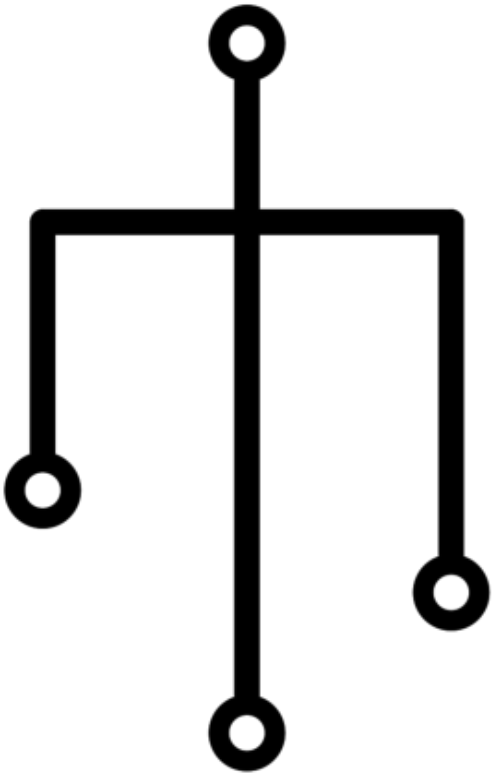
Overview of State of Digitalization of Manufacturing Industries and Finance

August 2021



PHILIPPINE DIGITAL JUSTICE INITIATIVE

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Abstract

This paper discusses and provides a general picture of the state of digitalization in the manufacturing and finance industry of the Philippines. It also lays down the perennial and pressing issues that the two industries are facing in digitizing, as well as the responses of the public and private sector on this phenomenon. The study reveals that although the government and private sector made efforts to digitalize the manufacturing and finance industries, the process of digitalization remains at the outset and concentrated on urban and private companies, rendering the few people to not experience its benefits fully while pushing the majority of the Filipino society to be left behind. The paper also emphasizes that the failure of the Philippine government—both the past and present—to push for national industrialization remains the root cause of the failure to fully take-off for the digitalization of manufacturing and finance industries.

Introduction

When discussing the advancement of the economy, the sectors of manufacturing industries and finance are the first two that top the list in terms of importance. This is undeniable considering that the former is mainly responsible for selling products both in the local and foreign market, and driving further innovation in terms of goods and services; whereas the latter is tasked with securing the proper and secured flow of monetary transactions and other related activities. To simply put, both are fundamental in making sure that the business, work, and consumption of the people are running properly. And among the many ways to ensure that both sectors are always on the top condition is to equip them with the latest technologies—in this decade, the digital technologies of the 4th wave of the Industrial Revolution.

With that, how can we be absolute that both the manufacturing and finance sector ride on this industrial wave? And what are their current status and future plans for their improvement? How can we be certain that their innovations are for the benefit of all Filipinos and not just the selected few? These are some of the questions that are addressed in this overview of the manufacturing industries and finance sector.

This paper will discuss the current state of digitalization in the Philippine manufacturing industries and finance sector. To be more precise, the paper will gloss over the (1) overall status, (2) challenges in the present, (3) future trajectory goals of these two economic sectors; and (4) evaluation and recommendations. There are three reasons why manufacturing and finance were chosen as the focus topic for this paper. First, the economic and social conditions for the two (both domestically and globally) are ripe for their technological advancement, especially with the incoming wave of Industry 4. Second, some research from advanced countries has shown that investment in the manufacturing industry for technological development and digitalization can serve as a springboard for economic growth. Third, the population of digitally-savvy Filipinos that contrastingly has no bank account is an untapped potential for the new wave of fintech.

