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THE IMPACT OF DIGITAL FINANCIAL SERVICES ON THE PROFITABILITY OF AGRICULTURE ENTERPRISES: A COMPARATIVE STUDY IN HUNGARY AND INDONESIA

Doctoral (PhD) Dissertation

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Prof. Dr. Csaba Székely, DSc.

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Dissertation to obtain a PhD degree

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within the framework of the International Economy and Management Programme

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ABSTRACT

The agriculture sector has a significant role to provide for food security in nations, and with the development of technology, digital financial services (DFS) in the agriculture sector can help deision makers to find ways to provide accessibility and efficiency in farming operations. This study intends to fill in the research gap about to what extent DFS could improve profitability of agriculture enterprises in a developed country (Hungary) in contrast to a developing country (Indonesia). The literature review in this study provides the history, structure, definitions and terms used, e.g. agriculture enterprise, DFS, profitability. The methods used in this study are (1) a survey to map DFS in agriculture enterprises, comparing two countries, Indonesia and Hungary, and (2) secondary data analysis to measure the significance of DFS on profitability measures, which are which are revenue, total costs and gross margin, in Indonesia and Hungary. The results from the chi-square test show that most of the variables are significant between countries (Indonesia and Hungary). The result also includes constraints in agriculture development and important features in DFS development. The regression analysis shows that DFS is significant to agriculture enterprises in Hungary but not significant to agriculture enterprises in Indonesia. In conclusion, as DFS in agriculture enterprises in Hungary are widely used through a specific system, a similar system could be applied to Indonesia through agriculture enterprises especially for rural areas where banks are not accessible. There is also an urgent need from agriculture enterprises to provide farmers with education and training to use DFS to facilitate farming transactions.

Keywords: digital financial services, profitability, agriculture enterprises

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
ARDA	Agriculture and Rural Development Agency
BPS	Biro Pusat Statistik (Indonesian Statistical Bureau)
CAP	Common Agriculture Policy
CTA	Centre technique de coopération agricole et rurale
DAS	Digital Agriculture Strategy
DFS	Digital Financial Services
DGT	Directorate General of Taxation (Indonesia)
G20	The G20 is an international forum, made up of 19 countries and the European Union, representing the world's major developed and emerging economies
GDP	Gross Domestic Product
GNP	Gross National Product
GVA	Gross Value Added
HSCO	Hungarian Central Statistical Office
IACS	Integrated Administration and Control System
ICA	International Cooperative Alliance
IOF	Investor-owned firms
KSH	Központi Statisztikai Hivatal
NFP	Not-for-profit organizations
ROI	Return on investment
VAT	Value Added Tax
WEF	World Economic Forum
WTO	World Trade Organization

CHAPTER 1: INTRODUCTION

1.1. Background of the Research Topic

On a broader scale, businesses are always thinking about major industry shifts and new technologies that will affect the way that they operate in the years ahead. With developments in technological innovation, internet-powered tech companies and startups are challenging the biggest incumbent industries like hospitality, transport, and now agriculture. From a management standpoint, technological innovation, in the form of digital transformation, will certainly impact all business sectors. In the agriculture sector, digital transformation will affect aspects of yield, efficiency, and profitability. There is huge potential, and need, to help the agriculture industry find efficiencies, conserve valuable resources, meet global demands for protein, and ensure consumers have access to clean, safe, healthy food. To achieve this, technological innovation is inevitable. To keep the workforce and operations intact, revenues and profitability will certainly decrease.

According to a study from Price Waterhouse Coopers (2016), regarding agriculture enterprises and digital technology, digital technology will impact the industry "on the farm", such as **input technologies** (encompassing all inputs such as fertilizers, pesticides, soil amendments, genetics, seeds, and feed); **precision agriculture** (including drones and robotics, big data, smart equipment and sensors, and farm management software); new production and **new business models** (indoor or controlled environment agriculture, cellular agriculture, input and asset sharing). Nowadays technologies are looking to disrupt the supply chain in the agriculture sector through traceability and packaging, processing technologies, waste-reducing technologies such as biotechnologies producing biomaterials from food and agricultural waste, farm-to-consumer distribution, e-grocers, and food nutrition transparency. These technologies are being applied globally across developed and emerging markets. As a supporting enterprise in the supply chain, agriculture enterprises are also subject to innovation to keep up with the changing trend. Changes in farm ownership are challenging the traditional dynamics between agriculture enterprises and farmer relationships. There is a trend of strategic acquisition of farmland and established farming operations by institutional investors. These stakeholders recognize the value of land scarcity and the investment opportunities that come with it. There is also a trend where younger farmers

are beginning to take over their family's farms. The younger generation of farmers are more technological-savvy and they looked from digital experiences in other industries to apply in the agriculture sector. Therefore, the farmers of the next generation may leave the long established traditional relationship for a breakthrough in digital agriculture. In the next decade, there will be retirement of much of the rural workforce in farms. As the older generation leaves the industry, they will depart with years of customer insights and agronomic expertise. The transfer of knowledge and client relationship may be difficult since the younger generation leaves the rural area for high paying jobs in urban areas. The urbanization that is taking place will have an impact on the loss of human resources in the agriculture sector. However, digitalization might be a driving force to bring young talent back to the agriculture industry. Digitalization will become increasingly important in the future, and since the agriculture business involves largely daily transactions to maintain the food supply chain, then digital payments will become a trend in day-to-day operations.

A study from Centre Technique de Coopération Agricole et Rurale (CTA) in 2018 mentioned that agriculture plays a major role in the economy with numerous cash transactions taking place throughout the value chain. Digitalization should be able to answer the challenge by finding ways that can be economically and environmentally sustainable. Although the study from CTA focuses on the digitalization of agriculture in Africa, the Caribbean, and the Pacific, overall, digitalization could potentially increase productivity and profitability levels. As digital agriculture matures, agriculture retailers will continue their important role of servicing producers through interrelated farm technologies and crop input products. Often structured as enterprises, agriculture retailers serve as the middlemen between manufacturers and growers in the agriculture value chain.

According to Nadeau and Nadeau (2016), agriculture enterprises are owned and democratically controlled by their members. Enterprises are owned by producers, consumers, workers, business, and other organizations, and combinations of the above. Also, according to the International Cooperative Alliance (ICA), unlike for-profit businesses, in which profitability is the primary measure of success, service to members is the priority of enterprises, but they also must maintain a level of profitability that allows them to operate sustainably over time. From a measurement perspective, the growth or decline of enterprises is problematic, because there is no worldwide, longitudinal data set encompassing the many different kinds of enterprises.

Throughout this research, the term “agriculture enterprises” is used to describe business units engaged in the production of food and fiber, ranching, and raising of livestock, aquaculture, and all other farming and agricultural related industries, which also encompasses cooperatives. The use of the term “agriculture enterprises” is to give a general idea about the structure of the business unit, as the term “cooperatives” has a different meaning in Indonesia and Hungary, respectively.

The number of agriculture enterprises in the world is approaching 3 million, and the number of agriculture enterprise memberships is about 2 billion. By 2030, there would be more opportunities to create additional agriculture enterprise enterprises (ICA, 2018):

1. Improving the measurement of performance in agriculture enterprises

   Without systematically measuring the number of agriculture enterprises and related variables over time, it is not possible to tell whether the agriculture enterprise movement is increasing or decreasing in size and sustainability. This lack of information creates a fundamental problem: how can we increase the role of enterprises in the world, if we do not know how many there are or what are they doing? Good data and analysis are prerequisites to good planning. Research on agriculture enterprises, including a periodic, global census, is necessary for effective planning their long-term growth.
2. Improving the legal and regulatory environment for agriculture enterprises.

