the 2015 findings, firms in the 2021 PSIA seldom availed of public financial support for innovation, with only 1.1% of the firms getting support (**Figure 25**). Overall figures per firm size also reveal that large firms had a higher proportion of public financial support recipients (1.5%) than micro (1%) and small and medium firms (1.2%). Across industries, agriculture exhibited the highest percentages of recipients—7.7% of large firms availed support, while 5.3% of micro firms and 2% of small/medium establishments identified themselves as recipients. Meanwhile, 4.1% of the large firms in non-manufacturing industries availed of public financial support.

Figure 25. Proportion (%) of establishments with public financial support for innovation, by industry



Note: Mfg. = manufacturing, ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

Roughly one-fourth of firms (25.2%) were aware of any government innovation policies or programs. The proportions remain relatively the same across firm size with small and medium firms registering a proportion of 25.7%, followed by micro (24.9%) and large firms (24.5%). Among industries, those with an above-average level of awareness are non-manufacturing industries which registered a 26.3% awareness rate, and other services which 26.1% of firms in indicated awareness of government policies. Small and medium firms also exhibited the highest proportions in all industries, except non-manufacturing industries and BPO. Large BPO firms registered a 29.9% proportion of policy-aware firms, while 27.3% of large firms in non-manufacturing industries indicated their awareness of government innovation policies.

Of the policy-aware firms, only 10% were provided government support in their respective innovation activities in 2021. Small, medium, and large firms exhibited a proportion of 12.1% for recipients of government assistance, while only 8.8% of micro firms availed of innovation support. Agriculture had the highest proportion of recipient firms, at 18.3%, while 11.6% and 10.3% of firms in non-manufacturing industries and ICT, respectively, were provided government assistance in innovation. Worth noting as well is the very high proportion of micro (37.2%) and large (32.4%) agriculture firms that were provided government support in innovation (**Table 20**).

Table 20. Proportion of establishments aware of any government innovation policy or intervention and of which, were provided government support or assistance in innovation, by size and by industry

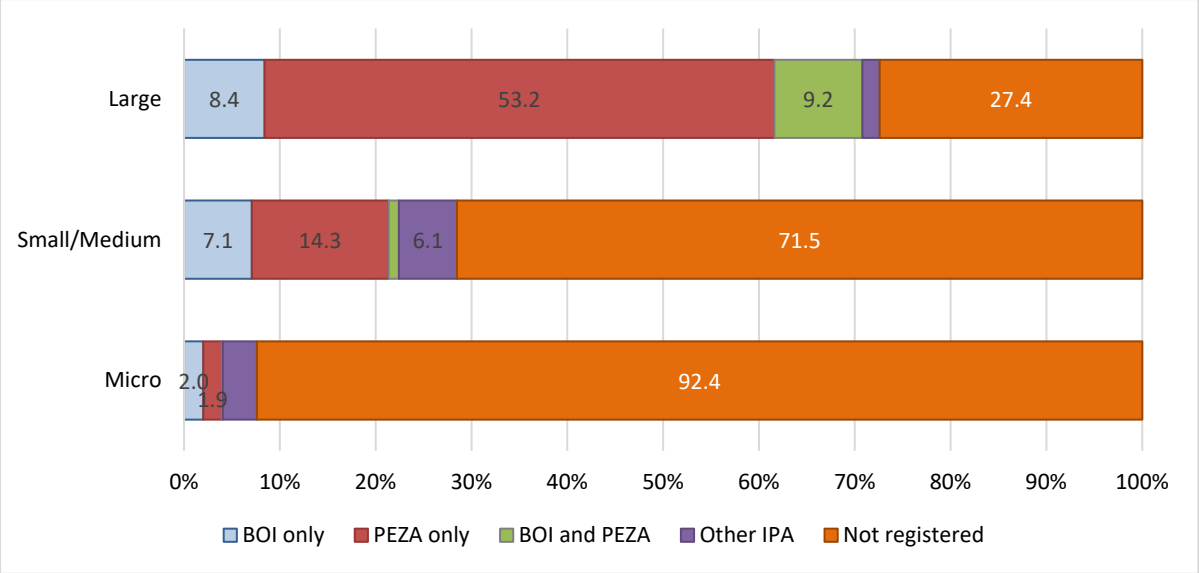
Industry	Size	Establishments Aware of Any Government Innovation Policies (%)	Of which, Provided Government Support in Innovation (%)
Agriculture	Micro	17.0	37.2
	Small/Medium	26.7	12.7
	Large	26.0	32.4
	Total	23.9	18.3
Food Manufacturing	Micro	25.2	7.7
	Small/Medium	27.3	6.7
	Large	23.9	0.0
	Total	25.7	7.4
Other Manufacturing	Micro	20.3	10.9
	Small/Medium	20.8	8.3
	Large	19.9	19.1
	Total	20.5	9.9
Non-manufacturing Industries	Micro	25.8	10.3
	Small/Medium	26.3	12.6
	Large	27.3	8.5
	Total	26.3	11.6
ICT	Micro	23.5	10.5
	Small/Medium	26.6	10.3
	Large	23.7	6.7
	Total	24.9	10.3
BPO	Micro	22.6	7.9
	Small/Medium	20.4	5.2
	Large	29.9	5.2
	Total	23.1	6.4
Other Services	Micro	25.7	8.1
	Small/Medium	27.5	14.5
	Large	22.1	18.2
	Total	26.1	9.8
All industries	Micro	24.9	8.8
	Small/Medium	25.7	12.1
	Large	24.5	12.1
	Total	25.2	10.0

Note: ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

As shown in **Figure 26**, 14.5% of firms were registered with an investment promotion agency (IPA) in 2021. The percentage shares of registered firms greatly varied across firm sizes. More than 90% of micro firms and 70% of small and medium establishments were not registered with any IPA. In contrast, the bulk of large firms (72.6%) were registered with at least one IPA. The Philippine Economic Zone Authority (PEZA) was the primary IPA of registered firms—

more than half of small and medium firms and more than 80% of large firms have been registered with PEZA.[6]

Figure 26. Proportion (%) of establishments by registration at an investment promotion agency



Note: IPA = investment promotion agency; MSMEs = micro, small, and medium enterprises; BOI = Board of Investments; PEZA = Philippine Economic Zone Authority
Source: 2021 PSIA, PIDS

Table 21 shows that, among IPA-registered firms, tax deduction was the most availed of incentive, with an overall proportion of 61.6%. Micro firms accounted for the highest proportion of availing firms (63.6%), while small/medium (60.2%) and large firms (52.4%) also registered considerable percentages. It was also the most utilized incentive in agriculture (66%), industry (62%), and services (61.4%). Other investment incentives that were considerably utilized included income tax holiday (ITH) (40.6%), value-added tax (VAT) zero-rating on local purchases (37.5%), and VAT exemption on importation (36.4%).

As in other indicators, sectoral disaggregation reveal differences in the most frequently used incentives. In food manufacturing, tax deduction was utilized by at least half of MSMEs, while 49.6% of large firms availed of VAT zero-rating on local purchases. Among other manufacturing firms, tax deduction was the most utilized by micro firms (69.1%), while 77% of small/medium firms availed of VAT zero-rating on local purchases, and all registered large firms availed of VAT exemption on imports. For all firm sizes, at least half of registered firms in non-manufacturing firms benefited from tax deductions. While the utilization of tax deduction was also more than 50% among ICT MSMEs, large firms heavily preferred VAT zero-rating on local purchases (69%). The same types of incentives were the most favored for each firm size in the BPO sector, while tax deduction was the most utilized in other services.

With the lower figures shown in **Table 21**, it could be implied that only a small percentage of incentive utilization occurred in 2021. Tax deduction was the most utilized incentive in 2021, by 12.8% of availing firms. Meanwhile, VAT zero-rating on local purchases, depreciation allowance of assets, and deduction on labor expense each had 8.5% of utilization. Among large firms, Special Corporate Income Tax (SCIT) (18.6%), VAT exemption on importation

[6] Firms that are registered both with PEZA and Board of Investments (BOI) were also included.

(16.3%), and duty exemption on importation (15.9%) were the most utilized incentives. On the other hand, tax deduction, VAT zero-rating on local purchases, and depreciation allowance of assets were the most preferred among MSMEs. The most favored incentive among agriculture and services firms. The percentage of utilization in 2021 stood at around 13% for the two industry groups. Meanwhile, 12.8% of industry firms utilized VAT zero-rating on local purchases.