The current State of Digitalization in Manufacturing and Finance

Manufacturing

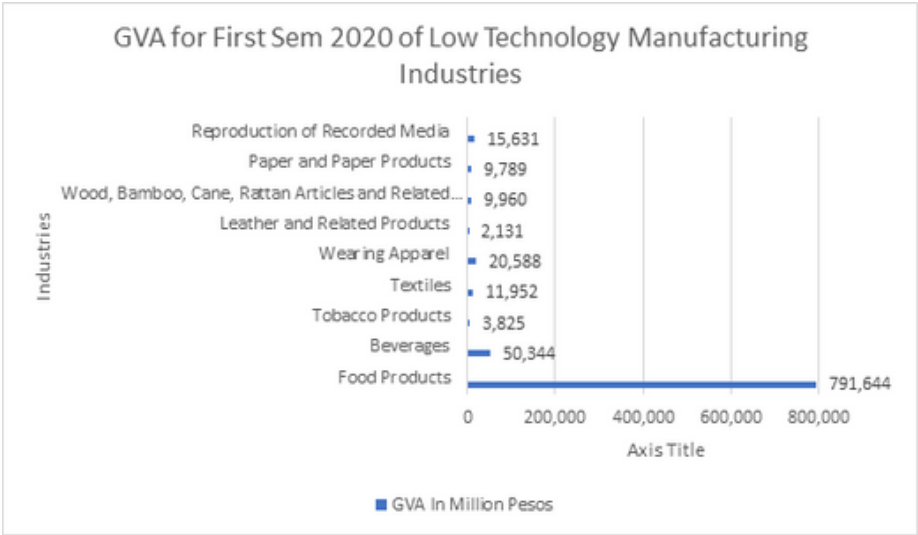
Overview for Manufacturing

Together with services and agriculture and fisheries, industry is included in one of the three fundamental economic sectors in the Philippines. The Philippine Standard Industrial Classification (2009) defines manufacturing industries as any production that involves the "physical or chemical transformation of materials, substances, or components into new products"; and any "substantial alteration, renovation, or reconstruction of goods" is included under this classification as well. Plants, factories, or mills are the terms used to refer to the manufacturing units (2009). Also, units that transform products by hand, from the worker's home, and/or sell products in the same premises of production fall under manufacturing industries. Even the units that hire other units through a contract to process materials can be considered as manufacturing units (2009).

According to the latest data from the Philippine Statistics Authority (2020), there are 24,200 manufacturing establishments in the Philippines in 2017. Meanwhile, as of 2020, there are 19.85% or 21.7 million Filipinos are employed in manufacturing industries (Plecher, 2020). Philippine manufacturing industries are comprised of 22 subsectors and can be further categorized into three types based on the type and level of technology employed in their production: (1) low-technology, (2) medium technology, and (3) high technology. Low technology industries are more labor and/or resource-intensive and less capital-intensive, while the medium and high technology are the opposite (Batongbacal, 2014). In addition, low-tech subsectors offer a wider opportunity for employment due to the less skill level required in production but are more vulnerable to competition from outside players (2014). The medium and high-tech manufacturing subsectors, on the other hand, require increasing employment of higher-skilled labor and use of higher-grade technologies (2014). Charts 1, 2,

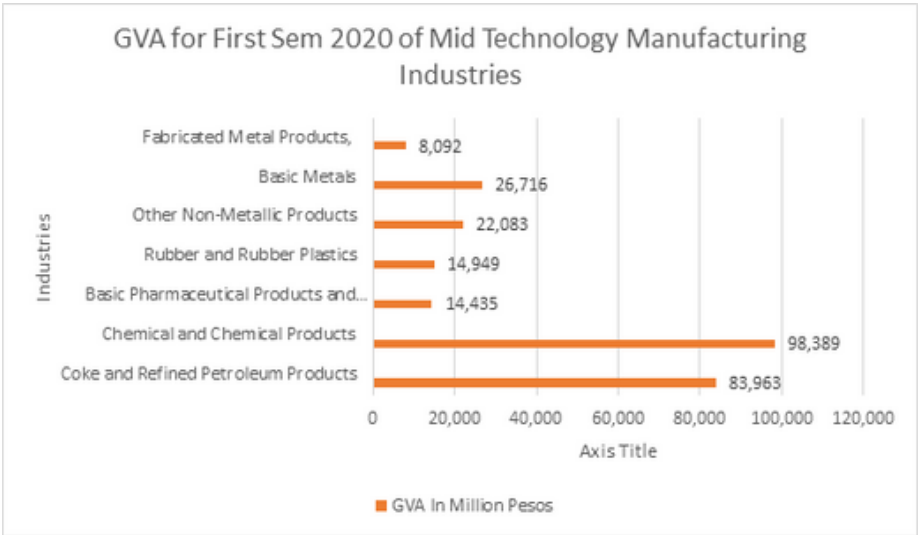
and 3 contain the Gross Value Added (GVA) share by percentage of manufacturing industries by subsector in the first quarter of 2020. Subsectors are further classified on this chart based on their respective technology level.

Chart 1



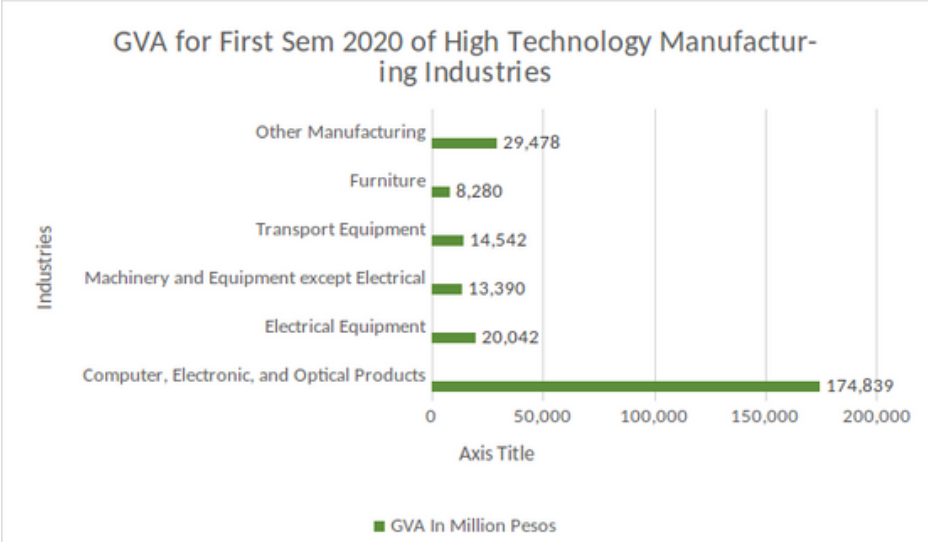
From: Q1 2018 to Q2 2020 National Accounts of the Philippines. (2020). Philippine Statistics Authority