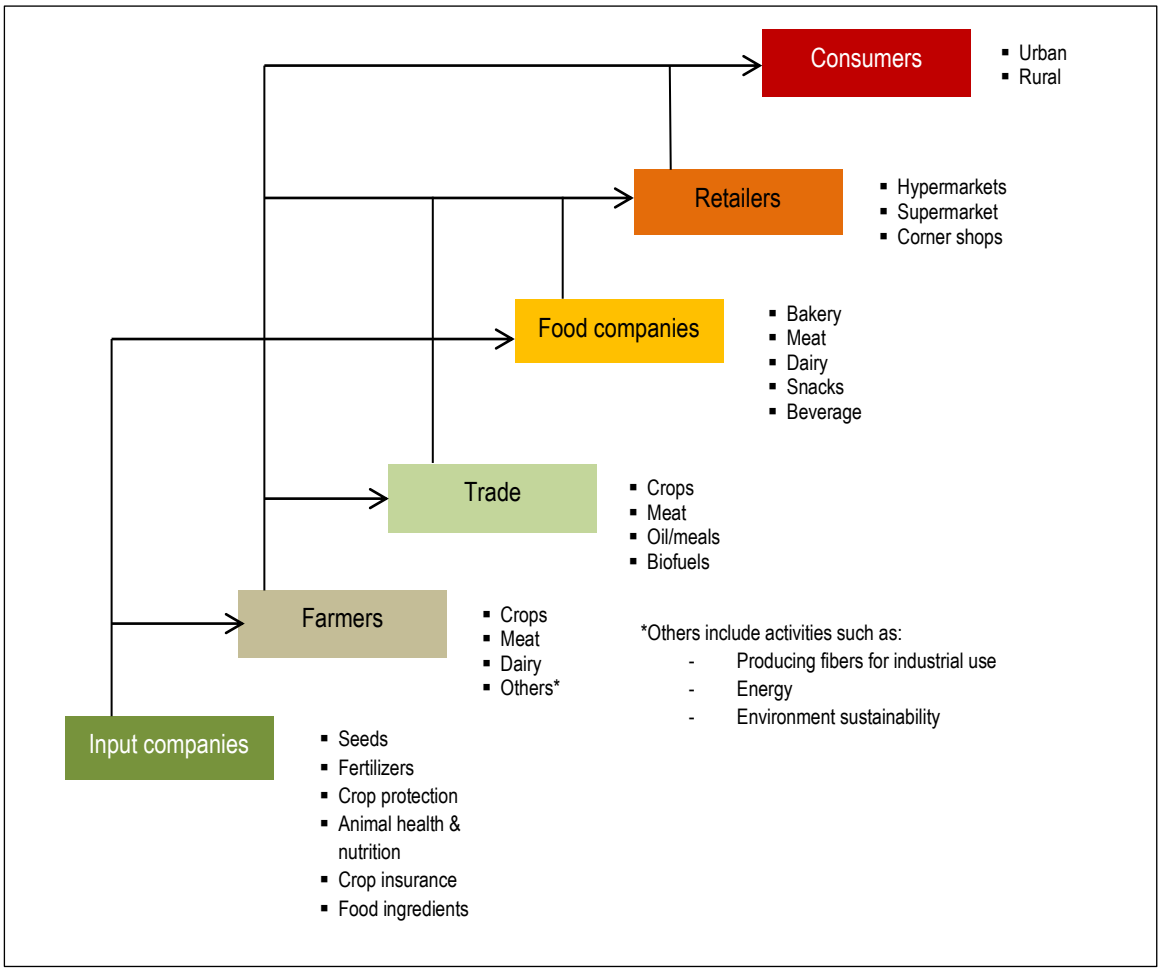
   The quality of agriculture enterprise laws, regulations and regulatory systems varies dramatically from one country to the next. All countries should have agriculture enterprise laws, regulations, and enforcement practices that are consistent with the seven agriculture enterprise principles.
3. Strengthening community-level, national and international support for enterprises.
4. Improving agriculture enterprise development and financial assistance.
5. Developing targeted strategies for agriculture enterprise sectors, countries, and job-creation opportunities.

The agriculture sector is commonly faced with problems such as production capacity and quality, access to markets, improved trading positions, and higher incomes. Digitalization is a driving force for agriculture enterprises to keep up with the changing trend. Digital financial services (DFS) hold an enormous opportunity for financial inclusion and expansion of basic services. Financial services can help development through facilitating transactions, investments, and managing accounts. When provided with appropriate DFS products and access to well-designed networks, agriculture

enterprises will benefit from improvements in income, financial management, and economic resilience. DFS will become increasingly important and widespread, since in the future, digitalization will take over some parts of daily operations of businesses, including agriculture.

1.2. Digitalization in the Agriculture Sector

Agriculture is an ancient occupation that has long been practiced by a significant portion of the population. At that time it used simple, basic technological solutions and even included the primary processing of food. It is only in recent centuries that it has become a complex system of many vertical stages. Today we are talking about agro-industry and agribusiness, which involves a whole value chain process. Its development can be characterized by the same characteristics as those of any industry. Digitalization has thus also become a key driver of its development.



Source: Own figure based on KPMG (2013)

Figure 1. Agriculture and Food Value Chain

Although individual crops and regions may vary, in general the agricultural value chain contains the following steps (*Fig.1*). At each link in this value chain, there is a transfer: of crops, labor, information, or money. Food is a physical commodity produced with varying degrees of human labor, and so transfers of physical crops and labor cannot be wholly digitized to a certain extent. Some agricultural information (weather, prices, basic agronomy) can be delivered digitally and is frequently in short supply, while other information (soil quality, best practices) is in equally high demand, yet may require a physical presence.