Table 21. Proportion (%) of establishments that availed financial and other incentives in 2021, by major sector and size of firm

Financial and Other Incentives	Agriculture				Industry				Services				Total			
	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms	Mi	Sm/ Md	Lg	All firms
Income tax holiday	23.3	2.2	0.0	7.9	7.9	7.2	5.7	7.3	4.7	4.3	12.2	4.9	5.7	5.3	8.6	5.7
Special Corporate Income Tax (SCIT)	13.0	2.5	0.0	5.3	9.1	13.9	14.3	12.2	4.5	7.0	24.3	6.1	5.6	9.5	18.6	7.9
Tax deduction	23.2	9.9	0.0	13.2	13.2	12.1	10.9	12.4	12.3	14.0	16.4	13.0	12.7	12.9	13.2	12.8
Duty exemption on importation of capital equipment, raw materials, spare parts or accessories	9.2	5.9	0.0	6.6	4.4	12.2	19.7	10.1	4.0	5.0	12.4	4.7	4.2	8.0	15.9	6.4
VAT exemption on importation	4.3	11.3	47.2	10.6	4.3	12.0	16.8	9.7	4.8	6.9	14.2	5.8	4.7	9.2	16.3	7.2
VAT Zero-rating on local purchases	4.3	5.6	46.9	6.6	9.2	15.0	14.4	12.8	5.2	8.1	15.8	6.6	6.0	10.8	15.7	8.5
Depreciation allowance of assets - additional for buildings; and for machineries and equipment	9.0	9.8	0.0	9.2	6.8	11.2	10.4	9.5	7.7	9.1	4.0	8.0	7.5	10.0	7.3	8.5
Deduction on labor expense	4.2	1.8	46.5	4.0	8.2	11.1	10.5	10.0	8.5	7.9	3.8	8.1	8.4	8.8	8.2	8.5
Deduction on R&D	4.6	3.9	0.0	4.0	4.3	5.0	8.3	5.1	4.1	4.9	0.2	4.2	4.1	4.9	4.4	4.5
Deduction on training expense	4.3	9.4	47.0	9.2	4.8	6.6	12.1	6.5	5.8	7.3	1.9	6.1	5.6	7.1	8.2	6.3
Deduction on domestic input expense	4.5	5.8	0.0	5.3	3.9	6.4	8.4	5.7	4.4	5.5	1.6	4.7	4.3	5.9	5.1	5.0
Deduction on power expense	9.1	5.9	0.0	6.6	7.0	8.2	11.4	8.1	6.2	7.6	3.6	6.5	6.4	7.7	7.6	7.0
Deduction for reinvestment allowance to manufacturing industry	4.5	7.8	0.0	6.6	3.1	5.5	6.6	4.8	3.7	4.8	0.2	3.9	3.6	5.3	3.5	4.3
Enhanced net operating loss carry-over (NOLCO)	7.9	4.5	0.0	5.3	4.8	6.8	6.4	6.0	5.1	6.0	1.5	5.2	5.1	6.2	4.0	5.5
Direct subsidy/grants	13.7	6.0	0.0	7.9	2.6	4.8	7.8	4.3	3.2	6.7	0.2	4.2	3.3	5.8	4.2	4.4
Subsidized loan	4.6	2.0	0.0	2.6	3.3	4.8	8.4	4.6	4.9	4.7	0.7	4.7	4.5	4.5	4.7	4.6
Loan guarantees	4.4	5.9	0.0	5.3	5.3	6.8	4.5	6.0	4.9	5.9	3.9	5.2	5.0	6.2	4.1	5.4
Others	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.3	0.3	0.2	1.9	0.3	0.4	0.1	0.9	0.3

Note: Mi = micro; Sm = small; Md = medium; Lg = large; ICT = information and communications technology; BPO = business process outsourcing; R&D = research and development; VAT = value-added tax; figures are proportions of establishments that have availed at least one type of incentive.
Source: 2021 PSIA, PIDS

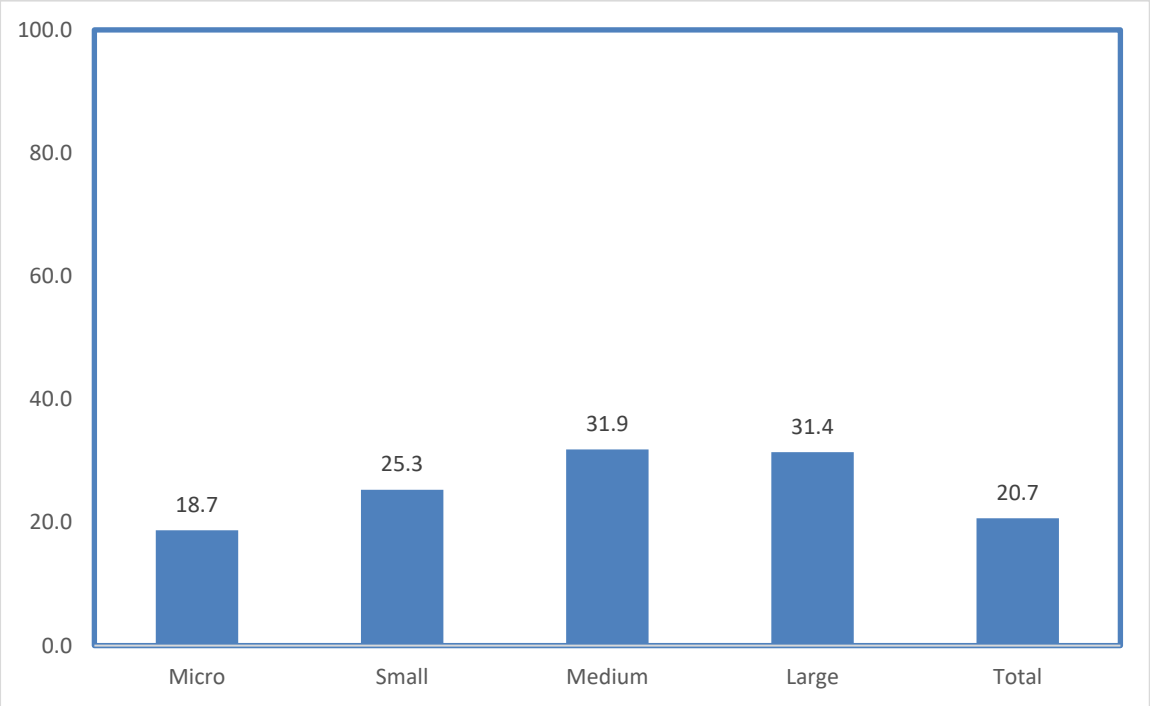
7. Use of FIRe Technologies

As the world is transitioning to the FIRe, also referred to as Industry 4.0, the 2021 PSIA attempts to capture indicators of awareness of, use of and barriers to using FIRe technologies that fuse the physical, digital, and biological worlds, thus, transforming the way we live, work, and communicate. Examples of such frontier technologies are artificial intelligence (AI) and big data, the Internet of Things (IoT), blockchain, robotics, neurotechnology, nanotechnology, 3D printing, cloud computing, energy storage, and synthetic biology, among others.

These emerging FIRe technologies open a multitude of opportunities for firms, for society and for the country. They are expected to boost economic productivity, enhance food security, improve environmental protection and agricultural production, as well as enhance public service delivery. Across firm sizes, the level of awareness of FIRe technologies is just about 1 in 5 firms. Large- and medium-sized firms have the highest proportions of awareness of FIRe technologies at about 31 and 32 percent, respectively. Micro-sized firms have the fewest proportion of establishments aware of FIRe technologies at only 19 percent (**Figure 27**).