Chart 2



From: Q1 2018 to Q2 2020 National Accounts of the Philippines. (2020). Philippine Statistics Authority

Chart 3



From: Q1 2018 to Q2 2020 National Accounts of the Philippines. (2020). Philippine Statistics Authority

Plans and Roadmaps Undertaken

Aside from the intrinsic goal to improve the overall performance of the economy and cause a chain-reaction of progress from structure towards its people, the plans of the Philippine government and business sector to digitalize the manufacturing and other industries are mainly because of grasping the benefits of the global technological phenomenon of "Industry 4.0 technologies". To simply put, Industry 4.0 refers to the incorporation of data and machine learning to computers and automotive machines in production and providing other types of services (Marr, 2018). Industry 4.0 is also known as the Fourth Industrial Revolution, as the application of this new technology caused disruption and change to the status quo of labor and production, similar to the effects of steam power (First industrial Revolution), electricity (Second Industrial Revolution), and computer technology (Third Industrial Technology) (2018). Aside from the commonly-spoken Internet of Things, Cloud, artificial intelligence (AI), robots (additive manufacturing), and 3D printing, Industry 4.0 has brought other new technologies such as blockchain, Big Data, neurotech, nanomaterials, energy storage, and synthetic biology (Dadios et al, 2018).

The government and the private sector--specifically the businesses and academe--have constantly crafted plans and roadmaps since the early 2010's aiming to boost the industrial sector of the Philippines as well as its linkage from other economic sectors. The grandest and all-encompassing program would be the Industrial Development Program (under the Department of Trade and Industry) that started in 2012. The general objective of IDP is to revive the "de-industrialized" Philippine industries by upgrading the existing industrial facilities to produce better higher-grade parts, components, and services, specifically those connected to the Global Value Chains (GVC) (Ofreneo, 2020). In a report by the Bureau of Investments (2016), there were 32 out of 40 roadmaps under the IDP that have been completed as of December of 2016. Aside from the programs that aim to adjust the industries on a general level, there are two that are worth discussing as their plan involves the revamping of the industries by incorporating new digital technologies, namely, the Manufacture Resurgence Program (MRP) and) SMART Program.

The MRP is under the IDP—or more correctly, a recalibration of it—with a special focus on improving the participation of manufacturing industries in GVC in the ASEAN region. The MRP aims to achieve this by addressing the problems horizontally (i.e., problems in smuggling, logistics, high cost and lack of reliability of power, etc.) and vertically (i.e., addressing the gaps in supply chains, market share, human resource development, integration of MSMEs, etc.), and with the aid of other government agencies (Department of Trade and Industries (DTI), n.d.). Covered by the MRP is the Comprehensive Automotive Resurgence Strategy (CARS) Program that aims to further "innovation, technology transfer, environmental protection, and SME development" to get the Philippines a proper market positioning in the ASEAN region (DTI, n.d.). Mitsubishi and Toyota, both are Japanese automotive manufacturing giants, heed the call for this governmental plan (Gamboa, 2019). But because of the excise tax caused by the TRAIN law, the two companies are struggling to increase the domestic sales of their locally manufactured Toyota Vios and Mitsubishi Mirage (2019).

Perhaps the latest and most large-scale attempt by the government to digitize the manufacturing sector is the Securing Manufacturing Revitalization and Transformation (SMART) Program that was announced by the DTI in the Manufacturing Summit in 2019 (Umali, 2020). In a nutshell, the SMART Program generally aims to adopt the Industry 4.0 technologies and utilize them to upgrade the processes, products, and services, and to develop new business models for manufacturing industries (2020). With a Php 25-30 billion allotted budget, SMART Program sees the following programs as the potential recipients: the (1) ECO-PUV Program; (2) DTI National Development Corporation Co-investment Program; (3) EV Incentive Scheme (EVIS) Program; and (4) Industrial Transformation Program (2020). The implementation method of SMART Program is not that different from MRP, as it plans to achieve its goal through different financial support, incentives, and confronting the intrinsic and extrinsic logistical issues.

Aside from roadmaps and programs, investments from South Korea and Japan were also eyed to boost the industries and push for the adoption and adaptation of new Industry 4.0 technologies. With a $1 billion budget, South Korea pledged to invest in infrastructures, automotive, and tourism in the Philippines while also encouraging other Korean companies to invest in electronic commerce as well (Malaya Business Insight, 2019). Particularly worth mentioning are their plans in automotive, specifically, Hyundai Motor Co. plans to establish electric vehicles (such as e-jeepneys) in Laguna (2019). Meanwhile, Japan targets investing in infrastructure development, railways, EV public transport systems, retail, manufacturing, logistics, warehousing, factory automation, construction, and real estate industries (Cahiles-Magkilat, 2019). Worth highlighting is the plan of Japanese firm Assemblepoint Co., Ltd's to produce 4-wheel EVs using IoT (2019).