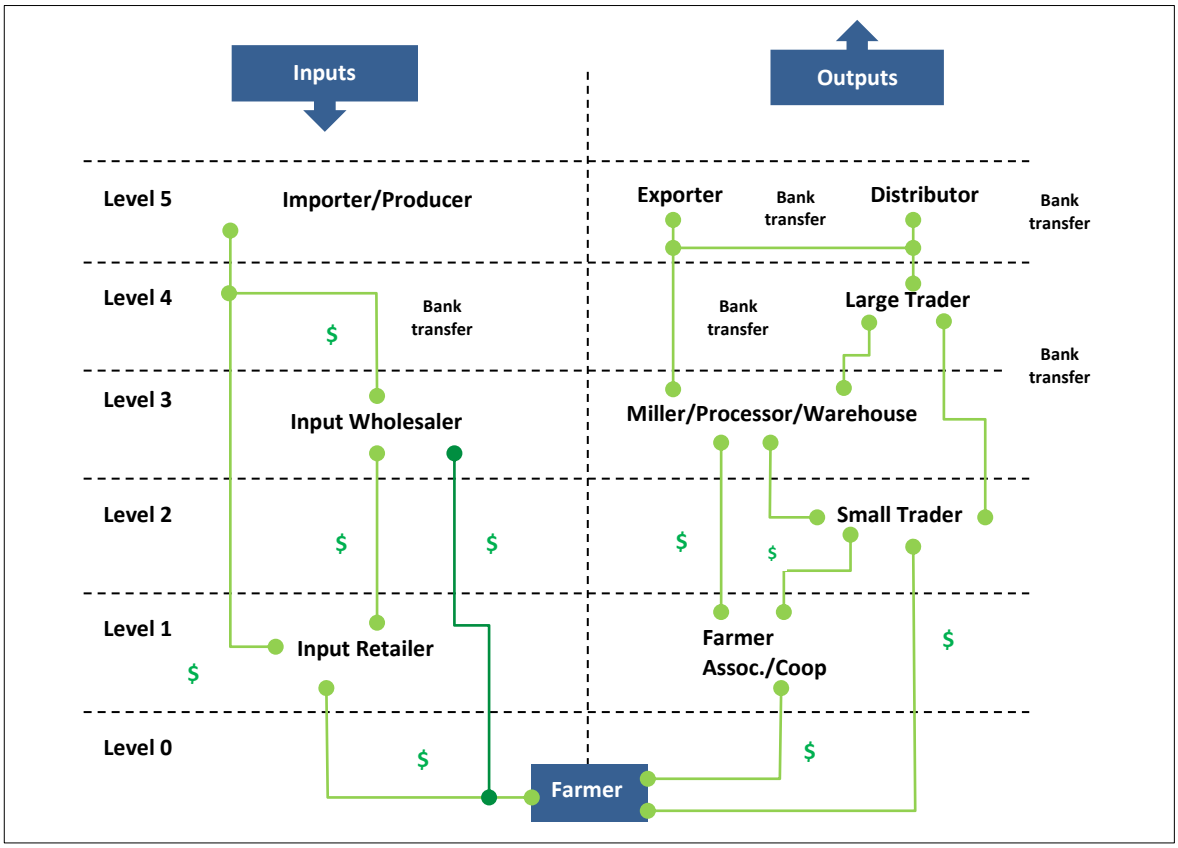
The agricultural industry recognizes that digital technology is a key issue, offering significant value-creation opportunities. There are five major issues that will transform the enterprises' environment over the next 30 years: demographics, emerging countries, urbanization, the environment and technology. The use of mobility, data analysis, and connected device technologies is seen as a way to optimize processes and harness added value, particularly for members.

Although they have already deployed practical initiatives based on digital technologies, agricultural enterprises see today as a turning point. The extensive business ecosystem of agricultural enterprises (members, customers, suppliers, other enterprises, etc.) has encouraged them to be among the first to adopt the digitization of information exchanges with their different partners, particularly members. More than half of the enterprises have also introduced, or are considering, collaborative working initiatives. These enterprises also use digital technology to optimize production, supply-chain, maintenance and traceability processes, mainly through the effective use of data.

Aside from the issues related to target value chains and technologies, the main challenges encountered revolve around the human factor. Agricultural enterprises should strengthen their teams to acquire the skills necessary for this transformation and have rolled out cross-functional and collaborative working methods that increase agility. Numerous partnerships with suppliers, universities and other enterprises have been put in place to pool resources and reduce costs.

Agriculture enterprises serve both the customer end and the supplier end of the value chain, from crop planning to harvest, until the final customers. The existing agriculture should be able to adapt with the change. The interconnectivity in the value chain will relieve many stresses that usually occur in product pricing, financing and credit services. Real-time inventory may be one way to set product pricing adjusted to the supply and demand of real-time orders and inventory changes. It creates the opportunity for growers

and farmers to be more proactive in planning. By providing digital platforms for sales, operations, and customers to view local inventory levels and place online orders will be helpful to reduce inefficiencies in paperwork, such as the use of carbon-copy forms for sales and inventory management. Alternately, agriculture enterprises can also focus on farm credit financing and crop insurance. Enterprises can help how farmers can use data to manage operations in the field, provide access to operating credit during down economies and better crop insurance premiums.



Source: Own figure based on Digital Financial Services for Agriculture, World Bank (2017).

Figure 2. Illustrative DFS Needs at Different Agri-Value Chain Level

Fig.2 illustrates the drivers shaping the need of DFS: revenue generation, transaction relationships, formal financial services usage, and information access/digital technology. The use of digital technologies in the agriculture value chain has the potential to address some of the problems faced by farmers, among them the lack of transparency in the value chain and operational inefficiencies that lead to higher costs. In practice, most of the daily transactions occurred in the agriculture value chain are cash-based. According to the Global Findex report (2017), about 15% of adults in developing economies have reported that they received payments for the sale of agricultural products in cash. For most low-

and middle-income countries, 95% of those receiving agricultural payments were paid in cash. Even the least cash-heavy agricultural sectors still show 75% of transactions in cash. Although still commonly used daily in the agriculture sector, cash has the following downsides as pointed out (Global Findex, 2017):

a. It is expensive. Making payments, transferring money, and withdrawing cash all require travel which brings its own costs, and/or fees.
b. It is insecure. Cash can be stolen, leaving the carrier with no recourse.
c. It is opaque. When cash changes hands there is often no record of the transaction, making cash transactions a means of potential misappropriation.
d. It is slow. As a physical commodity that can move no faster than the humans transporting it, cash payments take days or weeks to be executed.

Overall, the longer the transfer of cash takes, the more expensive, time-consuming, and insecure that process becomes. Differences of language, culture, and gender can make transactions more complex and expensive. Compounding these inefficiencies, agricultural workers count on multiple payment streams (input purchases, transport, crop sales, credit, etc.) for their entire livelihood, which multiplies the challenges faced in the sector.

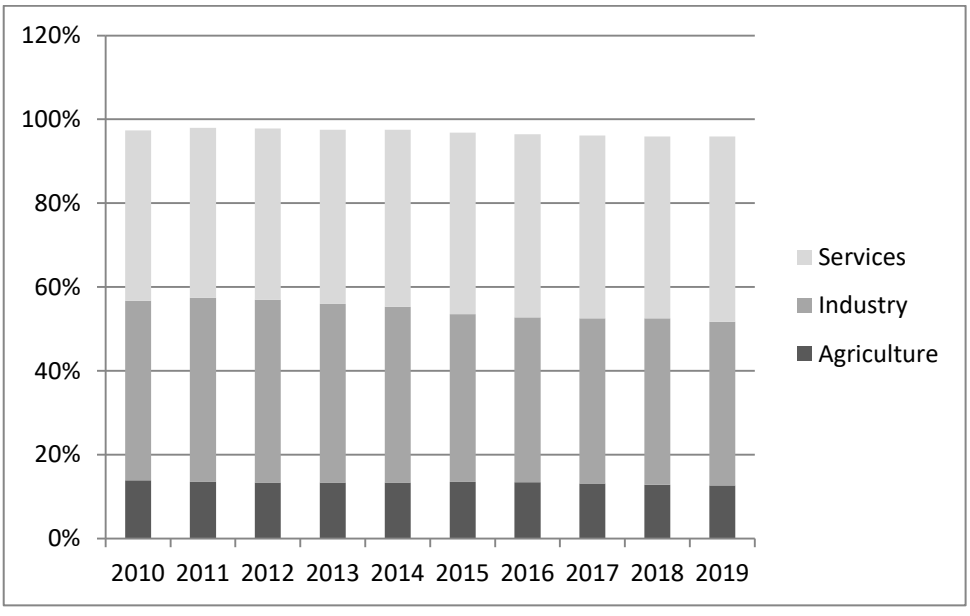
The G20 is an international forum, established in 1999, consists of 19 countries and the European Union, representing the world's major developed and emerging economies. Together, the G20 members represent 85 % of global GDP, 75% of international trade and two-thirds of the world's population. The member countries are: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, the United States, and the European Union. The G20 GPFI report (2015) about new trends in agricultureal finance, mentioned some potential research areas in the finance part. These five key research areas are: (1) understanding demand for smallholder households, (2) digital financial services, (3) financing for women in the agricultural sector, (4) value chain finance, and (5) agricultural insurance.