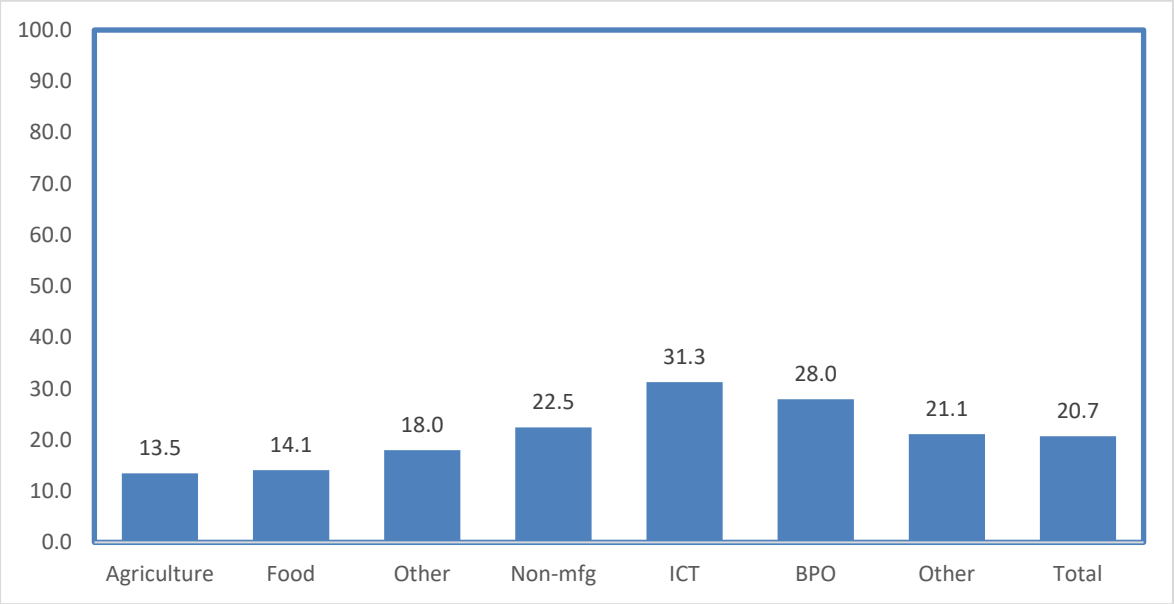
Looking at the sectors, the ICT and BPO sectors have the highest level of awareness of FIRe technologies at 31.3 and 28.0 percent, respectively. On the other hand, agriculture and food manufacturing have the lowest proportion of firms reporting that they are aware of FIRe technologies at 13.5 and 14.1 percent, respectively (**Figure 28**).

Figure 27. Awareness of the Fourth Industrial Revolution among establishments (%), by establishment size



Source: 2021 PSIA, PIDS

Figure 28. Awareness of the Fourth Industrial Revolution among establishments (%), by sector

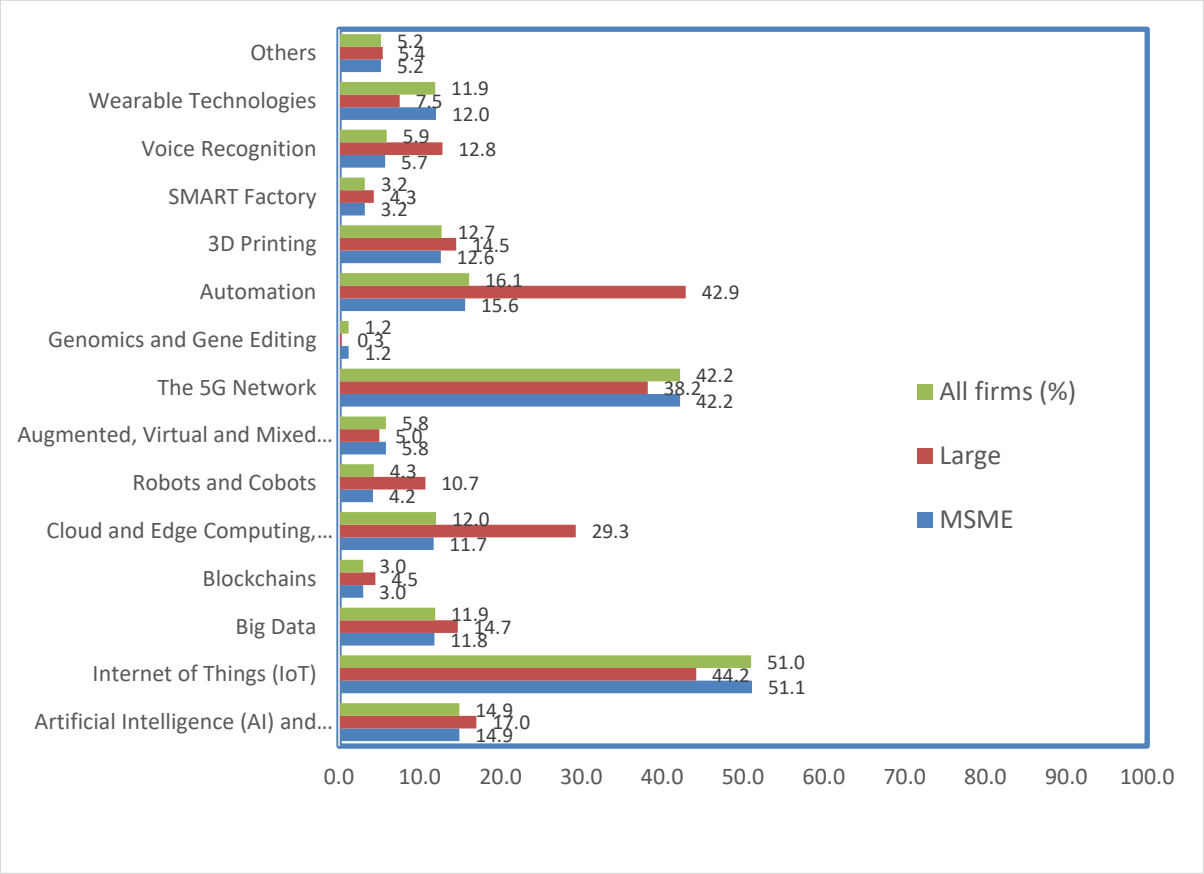


Note: Mfg. = manufacturing, ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

The 2021 PSIA identified 15 examples of FIRe technologies which firms may have likely used. These would include AI and Machine Learning, IoT, Big Data, Blockchains, Cloud and Edge Computing, Quantum Computing; Robots and Cobots. Augmented, Virtual and Mixed Reality, the 5G Network, Genomics and Gene Editing, Automation, 3D Printing, SMART Factory, Voice Recognition, Wearable Technologies and others. Analyzing the results of the survey by firm size (**Figure 29**), one can see that IoT[7] and use of the 5G network have been reported as the most common FIRe technology used by firms regardless of size. Meanwhile, Automation, Cloud and Edge computing have been significantly used by large firms relative to MSMEs. Meanwhile, MSMEs outpaced large firms in use of 5G technology, IoT and the use of wearable technologies. Authors of this report suspect that responding firms may be equating IOT to the Internet.

[7] The statistic on the use of IOT may need to be revisited as there may be a misunderstanding on the use of IOT and the use of internet.