It can be observed that the roadmaps and other government policies do not address the issue of long-standing foreign dependent economic policy of the Philippines that renders the country as the consumer of the global value chain.

This does not only affect the key industries in digitalization and technological advancement, but also the other important industries in the country that can push for an overall economic growth.

Status of digitization in manufacturing 2020

Even though the government has only made some drastic plans in terms of massive digitization, the presence of industry 4.0 is already present in private sectors. As early as 2013, some companies rendered their services related to IoT, Big Data, AI, and VR via outsourcing (Tracxn, 2020). A good example of this is the partnership of Jollibee Food Corp and Amazon Web Services for their cloud services (Aguinaldo & Mogato, 2018). As of 2020, with the SMART program still on a roll, the wide-scale digitization of the manufacturing industries is still considered to be unfulfilled. Despite that, one company, the Schneider Electric, has stepped up their game and fully equipped its Cavite plant with the latest smart technologies.

Initiated in 2017, the four plants of Schneider Electric in Cavite have been transformed into a Smart Factory in March of 2019 as it is considered to be the first highly digitalized manufacturing plant in the Philippines (Schneider Electric, 2019). During its transition stage, the company reported achieving 13% in energy savings and 14% growth in annual production, which is one of the key goals of upgrading their technology level (2019). Schneider Electric did not only step up their game on the technological aspect of production but also in providing upskilling and reskilling for their 1400 employees (2019). Aside from fully incorporating IoT and other smart technologies, the company also has VR-equipped training rooms for each of their four sites (2019).

Despite the advancement in digitalization of some of the industrial manufacturing plants in the Philippines, majority of the industries are still lagging in the level of technology. Even the electronics industry in the Philippines, which has been historically the chief manufacturing industry in

terms of annual exports, has remained labor-intensive, lacking in technological and product innovation and high-skill workforce, for several decades despite the other neighboring countries going the digitalized route already (Adnan et.al., 2017). Along with the absence of national industries, the manufacturing sector remains an export-dependent industry thereby rendering the local innovation stagnated or not fitted for the urgent local demands. The case of substandard working conditions and low wage in manufacturing industry plants is another topic.

Overview for Finance

The financial sector plays an important role in a country's overall economic stability and growth. Aside from providing the people with individual financial security, the financial sector "attracts deposits and provides loans from the surplus deficit side" thereby helping in facilitating the proper "allocation of resources and increasing the overall productivity of the economy" (Bakar and Sulong, 2018). The flourishing of the financial sector plays a more important role as a catalyst for economic growth in a developing country such as the Philippines (2018). If economic development would not push on the macro-level, the digitalization and its benefits—especially its bouncing effect on other economic sectors—would be more slow, sporadic, and left at the hands of the private sector.

But before further diving deeper into its current status, it is better to discuss what comprises the financial sector of the Philippines first. The financial subsector of the Philippines can be categorized into the following: (1) Commercial/Universal Banks; (2) thrift banks (e.g., savings, and mortgage banks, private development banks, stock savings and loan associations, and microfinance institutions); (3) and rural and cooperative banks (Oxford Business Group, 2018?). Aside from the major subsectors, real estate and cryptocurrency can also be included on the list. There are at least 43 commercial/universal

banks, 57 thrift banks, and 495 rural banks existing in the Philippines based on the latest data (2018).

As mentioned above, the financial sector of the Philippines has experienced continuous growth for the past years. The total assets of the banking system of the Philippines exhibited an 8.4 percent year-on-year (YOY), amounting to Php 18.4 trillion and shares 98.5% of the nominal GDP of the country (Banko Sentral ng Pilipinas (BSP), 2020). As of 2019, the commercial/universal banks share the biggest of the total assets of the financial sector, amounting to 92.3%, while the thrift banks share 6.3%, and rural and cooperative banks share 1.5% (2020).

The digitization of the banking system in the Philippines, dominated by online banking applications that can be accessed via mobile phones, have gained popularity in the Philippines for the past few years. Although it only became popular recently, the use of the internet in bank transactions is not new to the financial sector. In fact, as of 1999-2000, major banking companies in the Philippines can be accessed and perform transactions online, including account inquiries or deposits, loans, credit cards; fund transfer; bill payment; and customer service (AffordableCebu, 2013). Despite that, 71% or 51.2 million of Filipino adults do not have a bank account and mostly prefer to transact through traditional means (Adrian, 2020). Although this situation may seem to be detrimental for the spread and penetration of banking and financial literacy in the Filipino population and its overall growth, the government, business sector, and academe see the opposite. Rather, the combination of unbanked and digitally literate Filipinos is a great opportunity for the new form of banking —digital banking.