In relation with the new trends in agriculture finance, this research focuses on the use of digital financial services on the profitability of agriculture enterprises. The scope is limited to a comparison in two countries, Hungary and Indonesia. The reason for the choice of these two countries is Hungary, as an example where the agriculture sector is saturated, and Indonesia, as an example where the agriculture sector is progressing in terms of development. Not much information is known on the extent of digital financial

services adopted in both countries, notably in the agriculture sector. Due to the differences in the way agriculture and agriculture enterprises are developed in Hungary and Indonesia, the outcome may be different in many ways.

1.2.1 Overview of the Indonesian Agriculture Sector

Indonesia, a large archipelago nation of more than 17,000 islands with a population of 262 million, is on its way to become the largest economy in Southeast Asia. The country's gross national income per capita rose steadily from US$2,642 in 2007 to US$3,932 in 2017. With an average annual GDP growth of 5–6%, Indonesia has become the largest economy in Southeast Asia during the past decade.The poverty rate has been cut to more than half within two decades, leaving around 11% of the population still living below the national poverty line (World Bank, 2019). Today, Indonesia is the world's fourth most populous nation and the world's tenth largest economy in terms of purchasing power parity, and a member of the G-20 (World Bank, 2019). Digital technology is fast becoming the core of life, work, culture and identity. Yet, while the number of Indonesians using the internet has followed the upward global trend, some groups — the poor, the elderly, women, the less well-educated, people living in remote communities — are disadvantaged.



Source: Statista, 2020

Figure 3. Share of Economic Sectors in Indonesia's GDP from 2010 to 2019

Fig. 3 shows the share of economic sectors in the gross domestic product (GDP) in Indonesia from 2010 to 2019. In 2019, the share of agriculture in Indonesia's gross domestic product was around 12.72%, industry contributed approximately 38.95% and the services sector contributed about 44.23%. Indonesia is a leading producer of palm oil and a global producer of rubber, copra, cocoa and coffee. It is also the second marine fisheries producer in the world, after China. Large plantations cultivate export crops on about 15% of the total agricultural area, but the majority of farmers (68%) are smallholders operating on less than 1 hectare despite the fact that three out of five Indonesians live in rural areas with farming as their main occupation (IFAD, 2016). In contrast, Indonesia is also a net importer of grains, horticulture and livestock produce (ADB, 2015). The country's diverse landscape supports the agriculture sector to make a considerable contribution to the economy. Table 1 presents the number of farm holdings and farm sizes in Indonesia.

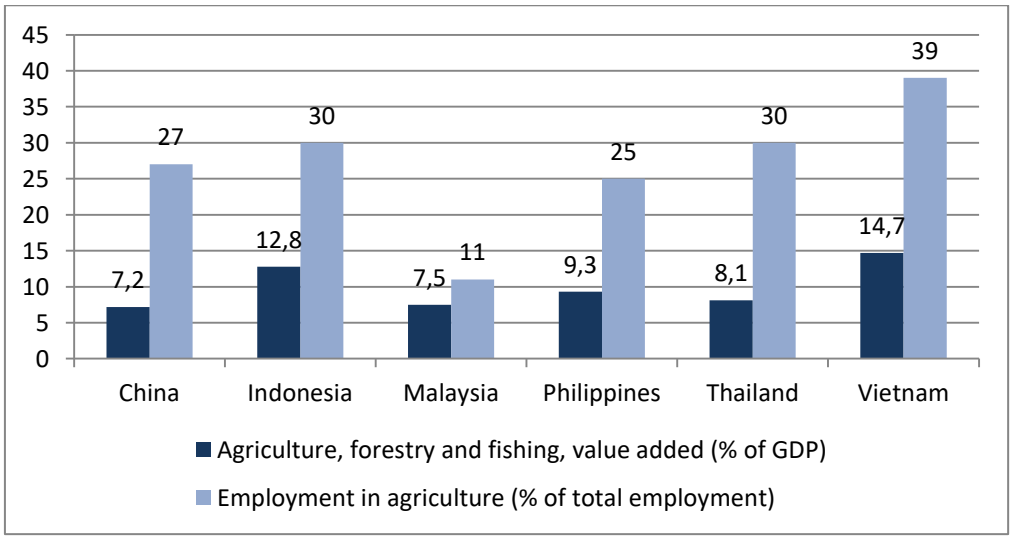
Table 1. Number of Farm Holdings and Farm Size, Indonesia

	Smaller farm	Other farm	National
Average farm size (ha)	0.56	5.01	0.92
Minimum farm size (ha)	0	1.02	0
Maximum farm size (ha)	1.02	6.88	6.88
Total number of holdings	2,721,963	752,903	3,474,866

Source: FAO, 2018.

The nation's total land area used for agricultural production has increased over the last decades and is now equivalent to 32% of the total land area. Although its share of GDP is decreasing, agriculture is still of crucial importance for Indonesia's economy, accounting for 12.72% of GDP. Moreover, the sector is the second biggest source of employment, in particular in the country's rural areas, with around 33% of Indonesia's labor force being employed in the agricultural sector. Rice is the primary staple food crop with a steady increase in annual production, making Indonesia the third largest rice producer in the world. Despite the gradual increase of food crop production, the country remains a net importer of grains (mainly wheat) and other agriculture produce, such as horticulture. Indonesia's total number of farmers are small family farms (93%). They dominate the sector and grow the bulk of staples, including rice, corn and cassava, as well as of cash crops, under which palm oil and rubber are the main export crops (FAO, 2018).

During the administration of President Joko Widodo, now serving his second term, business-friendly initiatives have been applied to attract investment in the agriculture sector, answering issues such as decreasing crop yields, limited access to capital, and outdated infrastructure. The development plan for agriculture includes targets for food security and farmers empowerment, including food sovereignty in four commodities: rice, sugar, corn and soybeans. Although the president's policies have addressed some of these challenges by expanding the total area of farming and revitalizing the infrastructure, there are still issues that require attention, mainly within the agriculture value chain. The progress has been slowed down by an underdeveloped downstream segment, and the inability of smallholder farmers to acquire the market demand, both nationally and internationally.