Figure 29. FIRe Technologies utilized by firms, by establishment size

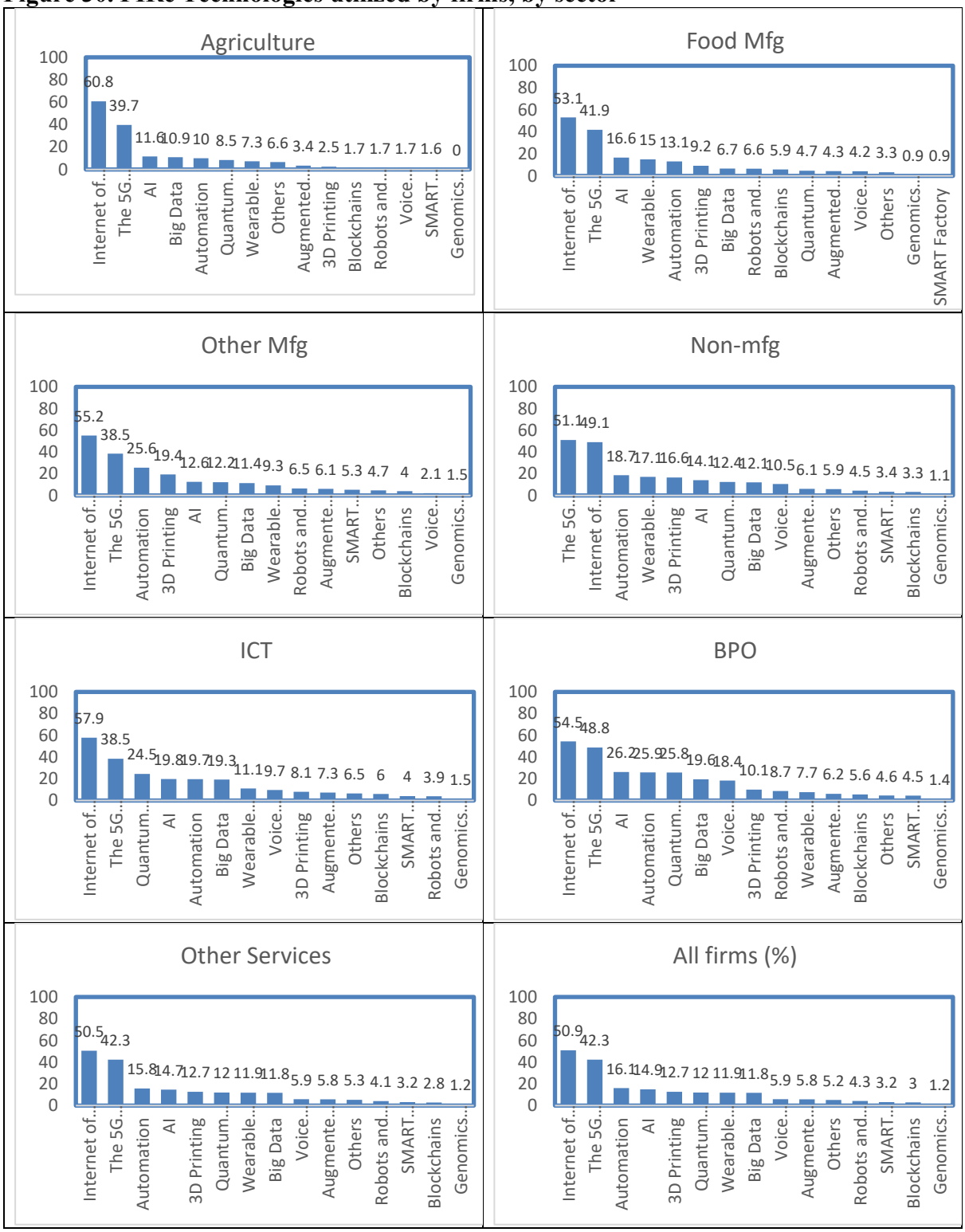


Source: 2021 PSIA, PIDS

In terms of sub-industry, the most common FIRe technology used is IoT and 5G network for almost all subindustry groups. IoT is used by more than half of all establishments in all industry groups except non-manufacturing while the 5G network is used by about 3-5 establishments out of 10. Genomics, Blockchains and the SMART manufacturing are the least commonly used FIRe technologies overall.

Automation and AI are also among the most common FIRe technologies commonly used in the agriculture, food manufacturing and other manufacturing sectors. Automation, use of wearable technology and 3D printing are among the commonly used FIRe technologies in non-manufacturing, probably due to the construction firms classified under this subindustry. Quantum computing has been often used in BPO and ICT sectors while 3D printing belongs to the top 5 most often used technologies in the Other services sector.

Figure 30. FIRe Technologies utilized by firms, by sector

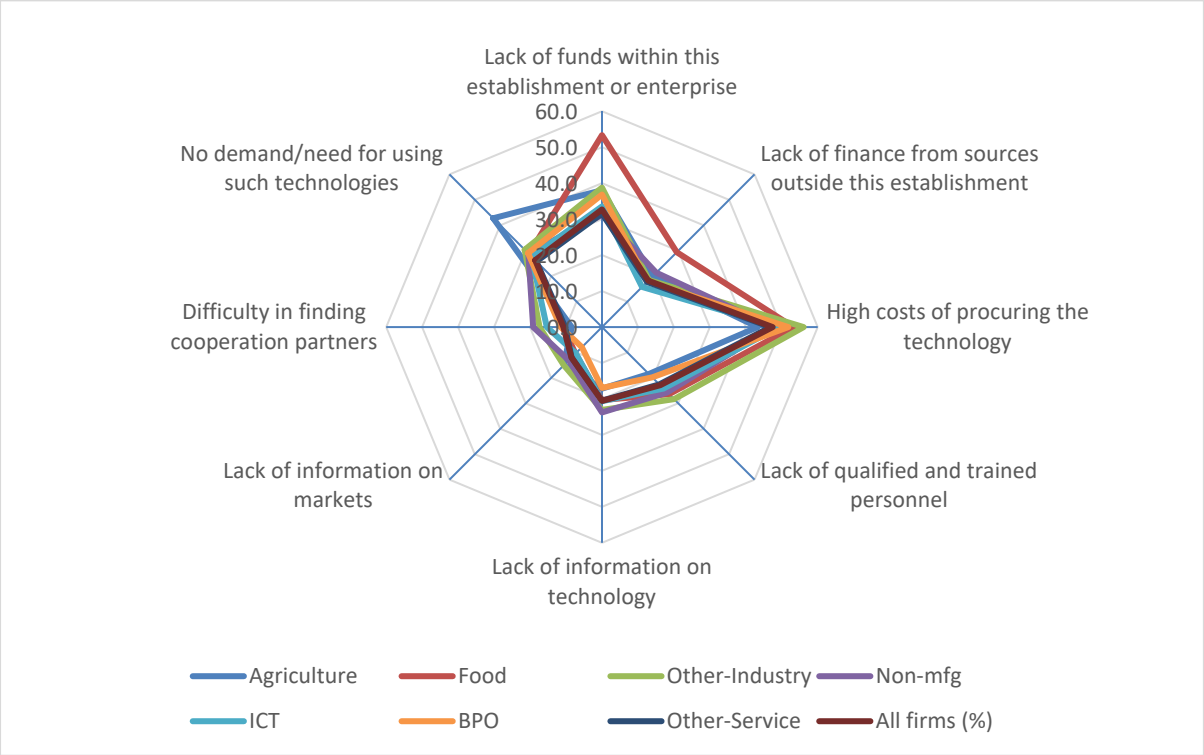


Note: Mfg. = manufacturing, ICT = information and communications technology; BPO = business process outsourcing
Source: 2021 PSIA, PIDS

The 2021 PSIA also asked the respondents about the barriers to use of FIRe technology. The results show that over all, the most common barrier is related to the high cost of technology. Around 47.5% of respondents cited this as a barrier. A distant second to this is the lack of funds within this establishment/enterprise which is cited by around a third of the respondent firms.

Zeroing in on the barriers faced by specific sectors, it can be observed that certain barriers have a more significant impact for certain sectors. For instance, food manufacturing establishments most often cited the lack of funds within its establishment as a barrier that prevents the use of FIRe technology. Funding from outside of the establishment also has also been cited by food manufacturing establishments as a barrier. Meanwhile, agriculture sector stands out by its high proportion of establishments citing the absence of demand/need for FIRe technologies (**Figure 31**).

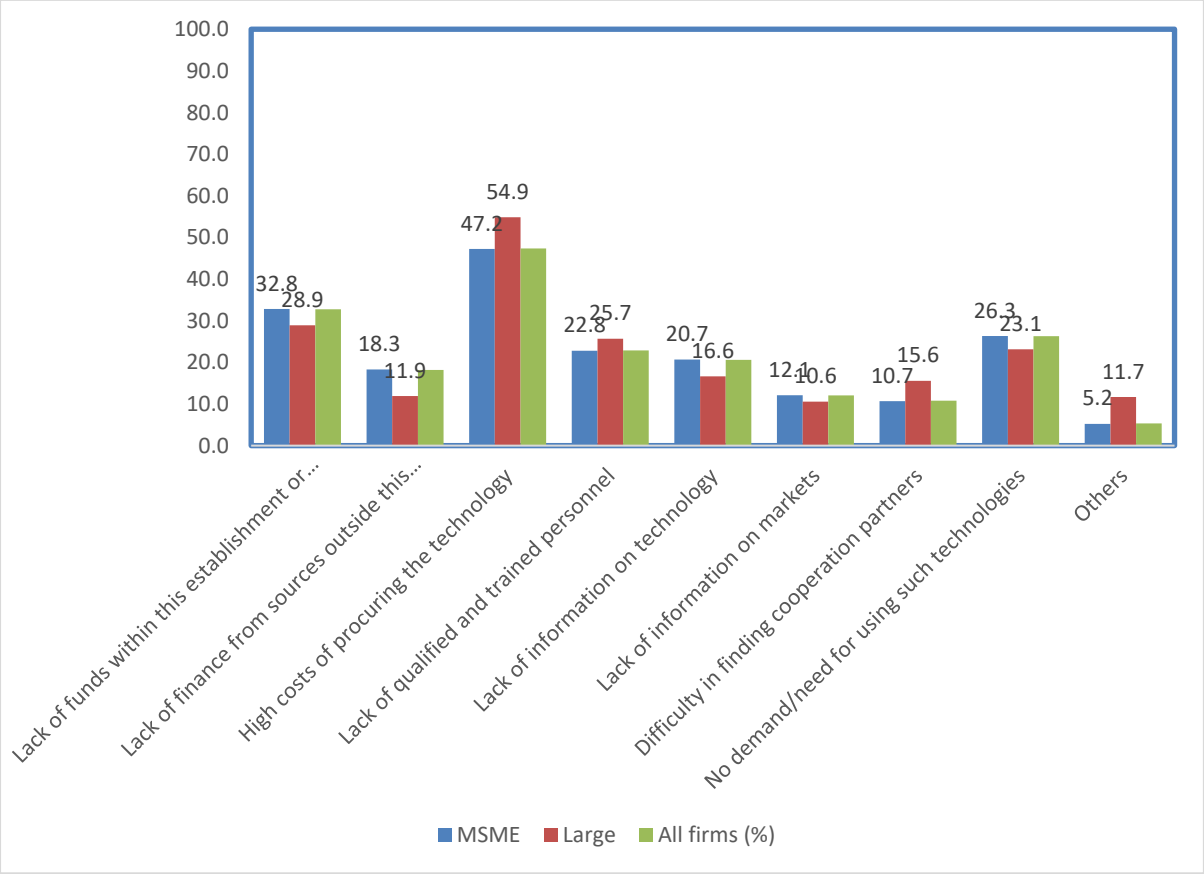
Figure 31. Barriers encountered in using FIRe technologies, by sector