Manufacturing

The potential and benefits of online banking have been harvested by banking companies for almost more than a decade now. However, its positive effects would only echo on the small ring of the Filipino population and sector if the

majority of the Filipinos are still unbanked and not joining the wave of online banking at all. In fact, according to the financial inclusion survey conducted by BSP in 2019, 71% or 51.2 million Filipinos have no bank account. In addition, 45% of the respondents stated that not having enough funds is the main reason why they do not have a bank account, 26% said that they do not have the necessary documents to proceed, while 17% have no knowledge of the details (BSP, 2019). Interestingly, the survey showed that 17% of the respondents do not know the details on how banking works, while 7% are unaware and 5% do not trust banking institutions (2019). Fortunately, the government, through the BSP and other associated agencies, have already initiated plans and roadmaps to introduce and endear more Filipinos to online banking.

The earliest for this decade is the National Strategy for Financial Inclusion (NSFI) that was launched in July of 2015. The main goal of NSFI is "(to) raise awareness, appreciation, and understanding of financial inclusion and enable coordination among stakeholders". (BSP, 2015). The target sector of the NSFI to be included in the national financial system are the unserved and underserved markets such as the low-income and marginalized, OFWs and their beneficiaries, MSMEs, agricultural sector, the youth, women, the indigenous people, among others (2015). Another roadmap worth mentioning is the E-commerce Philippines 2022, which is a successor of the Philippine E-commerce 2016-2020. Although both the old and new roadmaps focused on enlarging the landscape and reach of Philippine e-commerce, the financial sector, specifically the digital platforms and payment gateways, serves as a vital pillar in securing to achieve their target goals (DTI, 2020). The significance of financial inclusion and digital banking on this is seen in its inclusion on the roadmap frameworks, specifically under the "structure" section (2020) Although NSFI and E-commerce Philippines 2022 did not specifically mention the use of online banking as a means to intensify the inclusion, roadmaps such as this one is a good indicator that the government sees the importance of increasing the reach of the financial system.

The latest and digitally-inclined roadmap of the government aiming to harness the benefits of digitalization in the finance sector is the Digital Payments Transformation Roadmap 2020-2023. With the main goal to expand and enhance the digital payment ecosystem, this new roadmap targets to (1) amplify the preferences of customers to digital payments by converting 50% of the current retail transaction into digital and to include the 70% of adults under the financial umbrella; and (2) to utilize the digital ID (Philippine Identification System or PhilSys) to push for more innovative digital financial products and to adapt on next-generation type of payment to facilitate and process real-time transactions (Newsbytes, 2020). ING Philippines, Bank of the Philippine Islands (BPI), Banco de Oro (BDO), UnionBank, Landbank, Metrobank, and Security Bank are among the popular commercial banks in the Philippines that turned digital as early as 2017 (Zoleta, 2020).

Currents Status of Digitization in Finance

Commercial Banks and Money Lending Companies

Commercial or universal banks are the pioneer and most active in pushing the progress of digitization of the Philippine financial sector. The popular banking institutions that were mentioned in the previous section such as BPI, BDO, UnionBank, Landbank, and Metrobank, among others, also dominate the digital banking market. But among the commercial banks that offer a digital platform for transactions and other services, the Rizal Banking Corporation (RCBC) received recognition from the financial publication Asiamoney this 2020 (BusinessMirror, 2020). RCBC received the said award because of how the inclusion of DiskarTech, a type of" super-app", helped its online-banking platform to allow the opening of digital savings account without any "initial deposit requirement, maintaining balance, or dormancy fees" thus making it more accessible to people during the COVID-19 pandemic (2020). But despite such innovations, it is reported that about 51 million Filipino adults are reported

to be unbanked, most likely due to the lack of awareness of its multitude of benefits and worries about security issues (Agcaoili, 2020). However, the 2019 financial inclusion survey of BSP highlighted that the main reason as to why most respondents do not have a bank account is due to lack of funds (45%) and not seeing any reason to do so (27%) (BSP, 2019). It can be inferred from the BSP 2019 survey that a huge portion of Filiipinos do not even have disposable funds to even jumpstart a bank account, but more so to maintain it.

The gap in the digitization of commercial banking in the Philippines and the unbanked population is ironically more beneficial for the advancement of digitalization in finance. Despite not having bank accounts, the Filipino population has a high smartphone (61%) and internet penetration (67%) like its neighboring South-East Asian countries, making it apt and timely for wide financial inclusion through the new type of banking—neobanks (Sanchez, 2020; Kemp, 2020). Not to be confused with the existing online banking, neobanks refer to financial institutions that conduct transactions and other related services exclusively online or digitally—mostly on mobile apps--in terms of operation and do not have any physical branch (Howat, 2020). Acquiring its license from the BSP earlier this year, the Singapore-based neobank Tonik will be the first of its kind that will operate in the Philippines and is expected to operate in February of 2021 (Tonik Digital Bank, 2020). The coming of Tonik and other similar neobanks in the future is expected to cause major disruption in the traditional and digital banking scene in the Philippines.

But even before the arrival of neobanks, e-wallets that offer financial services through their mobile application platforms have already waged competition with the brick-and-mortar banking tradition in the Philippines. G-Cash and PayPal are the most popular e-wallets in the Philippines as of this date. In fact, CIMB Bank Philippines, the bank partner of G-Cash, has received two new awards from The European and CFI.co for its efforts to "further widen the reach of financial services products and solutions to all Filipinos" (The Manila Times, 2020).