Source: World Bank, 2018

Figure 4. Agriculture, Forestry and Fishing to GDP and Employment in Agriculture in Selected APEC Countries (in percent), 2018

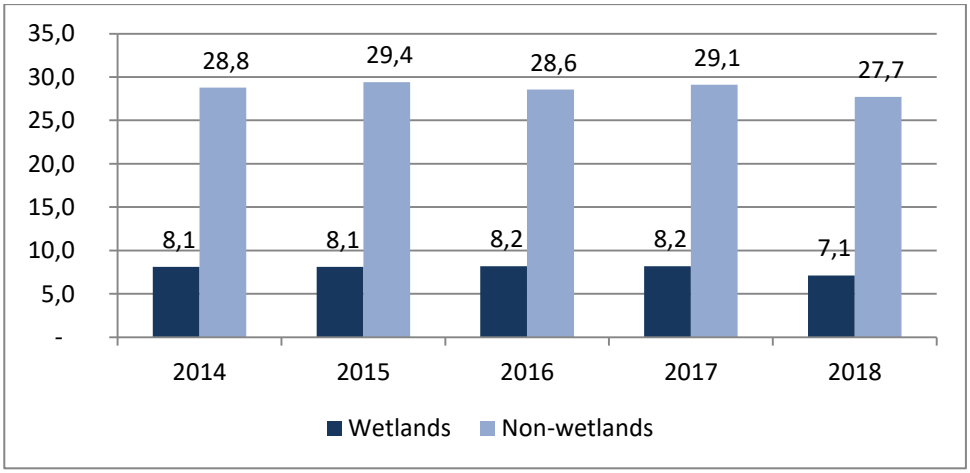
Fig. 4 below represents Indonesia's position among selected countries in the APEC. APEC is the Asia-Pacific Economic Cooperation, with member countries: Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Taiwan, Thailand, United States and Vietnam. The APEC Minister …

Despite the contribution of agriculture to the economy and policies made to help boost the sector, it has not been able to achieve the potential farm produce mainly due to socio-economic factors, such as education and income, which would optimize the

farm production. In the sector of agriculture, forestry and fishing, based on selected APEC countries, Indonesia is in second place after Vietnam, meaning that there is still a huge opportunity for development, given the huge size of the population.

In terms of structure, Indonesia's agricultural sector consists of two types of production: large-scale plantations under the guidance of the government or private investors, and smallholders using traditional farming methods. The latter tend to focus on horticultural commodities, while large plantations dominate leading exports such as palm oil, although a recent shift has seen smallholders increasingly account for a dominant share in other exports such as rubber.

The agricultural land in Indonesia is divided into 2 categories: wetland and non-wetland area. Wetland is the land or area for planting rice, which is divided again into sub-categories: irrigated wetland, non-irrigated wetland, dry field/garden, shifting cultivation and temporarily unused land. The non-wetland category is the land or area used to cultivate other kinds of plants (other crops, palm oil, horticulture, fruit, etc) other than rice.



Source: Statistics of Agricultural Land, Indonesia, 2018

Figure 5. The Growth of Agricultural Land Area in Indonesia (in millions of hectares)

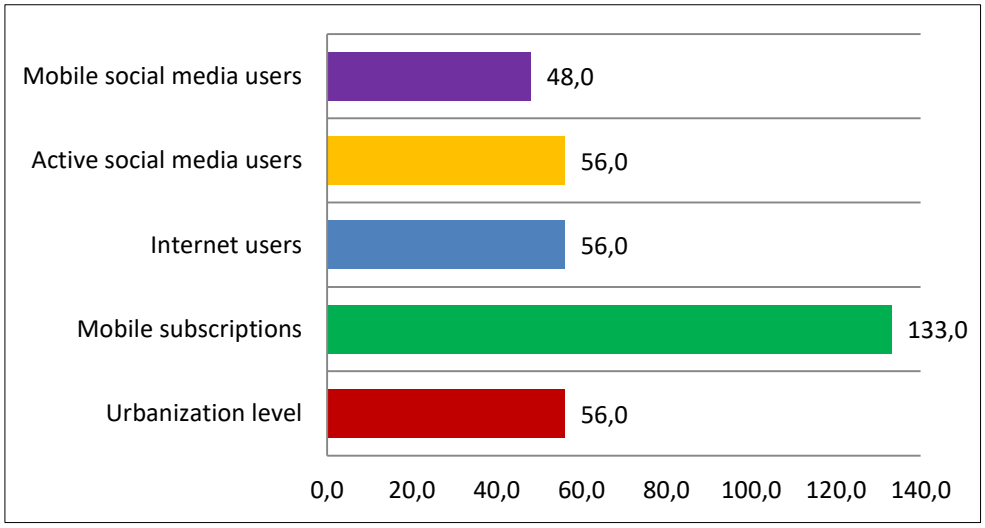
Fig. 5 shows that there is a decline in the use of the agricultural area, both for wetlands and non-wetlands. Indonesia's agriculture sector is made of four sub-sectors: cash crops, food crops, horticulture crops and livestock (BPS, 2018). Indonesia is one of the world's largest producers and exporters of cash crops such as palm oil, rubber, coconut, cocoa and coffee. These high-value crops dominate the agriculture landscape with 96.3% of the total value of Indonesia's agriculture commodity exports coming from cash crops with an export value of $31,815 million (Indonesia Agriculture

Statistics, 2018). Major food crops, ranked by export value, are rice, wheat, soybean, mung bean and peanuts. Horticultural crops include vegetabes (e.g. chili, shallot, cabbage, potato), fruits (e.g. pineapple, banana, mangosteen, mango), ornamental plants (e.g. orchid) and medicinal plants (e.g. ginger, turmeric).

About 31 million hectares in Indonesia are under cultivation, with about 40% of the cultivated land producing export crops. Approximately 60% of the country's cultivated land is located just in the heavily populated Java Island. Large plantations (large, privately-owned estates) cultivate export crops on about 15% of the total agriculture area, but the majority of traditional farming (68%) of both food and export crops are operating on small plots of about 0.8 to one hectare size.

1.2.2 Digitalization in Indonesian Agriculture

The digital environment in Indonesia is summarized below (*Fig. 6*). In addition to the overall figures, data presented in fig. 6 further explains that from a population of 268.2 million, the urbanization level is 56%, so there are more people living in cities compared to those living in rural areas. Also, mobile subscriptions are 133% compared to the total population (355.5 million vs. 268.2 million), which indicates that one person may have more than one mobile subscription, or may own several separate subscriptions for different purposes. Internet users are high, more than half of the population, which is 150 million or 56% of the total population, with 56% of active social media users and 48% of mobile social media users.



Source: Modified from https://datareportal.com/reports/digital-2019-indonesia

Figure 6. Digital Landscape in Indonesia, 2019 (in percent)

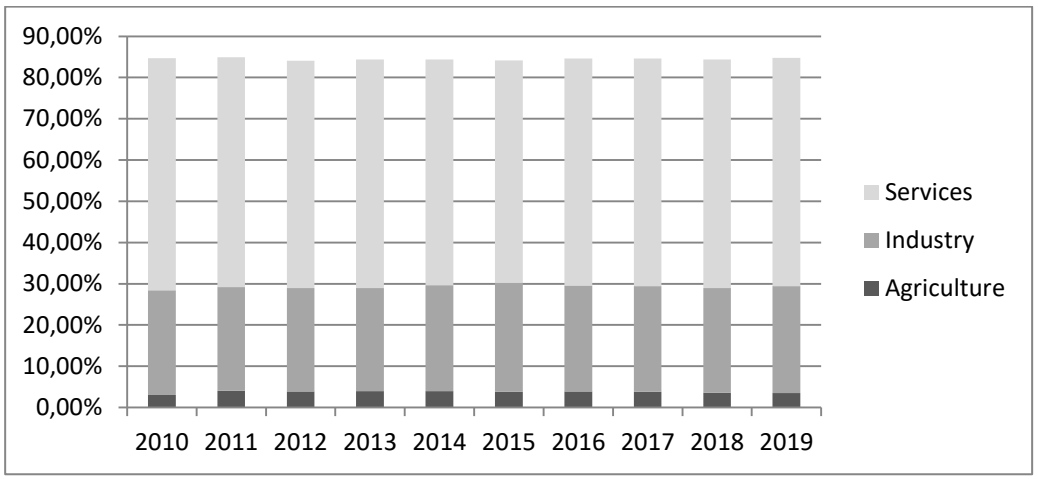
Economy-specific findings for Indonesia are made great progress, almost doubling its financial inclusion rate, from 19.6% of adults having an account to 36.1%, injust three years. However, around one-third of the population work in agriculture in some way, and of this cohort, 81% lived below the poverty line in 2015. The digitalization of Indonesia's rice subsidy, and a wide-scale pilot of a single social payments instrument, currently underway, have the capacity to substantially expand the digital payments ecosystem for the rural poor and drive further gains in financial inclusion. Digitalization of agricultural payments in the palm oil industry – valued around US$2.8 billion – is also gathering momentum, with significant benefits expected to flow to rural communities. Farmer associations (equivalent to agriculture enterprises) and aggregators are interested in digitizing payments. By working through farmer associations in the palm oil and cocoa sectors, payment providers can begin the development of a digital ecosystem at the association level, and use existing information services to educate farmers about the time and cost savings of digitalization.