Source: 2021 PSIA, PIDS

In terms of firm size, there have been no major difference in the barriers in using FIRe technologies (**Figure 32**). The high cost of procuring the technology is most often cited by both MSMEs (47.2%) and large firms (54.9%). Lack of funds within the establishment or enterprise has been the second most often cited barrier to FIRe technology use. While MSMEs and Large firms generally cite the same top two barriers, there is some divergence in the third most often cited barrier to FIRe technology use. For Large firms, the lack of qualified and trained personnel has been the most often cited barrier (25.7%) while for MSMEs, No demand or need for using these technologies (23.1%) is the most often cited barrier.

Figure 32. Barriers in using FIRe technologies, by Firm size



Source: 2021 PSIA, PIDS

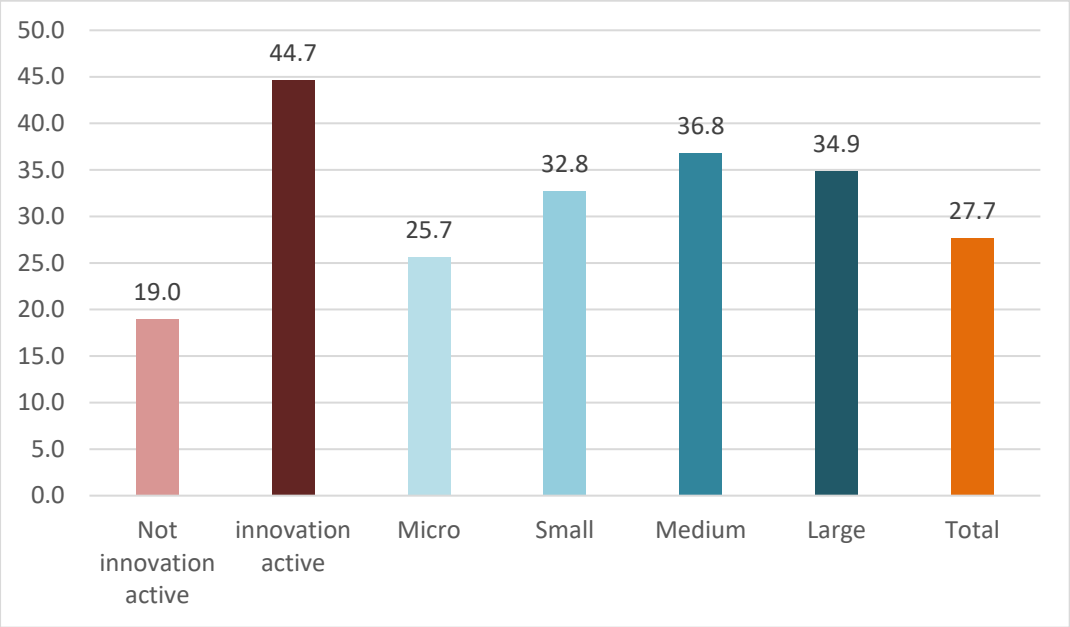
8. Information on Platform Use

One of the new modules in the current survey is a battery of questions on the use of internet platforms, which is defined as digital intermediaries and infrastructures that brings together various parties (such as sellers and buyers of products and services) through the internet to interact, thereby matching supply and demand in a multi-sided market.

Examples of internet platforms include (a) social media platforms such as Facebook, Instagram, Viber ; (b) e-commerce platforms such as Lazada, Shopee, and Zalora;(c) other platforms such as Google (search engine); Grab, Lalamove and Angkas (ride-sharing or logistics services); Netflix, Youtube and Spotify (media-streaming); Airbnb (accommodation services); Zoom and Webex (video conferencing); Gcash, Paymay, Paypal, Coins (e-money).

A quarter (27.7%) of firms reported having used platforms in 2021 (**Figure 32**). By innovation activity, nearly half (44.7%) of innovation active firms used platforms compared to merely a fifth (19.0%) among firms that were not innovation active in 2021. By size of firms, a bigger share of medium (36.8%) and large firms (34.9%) used digital platforms in 2021 compared to micro (25.7%) and small (32.8%) establishments.

Figure 33. Proportion (%) of Establishments that Used Platforms in 2021, by innovation activity and by size



Source: 2021 PSIA, PIDS

Firms were also asked to identify the top 3 platforms they used. Based on their listing, the Top 12 platforms used by all firms that reported having used platforms in 2021 are Facebook (24.3%) by a wide margin, followed by Google (2.4%) Gcash (2.3%) Messenger (2.2%) Instagram (2.0%) Shopee (2.0%) Grab (2.0%) Food Panda (1.8%) Lazada (1.7%) Website (1.3%) Viber (1.2%) and Zoom (1.0%).

Among platform users in 2021, a third (33.8%) own/manage platforms, about half (52.0%) sell products/ services in platform, a quarter (24.3%) report purchasing products/ services in platforms, and more than half (55.2%) advertise their firm or their firm's products/ services in platforms (**Table 22**).

Table 22. Proportion (%) of Establishments, by Platform Activity and Sector

Platform Activity	Agriculture	Industry	Services	Total
Own/ manage platform/s	35.1	35.3	33.7	33.8
Sell products/ services	62.5	53.0	51.9	52.0
Purchase products/ services	31.4	36.1	23.3	24.3
Advertise firm or firm's products/ services	46.1	53.2	55.4	55.2

Source: 2021 PSIA, PIDS

Platform owners were also asked a series of questions regarding their platform activity, although the authors of this report suspect that firms might have misunderstood owning platforms to mean having Facebook pages, or their own websites to mean owning platforms. An examination of the reported websites of the platforms confirm this suspicion. Firms that reported themselves as platform owners said that their platforms have largely Messaging/Communication (20.6%) and Social networking features (25.5%). Meanwhile, three fifths (59.3%) of platform owners report that their platforms were open to third-party users, mostly buyers, workers, employers, advertisers, and sellers (**Table 23**).

Table 23. Proportion (%) of platform owners that reported available platform features and allowed Third Party Users in the Platform

Available Platform Feature	%	Third Party Users Allowed	%
Media streaming	7.0	Advertisers	6.3
Messaging/Communication	20.6	Buyers	11.3
Social networking sites	25.5	Sellers	5.8
Marketplace	8.7	Content consumers	3.5
Crowdsource content	1.2	Content producers	1.3
Jobs platform	4.4	App developers	1.6
Fintech	7.2	App users	2.9
Search advertising	7.3	Employers	7.8
Food delivery	5.7	Workers	8.2
Transportation network	3.0	Drivers	3.0
Travel booking	1.7	Riders	4.9
Education platform	1.3	Couriers	3.9
Innovation platform	2.9	Payment channel	4.3
Others	1.4	Others	1.3

Source: PIDS (2023)

From January 2021 to December 2021, the share of platforms that acted as a marketplace were about 18.8% while a tenth (10.3%) of platform owners reported to be part of the sharing economy (i.e., platforms that allow sharing of access to underused/unused goods and services). As shown in **Table 24,** reported owners of platforms suggest that the drivers of growth of the platform are largely more transactions (23.3%), followed by more customers (14.5%). Further, their geographic markets are largely either local (23.6%) or national (12.5%).

Table 24. Proportion (%) of platform owners that reported drivers for platform growth and geographic markets served

Drivers for Platform Growth	%	Geographic Markets Served	%
More customers	7.0	Local	6.3
More transactions	20.6	National	11.3
More content	25.5	ASEAN	5.8
Others	8.7	Countries other than ASEAN	3.5

Source: PIDS (2023)

The average revenue of firms that report to be platform owners for 2021 from national and international trade/cross-border transactions is 141 Million PHP and 8.7 Million PHP, respectively. By major sector, average revenues are highest in Industry (**Table 25**).