Small-scale Online Lending

Money-lending is another type of financial option—and sometimes, a safety net—for many ordinary citizens. This is evident from the popularity and huge role of 5-6 Indian lenders among the small scale entrepreneurs in various Filipino communities in times of economic crises, which is reflected by the results of 2019 financial inclusion survey of BSP that showed that 10% of loan sources are from “informal” loaners while 45% are sourced from family and friends (Kondo, 2003; BSP, 2019). Although operating traditionally before, online money-lending companies have popped out in the past few years and are gaining more traction from the people seeking quick financial aid. However, the Securities and Exchange Commissions (SEC) warned the public to be careful in joining online money-lending businesses, as the government institution issued cease and desist orders to 48 of these companies due to several violations, including the violation of their right to privacy and online harassment (CNN Philippines, 2019). Similarly, the National Privacy Commission conducted a hearing to address the complaints to 48 online money-lending companies on their "misuse of borrower's information" by disclosure of their unpaid balances to other people (NPC, 2019). The NPC addressed this matter seriously as such cases may disrupt the momentum and negatively affect the perception of people with the security of online money-lending and other related financial transactions.

Cryptocurrency

Cryptocurrency is a new type of currency that is exclusively transacted in digital form/s. The start of this revolutionary currency is traced with Satoshi Nakamoto who created Bitcoin--the first digital currency and most popularly associated with cryptocurrency (Dela Cruz, 2018). Basically, cryptocurrency works similar to the currency that people use today, except that it is fully digital,

decentralized (transaction is peer-to-peer), and protected by cryptography (2018). Aside from transacting using "blockchains", people who are involved in cryptocurrency can earn money through "mining" wherein they solve "cryptic math problems" and if successful, they can earn a reward of 12.5 Bitcoin (2018).

This new form of currency entered the Philippines in the early 2010s, which led to the BSP in 2014 to raise concerns on Bitcoin since there are no existing regulations to protect consumers and businesses from financial losses who transact through this medium (Balusdan, 2018). By February 6, 2017, the BSP issued the Guidelines for Virtual Currency Exchanges or the Circular 944, requiring virtual currency exchanges to acquire a certificate of registration to operate as "a remittance and transfer company" (2018).

As of 2020, there are a total of 16 cryptocurrency banks that are officially recognized by BSP (Helms, 2020). Considered to be the newest innovation in blockchain technology in the Philippines, UnionBank and Philippine Digital Asset Exchange (PDAX) launched the blockchain app called Bonds.ph that will allow unbanked Filipinos "to invest in the government's new retail treasury bond" (2020). With the help of the technology of Coins.ph, UnionbBank also launched the first bitcoin atm in the Philippines on its branch in Makati City (Vidal, 2019).

Challenges in Digitization of Industries and Finance

It is undeniable that digitization is already on its move to be incorporated by manufacturing industries and the financial sector. And surely, it is a matter of time until it dominates the traditional format of the market of both of these sectors. However, there are major challenges—both internal and external--hampering both sectors to completely utilize and enjoy the benefits of digitalization. The internal challenges refer to problems that exist and can be mitigated and solved by the sector itself, while the external challenges are issues that are outside of their sectoral scope and would require structural solutions to be properly addressed.

Internal

Digitalization in manufacturing industries promises a great deal of positive effect in terms of higher productivity and chances of improvement and innovation, especially with the use of Cloud technology and the Internet of Things (IOT). Despite the bright future that it may present, the fear of massive unemployment due to automation, AI, and robotics replacing the workers in their current professions. Although this hysteria is not exclusive to the manufacturing industry as other industries (such as in agricultural and service industries) will also be affected, it will suffer the heaviest blow in the future, as Mckinsey & Company reported that 61% or 2.4 million of the manufacturing employee are potentially "automatable" (Moraje, 2017). Meanwhile, a projection from the research of Oxford Economics and Cisco (2018) showed that by 2028, at least 10% or 380,000 workers from the manufacturing industry will be displaced from work. Besides, at least 1.1 million jobs in the Philippines will disappear in the labor market by 2028 and may push workers to find a job in other industries (2018). Although the two pieces of research provide different figures, it does not remove the fact that there would be many lives and families that may negatively be affected by the digitization of industries due to displacement. It should be noted, however, that digitalization will not be detrimental for the people as long as it does not remove the economic opportunities available to the people, but rather help them in upskilling or open more professions that are less “robotic”.

One of the major internal challenges for the financial sector to fully adopt the digitalization of their system and overall financial inclusion are the "adoption barriers". An idea discussed in a roundtable discussion facilitated by the Milken Institute, this barrier consists of four factors: awareness, trust, prior financial inclusion, and convenience (Schellhase, 2019). According to the participants, the first factor is the most fundamental, as this determines the engagement of people regarding the digital option as an alternative to the traditional (2019).