1.2.3 Overview of the Hungarian Agriculture Sector

Hungary has an area of 93,024 km^2 of which 57% is agriculture land, while forests cover 21%. Hungary has a population of nearly 10 million, of which more than 4.5 million (or 46.7%) live in predominantly rural areas. Hungary has a farming sector characterized by small farms, in which nearly 85% of the roughly 500,000 farms have less than 5 ha. In addition, it is also characterized by a rather atypical agricultural sector with a very high share of arable farming (81% of agricultural land and low grassland (14.2%).

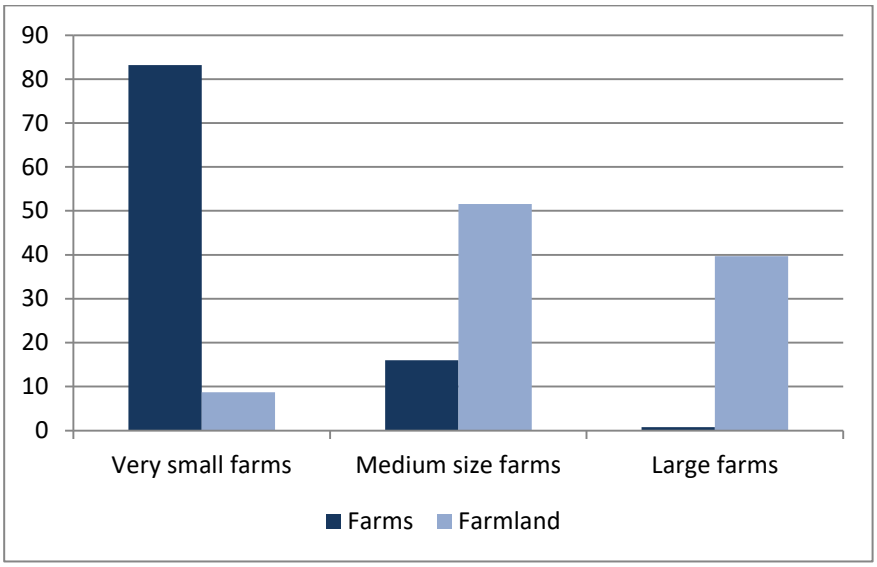
According the latest national statistics (HCSO, 2017), there were 9,000 agricultural enterprises and 416,000 agricultural holdings engaged in agriculture in 2016. However, many of the agricultural holdings were subsistence or non-subsistence farmers cultivating agricultural areas less than 1 hectare (Szerletics, 2018). Due to the new Land Transaction Act in force in 2014, only active farmers (and their family members) living in Hungary and obtaining at least a secondary agricultural and/or forestry qualification can buy land up to 300 hectares (except for livestock farms and seed producers where the limit is 1,800 hectares). Furthermore, in the new Land Transaction Act, preemption rights are provided for the Hungarian State, the farmer using the land, the neighboring farmers, local farmers and farmers

living within 20 km distance. All of the above creates high administrative burdens and strong state control for local land markets. In terms of land use regulations, Hungarian land policy favors family farms instead of large farms. Overall, land regulations together with degressivity are responsible for the splitting up of large farms. *Fig. 7* shows the share of economic sectors in gross domestic product (GDP) in Hungary from 2010 to 2019. In 2019, the share of agriculture in Hungary's gross domestic product (GDP) was 3.47%, industry contributed approximately 25.98% and the services sector contributed about 55.29%.



Source: Statista, 2020

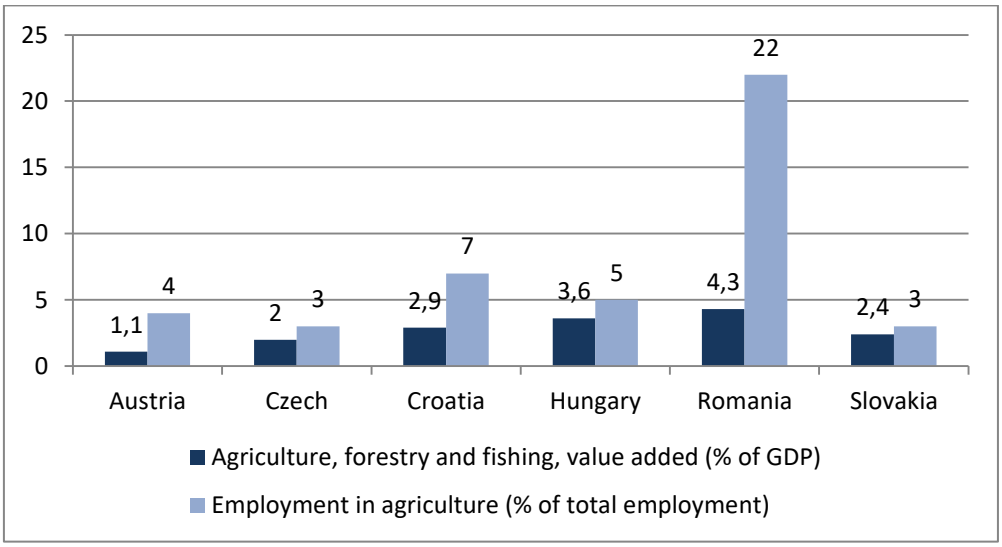
Figure 7. Share of Economic Factors in Hungary's GDP from 2010 to 2019



Source: Eurostat, 2017

Figure 8. Hungary: Farms and Farmland by Farm Size, 2016 (in standard output)

Data from Eurostat (2017) backed up the evidence of farms and farmland by comparing small size, medium and large farms in Hungary. From *fig.8*, it can be seen that very small farms has more farms than farmland in contrast to large farms which have more farmland and less farms. The largest share of the total agriculture output in Hungary in 2018 was represented by cereals (27%), live animals (24%), industrial crops (13%), and animal products (11%). The share of total crop production was 58% and 35% for animal and animal products (HCSO, 2018).



Source: World Bank, 2018

Figure 9. Agriculture, Forestry and Fishing to GDP and Employment in Agriculture in Hungary and Its Neighboring Countries (in percent), 2018

In addition, *fig. 9* represents Hungary's agriculture position among its neighboring countries (Austria, Czech Republic, Croatia, Romania and Slovakia Republic), in which Hungary came in second position (3.6%) after Romania (4.3%) in terms of the agriculture sector's contribution to GDP, and in third position (5%) after Romania (22%) and Croatia (7%) in terms of employment in agriculture compared to the total employment.