Table 25. Average Revenue of Platforms (in Million PHP), by sector and transaction

Major Sector	Average Revenue (in Million PHP)	
	Local	International
Agriculture	72.7	
Industry	535.0	7.3
Services	109.0	8.8
Total	**141.0**	**8.7**

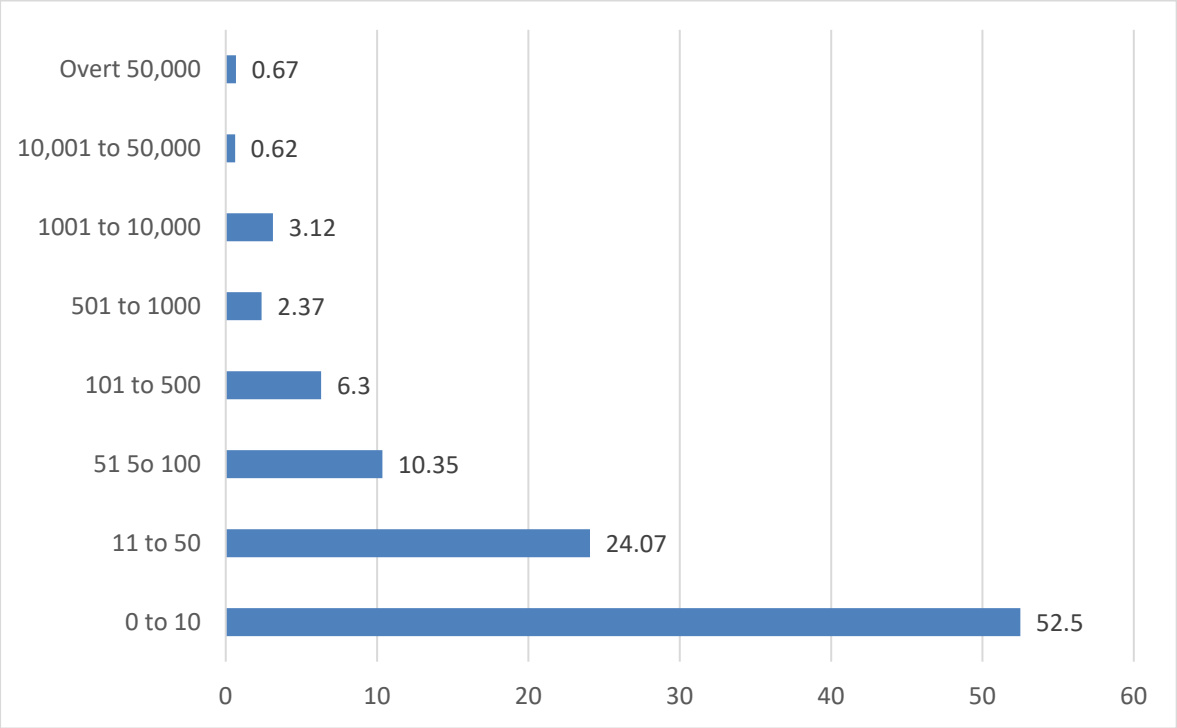
Source: PIDS (2023)

Most reported revenues are coming from service and product sales (17.5%), followed by transaction fees (7.8%). Other sources of revenue include: advertisements (3.5%), admission fees (2.1%), commission (2.0%), membership fees (1.5%), riders (1.4%), subscription fees (1.1%), couriers (1.0%), data monetization (0.3%), and others (3.3%).

Meanwhile, 54.7% of platform owners report that the platform set the prices and circumstances of logistics. A fifth (19.4%) report that a third party set the prices and circumstances of logistics, while a quarter (25.8%) say it is others (most of whom report the owner/management of the firm). The top 2 factors viewed to have affected the prices or circumstances of logistics in 2021 are location (14.5%) and demand (11.0%). Platform owners also cited fixed-rate (9.3%), payment method (4.8%) choice of courier (4.6%), and other factors (4.1%) affected logistics prices.

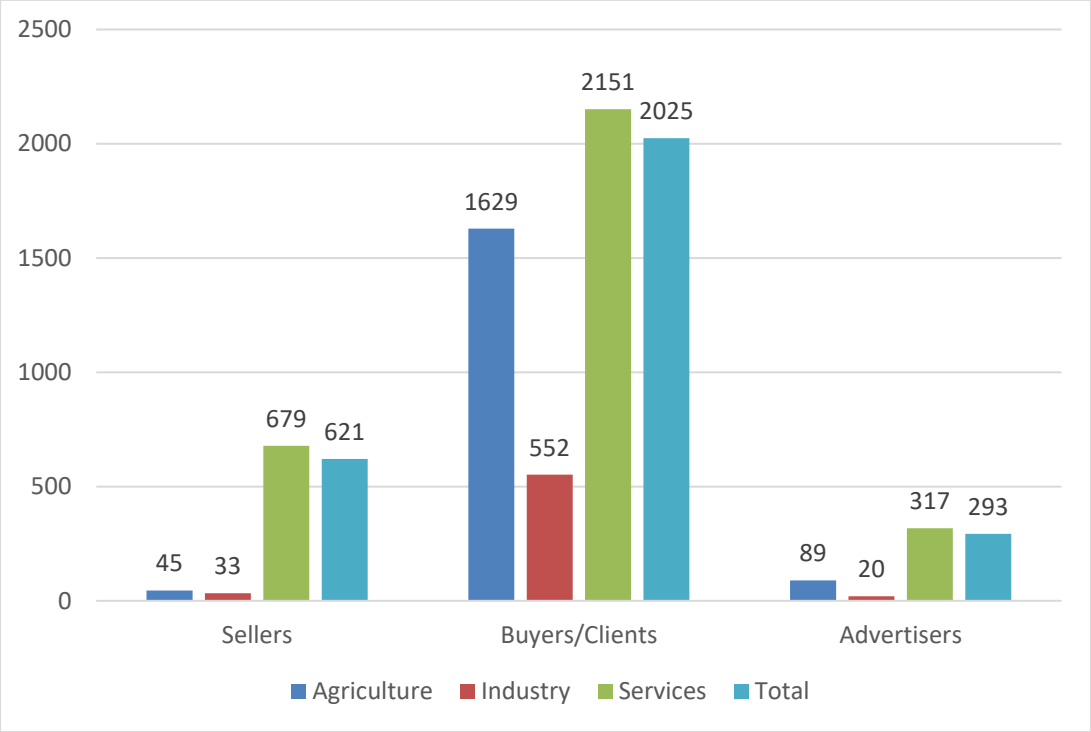
Half (52.5%) of platforms report daily transactions 10 or below; a quarter (24.1%) between 11 to 50 (**Figure 34**). In 2021, the average number of clients, sellers and advertisers in platforms was 2025, 621, 293, respectively, with variation across major sectors; services topping the sectors (Figure 35).

Figure 34. Proportion (%) of Firms by Number of Daily Transactions



Source: 2021 PSIA, PIDS

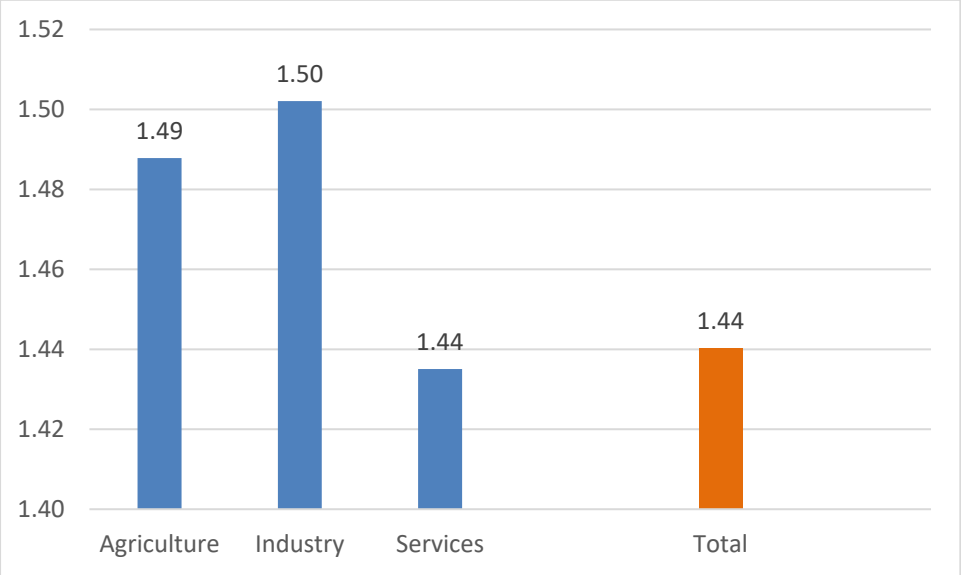
Figure 35. Average Platform Engagement in 2021, by Major Sector



Source: 2021 PSIA, PIDS

On the other hand, 55.9% of platform owners reported to have advertised in their own platforms. The average share of foreign ownership of platforms is 1.4% (**Figure 36**). The top 3 funds for platforms are personal savings (12.3%), venture capital (8.3%), and loans (7.0%). Other sources of funding include: financing from friends and family (4.1%), business angels (3.1%), business incubators (2.1%), grants (1.4%), and crowdfunding (0.3%). Meanwhile, the most common taxes mentioned by platforms are income tax (22.9%), value-added tax (VAT) (18.1%), withholding tax (17.2%), and corporate tax (12.3%).