Meanwhile, the three remaining factors are interrelated with one another. For instance, financial inclusion—referring to having a commercial bank account—is a fundamental aspect in building trust (decrease of fear on cybersecurity issues such as cybercrime and identity theft) and providing convenience (lack of establishments or transactions accepting digital payments) to future consumers (2019). Despite the majority of the adult population of the Philippines being mobile phone and internet savvy, these barriers remain as impending challenges that prevent the finance industry from bringing the benefits of digital banking to the majority of the Filipino.

External

Aside from the internal challenges, the external or structural challenges pose a greater barrier when it comes to fully achieve the widespread beneficial effect of digitalization in the manufacturing and finance sector in the Philippines. These structural problems can be classified into two categories: the technological and policy infrastructure. The technological infrastructure, which mainly refers to the poor status and quality of internet connectivity n in the Philippines, is the most important and urgent aspect to be addressed. Although digitalization in manufacturing industries may mainly revolve around the incorporation of robotics and automation, the assurance of high-quality internet connection is fundamental, as Cloud Technologies and IoT are an important aspect for the AIs in manufacturing to be highly functional—especially in automotive (Stix, 2017). To be more specific, the manufacturing sector uses the pay-per-use pricing model of Cloud that allows them "to automate processes, harness data, and optimize costs" thus limiting the costs of unnecessary data investments (Maguera, 2020, as cited from People's Television News, 2020). Meanwhile, the financial sector, specifically the commercial banks, use cloud technology as a "platform of services and tools which provides quick access to analytic tools and development tools" intending to provide security for their

financial data and transactions (Piad, 2020).

The policy infrastructure refers to laws and other government policies that may mitigate the speed of digitalization in both sectors. For the manufacturing sector, the main concern is the high cost of logistics in the country. According to the Philippine Digital Economy Report of The World Bank Group (2020), 27% of sales of manufacturing firms in the Philippines funnel to the logistics cost, which is higher in comparison with Indonesia (21%), Vietnam (16%), and Thailand (11%). This has a negative impact not only on the manufacturing sector but also on MSMEs who participate in e-commerce, as they do not get the full benefits of the digital marketing alternative.

On the other hand, the creation of policies on biometric national identity or national ID is the most urgent in the financial sector, as it limits the coverage of important data that can be linked to individuals thus undermining the potential data inclusion (Schellhase, 2020). Having a national id is also a prerequisite to an e-Know-your-Customers (e-KYC) and expanded use of open application programming interface (APIs) that would help commercial banks in quick access of data and enhancing the security features of both the firms and customers themselves (2020). Although the government enacted the Philippine Identification System Act on August 6, 2018, partnered financial technology (fintech) groups raised concerns on "inconsistency of terms, overlapping jurisdictions over semantically similar concepts, concepts not covered by existing taxonomies, implementation mismatch and policy conflict." (Piad, 2020). In addition, groups such as the Foundation for Media Alternatives (2018) have also pointed out several concerns on the national id system such as violations in privacy and security rights, crossing the boundaries beyond the agreed terms, and other infringements on civil liberties.

But above the challenges mentioned above, the basic societal problems not being addressed throughout the decades have always been the biggest barrier towards advancement in technology and society in general. This includes, for instance, the perennial struggle of farmers for their ownership rights on the

lands that have been tilled for generations of farmers since Spanish period. The redistribution of economic means to the Filipino farmers that is approximately 9.72 million in population will not only empower a large portion of population, but will also spur local and regional economic development and technological advancement (Philippine Statistics Authority [PSA], 2020). The lack of economic leverage--and thus, source of income--for the majority of the Filipinos can also be related as a factor as to why a huge portion of Filipino adults are not unbanked or unaware of digital banking and its foreseeable benefits.

Future of Digitalization

Manufacturing and Finance Industries

One of the investments that the manufacturing industries are currently eyeing is the incorporation of Collaborative Robots or "cobots" in the production line. Cobots are designed to directly interact and work with human co-workers to handle their shared payload (Peshkin & Colgate, 1999). According to the Denmark-based company Universal Robots, which is coincidentally urging the manufacturing industries to adopt robotics and automation, the adoption of cobots in the production line can serve as a transitory move from manual production to dominant or full automation in manufacturing (Manila Standard, 2020). In terms of productivity, cobots can increase productivity by 300%, reduce defects by 90%, and increase profits by 20% (2020). Also, Universal Robots are planning to collaborate with electronics, automotive, semiconductor, food & beverage, furniture, and consumer products industries (2020). A similar step not only by the business sector but also with the involvement of the government, an organization named "AI Pilipinas Coalition" was established to "empower people and organizations through the use of Artificial Intelligence" (Microsoft Philippines, 2020). In partnership with Microsoft, the coalition endeavors to establish a clear legal and regulatory mandate from the government with regards to the responsible use of and a clear roadmap for AI

in the Philippines (2020). The coalition also aims to prepare the workforce to support related data-driven innovation and most importantly, to prepare the workforce for the AI economy (2020).