Table 2 shows that in Hungary, most of the farm areas fall in the category of 0 to 3 hectares (32%, in 2016) as opposed to areas with more than 1,200 hectares (0.15%, in 2016). Although most farm size categories remain stable with a slight increase of decrease, the most significant change is in 2014-2015, where there is an increase in the category of 600 to 1,200 hectares of farm area.

Table 2. Number of Farms by Physical Size Categories in Hungary, 2012-2016

Farm size (UAA)	2012	2013	2014	2015	2016
0-3 ha	58,546	59,732	60,143	55,373	54,922
3.01 -5.00 ha	25,448	25,653	25,280	25,698	25,456
5.01 – 10.00 ha	32,214	32,433	32,134	33,808	33,863
10.01 – 25.00 ha	30,465	30,280	30,195	28,961	28,572
25.01 – 50.00 ha	12,997	13,032	13,024	13,035	13,044
50.01 – 100.00 ha	7,689	7,761	7,792	8,170	8,308
100.01 – 300.00 ha	6,509	6,574	6,669	6,979	7,154
300.01 – 600.00 ha	981	982	1,067	1,231	1,227
600.01 – 1,200.00 ha	556	566	565	701	773
>1,200.01 ha	477	443	439	323	259
Total	175,882	177,456	177,308	174,279	173,578

Source: Szerletics, 2018

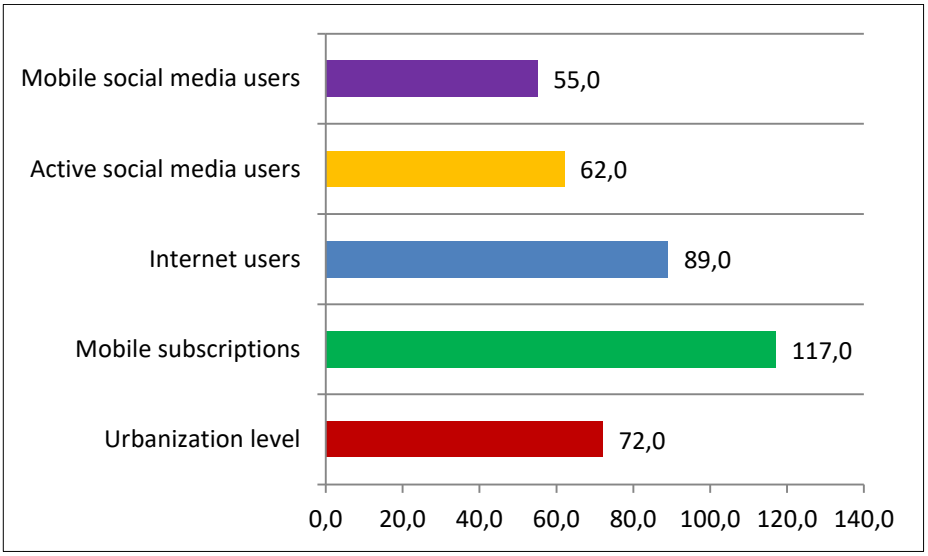
The Common Agricultural Policy (CAP) is implied by the European Union to provide a decent standard of living for farmers and agricultural workers, in addition to provide a stable, varied food supply for its 500 million citizens. As a common policy for all 27 EU countries (Brexit taken into account), the CAP strengthens the competitiveness and sustainability of EU agriculture by providing Direct Payments aimed at stabilizing farm revenues and finances projects responding to country-specific needs through national (or regional) Rural Development Programmes. The impact of CAP also influenced the structural changes of agricultural holdings. According to EC (2015), there were 11 million farms cultivating 172 million hectares of agricultural land with 22 million people in European agriculture in 2015. The European Commission or EC (2013) suggests that the number of farms has been declining since 1975 and those remaining have become bigger both in terms of agricultural area and also in economic terms.

According to the latest figures published by the HCSO (2019), capital expenditures in agriculture expanded by 8.3% at unchanged prices in 2018. Farmers spent HUF 347.7 billion (EUR 1.1bn) on development projects in 2018, HUF 43.6 billion (EUR 138 million) more (at current prices) than in 2017. The share of agriculture from capital expenditures within the national economy was 4.1%. Overall, the sector-level profitability of agriculture improved by 3% in 2018. The support schemes included in the Rural Development Program made a considerable contribution to the increased CAPEX. Specifically, farmers received HUF 12.5 billion

for the modernization of animal farms, HUF 15.3 billion for horticultural development, HUF 11.0 billion for value-added agricultural products, and HUF 3.7 billion for wine production. In addition to the above, the following factors also contributed to the increase in capital expenditures: income-supplementing agricultural subsidies, a stable financial background guaranteed by a sound risk management system, the growing profitability of agricultural production, and low loan interest rates.

1.2.4 Digitalization in Hungarian Agriculture

Hungary's digital environment can be summarized in *fig. 10* below for a general overview, with percentages in main points such as total population, mobile subscriptions, internet users, active social media users, and mobile social media users.



Source: Modified from https://datareportal.com/reports/digital-2019-hungary

Figure 10. Hungary's Digital Landscape, 2019 (in percent)

In addition to the overall figures, data presented in *fig. 10* further explains that from a population of 9.67 million, the urbanization level is 72%, so there are more people living in cities compared to those living in rural areas. Also, mobile subscriptions are 117%, compared to the total population (11.34 million vs. 9.67 million), which indicates one person has more than one mobile subscription, or owns several separate subscriptions for different purposes. Internet users are high, which is 8.59 million, or 89% of the total population, with 62% of active social media users and 55% of mobile social media users.

Hungary was one of the first countries to establish a national Digital Agriculture Strategy. According to Takácsné et al., (2018), the application of precision agriculture (PA) as a technology breakthrough confirmed increasing yields and has profitability benefits compared to conventional farming. Consequently, this study about the impact of DFS on the profitability of agriculture enterprises is associated within the DAS itself to assist the work of farmers and larger companies to apply DFS technology and simultaneously, increase efficiency.

1.3 Research Objectives

The background of the study in the previous sections explained on how technology developments could help improve the agriculture sector in both Indonesia and Hungary. Besides the differences on how the agriculture sector works in Indonesia and Hungary, a comparison of the digital landscape between Indonesia and Hungary could tell on how the development of agriculture and internet evolves in each country. However, the comparison is not absolute, since in many aspects both countries are different e.g. country size, population size and internet coverage, but it is useful as a starting point to discover some ideas on how DFS could be developed and applied in Indonesia based on Hungary's example, or vice versa.

Previously, this research wanted to make agriculture cooperatives as the basis of comparison between Indonesia and Hungary. However, the situation in the agriculture sector in Hungary changed, so it is not appropriate to fully use agriculture cooperatives as the object of the study. Instead, the term "agriculture enterprises" are used in the study as it covers all types of business models in the agriculture sector, including cooperatives.

The research objective renews a theme on which some previous research had been undertaken with the aim of understanding the determinants of DFS and the application in enterprises. In this context, this research aims:

(1) To find out about the factors that affect the application of DFS in agriculture enterprises, and

(2) To find out whether the application of DFS, given the digital and agriculture landscape in Hungary and Indonesia, including recent agriculture strategies, could have an impact on the profitability of agriculture enterprises.