Figure 36. Average percent share (%) of foreign ownership in platforms, by major sector



Source: 2021 PSIA, PIDS

Most employees (84.3%) directly employed for platform operations in 2021 have bachelors' degree or higher, especially in Services (85.6%). The work arrangements of these platform employees include telecommuting (9.3%), part-time (8.1%), compressed workweeks (6.9%), full-time (4.7%), and job sharing (3.1%).

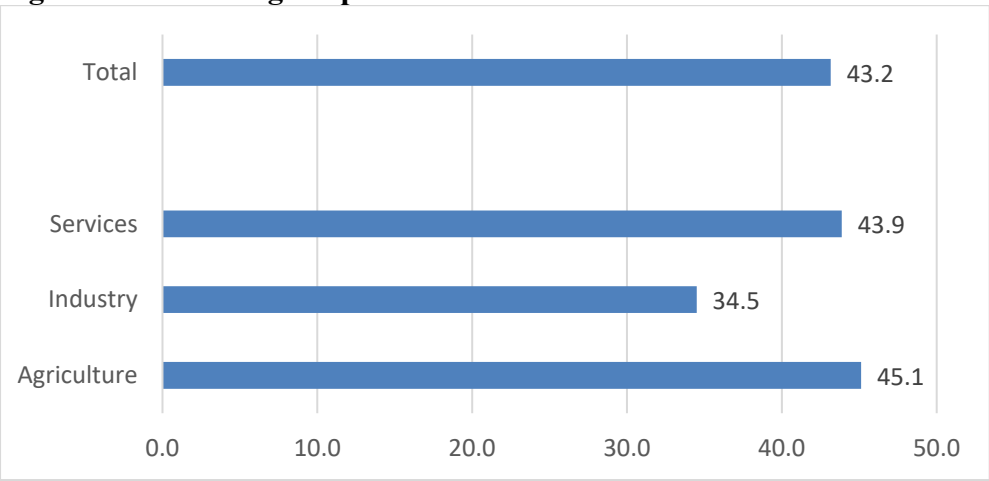
Table 26. Employment in Platforms, by highest educational attainment, sex, and major sector

Highest Educational Attainment	Sex	Major Sector			
		Agriculture	Industry	Services	Total
Primary or less	Male	76	1,358	3,970	5,404
	Female	0	301	2,007	2,307
Beyond primary but less than bachelors	Male	274	15,972	68,599	84,846
	Female	79	5,169	102,586	107,834
Bachelors or higher	Male	89	7,722	303,721	311,532
	Female	132	7,540	753,593	761,266

Source: 2021 PSIA, PIDS

Figure 37 shows that nearly half (43.2%) of platforms admitted collecting platform users' data, including personal identification data (10.8%), payment data (7.8%), service transaction data (7.5%), product transaction data (6.8%) and phone contacts (6.1%). According to responding platform firms (**Table 27**), users' data collected were largely used to communicate with users (8.3%), to provide better user experience (8.1%), and to operate, maintain, and provide features and functionality of the platforms' products and services (6.9%).

Figure 37. Percentage of platforms that collected users' data in 2021



Source: PIDS (2023)

Table 27. Proportion (%) of platform owners that reported collection and utilization of users' data

Users' Data Collected	%	Users' Data Utilized	%
Payment data	7.8	To optimize platform app/website	4.7
Product transaction data	6.8	To provide better user experience	8.1
Service transaction data	7.5	To advertise	6.5
Content consumption	0.9	To operate, maintain, and provide features and functionality of the platforms' products and services	6.9
Personal expression data	1.6	To communicate with users	8.3
Search queries	3.9	To personalize content and information	3.1
Browsing data	2.4	To measure traffic and usage trends	2.5
Friends and groups followed	2.0	To develop new services	3.3
Phone contacts	6.1	To attract more users and increase their usage of the platform	4.0
Device/connection data	2.3	To fix technology problems	1.6
Location data	5.0	For safety and security	1.9
		Personal identification data	10.8

Source: PIDS (2023)

Less than half (44.9%) of platforms reported that users needed to set up an account to be able to access products/services on the platform in 2021. Verification processes required for platform clients in 2021 were largely personal appearance/interview (11.2%), two-factor authentication (i.e., code sent to email/mobile number) (10.2%), and submission of valid IDs (9.9%). Other verification processes mentioned include photo and video documentation (3.2%), biometric verification (i.e., facial, voice, iris, fingerprint recognition) (2.8%), video interview (1.0%) and others (4.8%).

9. Policy Issues and Ways Forward

The 2021 PSIA suggests that policy and program interventions to foster innovation in Philippine business and industry is a challenge given the constraints that firms work with: scarce resources (including the requisite innovation mindsets and workforce skills), aside from competing aims of public policy, as well as institutional issues. It is crucial for the National Innovation Council (NIC) to use the results of the 2021 PSIA as inputs for its work.

9.1 Addressing barriers to innovation

In the 2021 PSIA, as in the 2015 PSIA, cost factors were the most common type of innovation barrier that were considered significant ("high") across firms of different sizes and sectors. The Philippine Innovation Act (R.A. 11293) contains various interventions to address specific barriers to innovation (**Table 28)**. Three provisions in the law should help address the lack of funds, while the other interventions are concerned with knowledge, market and regulatory barriers which could also indirectly reduce the cost of innovation. The law was signed in 2019 and the Implementing Rules and Regulations approved in 2020. Although some progress has been made, it will take time before the law becomes fully operational. See Republic Act 11293

Philippine Innovation Act Progress Report October 2021 – September 2022.[8] The NIC should regularly examine whether there are any implementation deficits to the legislation.

Given its scope, R.A. 11293 can be viewed as a comprehensive approach to removing the various barriers to innovation. A robust Monitoring and Evaluation (M&E) system must be developed to determine the effectiveness of the Philippine Innovation Act. Future SIA can help track the progress and impact of the interventions. The results of the 2021 PSIA can also provide guidance on where specific interventions should be focused. As the results in the 2021 PSA show, for example, a larger proportion of establishments in the Agriculture sector regarded the importance of the different barriers as high.

Table 28. Alignment of R.A. 11293 provisions with the factors affecting innovation

The Philippine Innovation Act (R.A. 11293)	**Cost factors**	**Knowledge factors**	**Market factors**	**Legal issues such as regulations or tax rules**
Section 12. Micro, Small and Medium Enterprise (MSME) Innovation		x	x	
Section 13. Innovation Centers and Business Incubators		x		
Section 15. Strategic Research, Development and Extension (RD&E) Programs		x		
Section 16. Innovation Instruments		x		
Section 17. Whole of Government Approach Note: A joint web portal will be created with information on innovation policies, strategies, programs, including services, grants, and financial assistance for related trainings.		x		
Section 18. Diaspora for Innovation and Development		x		
Section 19. Intellectual Property System and Management			x	x
Section 20. Advocacy and Community Education		x		
Section 21. Innovation Fund Note: Grants can be accessed by NGAs, LGUs, SUCs, and GOCCs but public-private partnerships are also encouraged.	x			
Section 22. Innovation Development Credit and Financing	x			
Section 23. Credit Quota	x			
Section 24. Removing Barriers to Innovation				x
Section 25. Innovation Alliances		x		
Section 26. Government Procurement			x	

Note: Authors' compilation

[8] https://eigis-innovation.neda.gov.ph/resources/NIC_Accomplishment_Report_NEDA_Website.pdf

9.2 Working with the private sector to foster innovation enhance digital skills and adoption of data governance frameworks

The government needs to work with the private sector to foster innovation particularly through re-skilling and upskilling the workforce. There is a clear relationship between skills of employees and innovation activity of firms. Previous studies pointed out that the Philippines is a laggard particularly in digital skills within the ASEAN region. Since innovation is about the accumulation of "knowledge capital" that enters firms and the public sector, or the national production function along with physical and human capital, any R&D spending will have little impact without a vast pool of skilled human resources, especially R&D engineers and scientists, especially amid the growing threat that AI poses on jobs.