The aforementioned National Strategy for Financial Inclusion (NSFI) is still the most comprehensive roadmap of the BSP aiming to digitalize the financial sector. Headed by the Financial Inclusion Steering Committee (FISC), the main goal of this roadmap is to maximize the number of Filipinos that will be affected by the financial inclusion of the government (Bangko Sentral ng Pilipinas, 2020). One example of how the committee introduced digital technology to Filipinos is the use of online cash transfer to the beneficiaries of the Department of Social Welfare and Development (DSWD) and online platform for government transactions of the Department of Finance (Bangko Sentral ng Pilipinas, 2019). BSP is also committed to supporting the PhilSys or the Philippine Identification System, which is projected to be completed by 2022 (2019). In November of 2020, BSP issued Circular 1105 or the guidelines for financial institutions aiming to apply for a digital banking license in the Philippines (Caraballo, 2020).

Suggestions by Independent Organizations

Foreseeing the impacts of digitization of manufacturing industries and the financial sector to the economy and society of the Philippines, independent organizations also provided research and insights on how to properly grab and maximize the benefits of digitalization. For instance, the Philippine Institute for Development Studies (PIDS), for instance, has conducted a study and created proposals on how the government can efficiently harness the Fourth Industrial Revolution by systematically reviewing and adjusting its policies, institutions, and development efforts (Dadios, 2018). Aside from highlighting that the government should accumulate various types of capital (e.g., institutional, organizational, and physical) while addressing the technological and knowledge gaps, the research also advised that both public and private institutions should

invest more in the research and development aspect (2018). Fundamental suggestions such as (1) boosting competition by openness to international trade and reducing anti-competition practices in ICT industries; (2) development of education system (both in public and private institutions) that can produce workers that are adapted and trainable to new technologies; and (3) establishment of a universal social protection system for the vulnerable group that can be affected by technological disruptions were also presented on this research (2018).

Similarly, research by the World Bank Philippines was conducted in 2020 aiming to assess the status of the digital economy of the Philippines and formulate policy recommendations to boost digital adoption, decrease the digital divide, and adapt to the changes brought by the COVID-19 pandemic in our society (World Bank Group (WBG), 2020). To achieve this, the research suggests that the Philippines (1) upgrade its digital infrastructure; (2) promote digital payments (and digital taxation); reduce logistics cost; and (3) foster a more competitive business environment (2020). According to the research, completing this policy reform can help the Philippines become more competitive, resilient, and inclusive (2020).

Evaluation

Based on the discussions in the previous sections, it is clear that both the manufacturing industries and finance that the process of digitizing their production is already on the roll albeit on a minimal percentage, as it is only concentrated on the private sectors in the National Capital Region and other urbanized areas in the Philippines. Specifically, the two sectors have already utilized Industry 4.0 technologies to improve their operations—Cloud technology and AI are the most commonly used. However, it is also apparent that the level of digitization between the two sectors has a wide gap in terms of the level of distribution and intensity. This can be seen in the fact that although

there are manufacturing subsectors such as electronics and automotive that employ robots, AI, and other smart technologies, others are still left on the brick-and-mortar level of technology, such as the food and beverages, wearing apparels, textile, etc. to mention a few. Whereas in the financial sector, not only that the commercial banks are on a constant level of improving the security and reliability of their online banking services by using new digital technologies, but other players such as the neobanks are emerging and the microfinance businesses are also revamping their gears by going online. Although understandably, the finance sector is expected to exponentially improve its services, as they are the ones responsible and liable in handling the day-to-day monetary transactions and other related activities of the people, the advancement of digital technologies of the manufacturing sector is still important, as that would benefit the economy in a macro-scale.

The government is not so negligent to the fact that both sectors require improvement in their technological aspect—especially on using Industry 4.0 technologies--to provide better products and services. As early as 2012, responsible government institutions rolled out plans and roadmaps aiming to ride the wave of Industry 4.0 technologies and grasp its benefits not only for the manufacturing industries and finance sector but for the economy at large--and soon, the digital economy. Other roadmaps, such as the SMART program for the manufacturing and Digital Payments Transformation roadmap 2020-2023, are still in progress and only time will tell if they would turn-out according to the plan.

However, the completion of these roadmaps and the overall advancement of digitalization in manufacturing industries and finance still face several pre-existing challenges, most especially in the digital and policy infrastructure of the country. Specifically on the heavy dependence in foreign industries and technologies that results in the lack of technological innovation and heavy export-dependence of local manufacturing industries that snowballs to the slow incorporation and adaptation of the Filipinos to digitalization. Aside from that,

independent researches also pointed out that the government needs to focus on boosting competition in business and ICT industries, create educational programs that can equip students on knowledge regarding the Industry 4.0 technologies, and ensure that the people who will be the most vulnerable to disruptions of technology would receive proper help and safety net. The importance of the last aspect is echoed by Sonny Africa (2018) in his article titled "4th industrial Revolution: Change is Coming?" wherein he wrote that maximizing the Industry 4.0 technologies should not be the only goal, but it should also be about "advancing national development and upholding people's rights and welfare". The last aspect is the most important one, as it reminds the policymakers and stakeholders of digitalization that aside from upgrading the level of technology and accumulating all the positive effects it holds, the most important concern should be on how to diffuse the possible benefits to the majority of the Filipino people. Spearheading from the government is the only possible way to achieve this digitalization for the people--that is, if its core principles are to serve the masses and not the few who are already in riches.

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