Digitalization in government and the private sector must be promoted and enhanced, and with this the collection of vast data by organizations in the public and private sectors. Data governance frameworks need to be adopted. The pandemic pushed firms to digitalize and use platforms, but the extent of platform use still can be improved. A concrete policy and set of public interventions on digital skills and the formulation of data governance frameworks are needed.

9.3 Strengthening linkages between knowledge producers and users

The 2021 PSIA reported that firms largely only get information on innovation from limited sources. The government should promote the free exchange of ideas and flow of knowledge from outside of firms. A better understanding of the linkages between skills of employees (both technical and digital skills) and innovation is needed. There is danger though in just having more investments for investments sake in innovation activity: it matters where these funds are spent. Simple "more-is-better" prescriptions, such as having more training and more funds for education may not achieve desired outcomes.

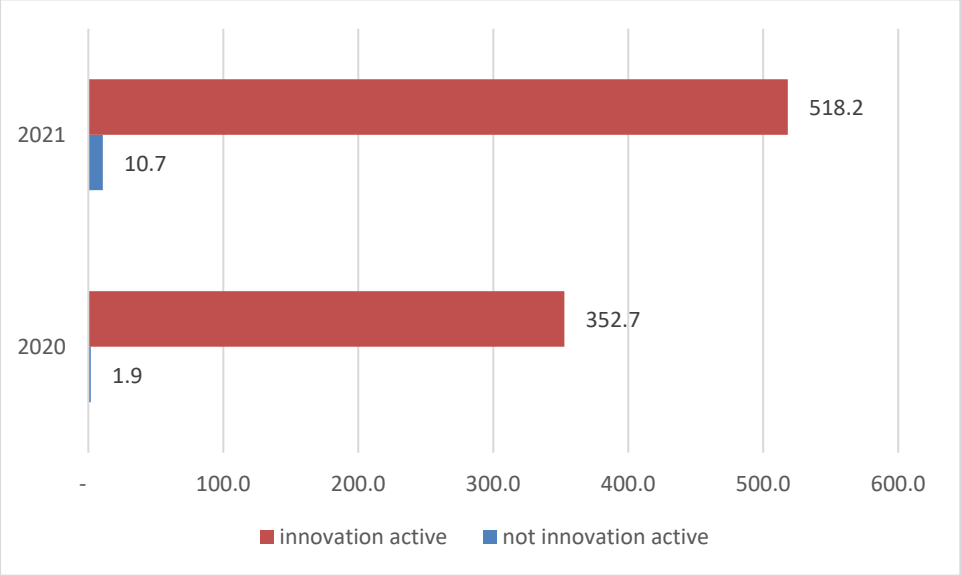
Given the shift in mindsets towards a more open system of innovation and the importance of knowledge management practices as a determinant of innovation, the government must actively promote the free exchange of ideas and flow of knowledge from outside the companies to improve innovation activity.

9.4 Improving support for innovative activities of businesses

The link between innovation and revenues in establishments is crucial not only for their long-term success and growth but also for the entire economy. By firms introducing innovation, they differentiate themselves from competitors and capture a larger share of the market. This can result in increased sales and revenues as customers are drawn to the unique and improved offerings. Furthermore, innovation can enable establishments to command premium pricing, as customers are often willing to pay more for innovative products or services that offer greater value or convenience. Secondly, innovation can enhance operational efficiency and cost-effectiveness, leading to improved revenues. Through innovative processes or technologies, establishments can streamline their operations, reduce waste, and optimize resource utilization. Lastly, innovation can open up new market opportunities and expand the customer base of establishments. By identifying untapped market segments or unmet customer needs, establishments can develop innovative solutions that address these gaps. This allows them to enter new markets or attract new customers, thereby increasing their revenue streams.

The survey results confirm that when establishments embrace innovation, they generate higher revenues (**Figure 38**).

Figure 38. Average Revenues, by Innovation Activity (in Million PHP): 2020 and 2021



Source: PIDS (2023)

Thus, there is empirical support for the plan of government articulated in Chapter 8 of the Philippine Development Plan (PDP) 2023-2028 to "Advance Research and Development, Technology, and Innovation" (NEDA 2023) by way of improved support for innovative activities in start-ups and MSMEs.

9.5 Targeting assistance to MSMEs

The current and past PSIA show that large establishments are more likely to engage in innovation, especially as they are in a better financial capacity to innovate. Furthermore, there are many barriers and bottlenecks faced by MSMEs to innovate, including the lack of information sources on innovation. MSMEs should be supported adequately to capacitate them to develop eventually into larger-sized, more productive firms.

9.6 Whole-of-society approach

In the previous administration, a whole of government (WOG) approach was promoted especially in pandemic management, though how to actually operationalize WOG was not clearly explained. From adopting a WOG, the entire should work together with academe and the business sectors, and the general public through a whole of society approach to foster innovation. Data sharing is a crucial element in a WOG and whole of nation paradigm of public sector management. Government agencies cannot use the Data Privacy Act as an excuse for not making data available for use, otherwise the country will be data rich and information poor (DRIP). The power of data, when it is transformed into information and eventually insight is that it can be a catalyst for innovation and change.

Government must regularly examine regulatory frameworks through a regulatory management system, so that regulators can go beyond merely implementing regulations (that may not be

always applicable to vastly changing business environments) and consider the ultimate goal of regulations to improve public welfare (Llanto 2015). The NIC, together with legislators, and regulators, have to establish an effective mechanism for RMS to regularly identify what regulations are becoming bottlenecks to innovation.

According to Cusolito and Maloney (2018), total factor productivity growth can be decomposed into three components. The **within-firm** component is driven by firm level innovation and other improvements in internal capabilities. The **between-firm** improvements occur when distortions to the efficient allocation of resources are removed allowing factors of production to move from low-productivity firms to high-productivity firms. Improved **selection** results from the exit of less competitive firms and the entry of more competitive firms.

Thus, in addition to innovation strategies, complementary policies are needed such as those that reduce regulatory burden, enforce competition, and promote openness to trade and investment.

While innovation heavily relies on science, technology, and research and development (R&D), it is crucial for the government to establish a strong foundation in scientific endeavors. However, the ultimate implementation of innovation occurs within companies, where it aims to enhance the value of their products and services. Therefore, although the government plays a critical role in fostering innovation, it is ultimately the firms that take the lead in transforming ideas into tangible advancements that benefit consumers and markets. As part of government's reflection on the extent of effects of its interventions in Philippine business and industry, the government should pursue an impact evaluation of some large-funded S&T projects to determine what works and what does not.

As in past reports of innovation (Albert *et al*. 2018), government should be focused on : (a) removing barriers and bottlenecks to innovation in regulatory frameworks and practices; (b) providing meaningful and impactful support to innovators; (c) investing in the required technology, research infrastructure, and R&D researchers; (d) carrying out appropriate policy reforms in education, the investment climate, and trade. Innovation policy acts within a context, typically in an established institutional setting that can be overcrowded with many agencies that have limited financial resources to support innovation.

Certainly, the country will need a National Innovation Framework and Plan of Action, but the NIC will need more involvement from the private sector and academe to craft this action agenda, and perhaps by having one main innovation champion in government. While there is some advantage having this done by the NIC, which is under the NEDA, but there are also risks, especially as innovation policy and action have always been regarded by firms as either led by DTI, DOST, or the Department of Information and Communications Technology (DICT). The NIC and NEDA though can have a stirring role among government actors who will be "rowing" interventions for innovation.

Finally, innovation policy can be complex, so it will be important for government, especially the NIC, to continue regularly monitoring where we are in innovation. The country has so far conducted three rounds of the PSIA. The results of the recent PSIA reveal a promising landscape of innovation. The findings indicate a significant level of engagement in innovation activities, including the use of internet platforms, thus showcasing a commitment by firms to advancing technological capabilities for improving products and services. Furthermore, the

survey highlights the potential for further growth and collaboration, emphasizing the importance of continued support from the government to foster an environment conducive to innovation in the Philippines. The NIC (and budget managers in the country) should take note that the management of the innovation ecosystem cannot be effectively done if what is being managed is not being measured (and measured well).

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