1.4 Research Gap

Based on the preliminary findings in many literature and news from the agriculture sector, there is a common ground when discussing about the agriculture sector and DFS. Even though in a global scale there is a significant overall progress in financial, technical and economic resources to boost the use of digital financial services in everyday life, there are still challenges that need to be answered in order to keep up with recent developments in finance. Agriculture enterprises are often the most neglected part of the agriculture sector, but in both developed and developing countries, agriculture enterprises exist in the agriculture value chain to assist farmers to link with the downstream and upstream flow. DFS in agriculture enterprises could have a more significant role in order to increase the profitability of the enterprises as a whole, while at the same time help facilitate the flow of cash among farmers who are the members of the agriculture enterprise. In most developing countries, still there is a lack of investment from financial institutions or financial providers to provide the access to financial services, resulting in low agriculture productivity and efficiency, which leads to low incomes and high losses. As there are no previous studies comparing on how digital financial services could affect the profitability of agriculture enterprises in a developed country (Hungary) in contrast to a developing country (Indonesia), this study is intended to fill in the research gap.

1.5 Planning of the Research

The planning of the research will be divided into five steps:

1. The research will use both primary data and secondary data. The first step is to provide a background to build the survey questions. This is important as the survey needs to be conducted ahead of time.
2. Building a questionnaire for the survey which will be distributed to stakeholders of agriculture enterprises in Indonesia and Hungary. The questionnaire will be divided into 3 parts: demographics, agriculture sector, and DFS.
3. The literature review to provide the scientific background in conducting the research.
4. Based on the literature review, the methodology, including the research objectives, research questions, and hypotheses will be constructed. From this step, what type of secondary data needed are summarized to relate to the hypotheses.
5. The analysis of the survey results and the hypotheses, including limitations and new scientific contribution.

6. The conclusion and recommendation, including practical implications.

1.6 Possible Constraints

There may be possible constraints when undertaking this study. Table 3 summarizes the issues that may come up during the research process. However, for each constraint, there are alternative solutions that could help overcome the difficulties faced in the research process.

Table 3. List of Possible Constraints

No	List of possible constraints	What can we do about it?
1	Language constraints in interviews or preparing questionnaires	Use help for questionnaire translation and interviews to avoid misunderstanding or miscommunication; needs special attention.
2	Unable to obtain the data needed for the research	Depends on whether the agriculture enterprises are open about their activities and their innovation so far. This part should be focused in specific areas.
3	Availability of secondary data	Statistics for agriculture enterprises in Europe are updated while it is not the case for Indonesia. However, a compromise could be made by using the last 5 years of time series data from national databases and from the World Bank data.
4	Unwillingness of the agriculture agriculture enterprise to participate	Depends on the cooperation of the members of the agriculture enterprise are able to assist in obtaining data.
5	Technical aspects of the agriculture enterprise management	Depends whether the agriculture enterprises are open with their financial statements and/or financial aspects in running the business .It needs routine control.
6	Time	The time limit is the constraint; however the research project must be fulfilled. There is a consequence of not being able to graduate on time.
7	Budget	The budget is also a concern regarding the research will be done in 2 countries as a comparison study. The travelling budget makes up most of the costs.
8	Reality in the field vs. expected outcome	Any change between reality in the field and the expected outcome has to be treated with a sense of urgency or mitigation plan.

Source: Researcher's own construction

CHAPTER 2: REVIEW OF RELATED LITERATURE

2.1 The Cooperative Structure of Indonesia

The cooperative idea was first introduced in Indonesia during the Dutch occupation. It started as a Bank for Civil Servants, which is a savings and loan cooperative in Purwokerto, and was set up in 1896 to protect citizens from indebtedness to money lenders. There is a link between the Netherlands and Indonesia concerning cooperatives can be traced back to the first cooperative law which was introduced in Indonesia in 1915 and based on the Netherlands cooperative model. Then, in 1927, a revised law, primarily based on British-Indian model was issued. The first cooperative department was established in 1935, and this became a part of the Office for Cooperatives and Home Trade in 1939. At this time, cooperatives were primarily for financing, e.g. saving and credit, and most of the cooperatives were based on the island of Java. After the Japanese occupation and Indonesia's independence from the Dutch in 1945, the cooperative gained momentum. In 1945, article 33 of the Indonesian constitution explicitly mentioned cooperatives as fundamental to the national economy. The first Cooperative Congress was held in 1947, which decided to establish the national cooperative apex organization, today known as the Indonesian Cooperative Council (*Dekopin*).

In 1958 a new cooperative law was issued, and in the period 1960-1966, the number of cooperatives expanded rapidly, however, they were highly politicized. The change of government in 1966 brought a strong reaction in favor of cooperatives. The cooperative law of 1967, known as the "Law on the Basic Principles of Cooperatives", made provision for independence. Cooperatives, apart from those in agriculture, were registered and audited by the government, but not actively promoted and it was viewed as government propaganda. The government directed agriculture cooperatives, known as KUD: *Koperasi Unit Desa* or VUC: Village Unit Cooperatives. These agriculture cooperatives (KUD/VUC) were viewed as fundamental unions for agricultural development and were inseparable from the Indonesian food self-sufficiency program. The VUC was given responsibilities in farm credit scheme, agriculture input and incentives distribution, marketing of farm commodities and other economic activities. The government notably guaranteed both marketing and market price to encourage the growth of farm agriculture cooperatives.

A research from Riswan, Suyono, & Mafudi (2017), found that during the New Order or the Suharto regime from 1980 to 1990, VUCs experienced success, notably in financial performance. However, the success in that period was mainly caused by the monopolistic system in the VUCs in managing seeds and fertilizers. After the 1990s, the VUCs no longer had this monopolistic right, and they were unable to compete with modern businesses. As a result, the majority of VUCs went bankrupt, or could still operate, but with poor financial performance. Efforts from the regime to make VUCs as a viable instrument for initiating and implementing rural development failed. According to several previous research, there are some reasons for this failure. Corruption is one of them, also the lack of management capacity (human capital), were the facts that the incorporation of VUC is against agriculture enterprise principles. The government during that regime incorporated VUCs as their distribution vehicle to support green revolution program instead of a common economic need of the members. In addition, instead of enhancing the self-sufficiency of its members, the government granted VUCs all the equity capital, and members contributed a minimal amount or paid even nothing.

Table 4. The Timeline of Cooperative Regulations in Indonesia

Year	Description
1896	Cooperative idea in the form of savings and loan agriculture enterprise
1915	The first cooperative law in Indonesia based on the Netherlands cooperative model *(Verorderning op de Cooperatieve Vereeniging)*
1927	A new cooperative law was passed based on the Britiish Indian model
1935	The establishment of the first Indonesian cooperative department
1939	The first Indonesian cooperative department became a part of the Indonesian Agriculture enterprise Commission
1945	Indonesia's independence from Dutch colonialization; cooperatives are regulated by the National Constitution no. 33, article 1.
1958	In the wake of the Presidential Decree to reject attempts for a new National Constitution that focused more on capitalism, in which rules for cooperatives refer back to the National Constitution of 1945.
1967	The New Order regime: revision of the cooperative law in 1958 to include agriculture enterprises as social functions.
1992	Re-establishment of the new cooperative law in State Law no. 25
2017	In 2015, the parliament proposed a new law to replace the 1992 State Law regarding cooperatives but failed. In effect, the 1992 State Law is still used as the base for cooperative regulations.

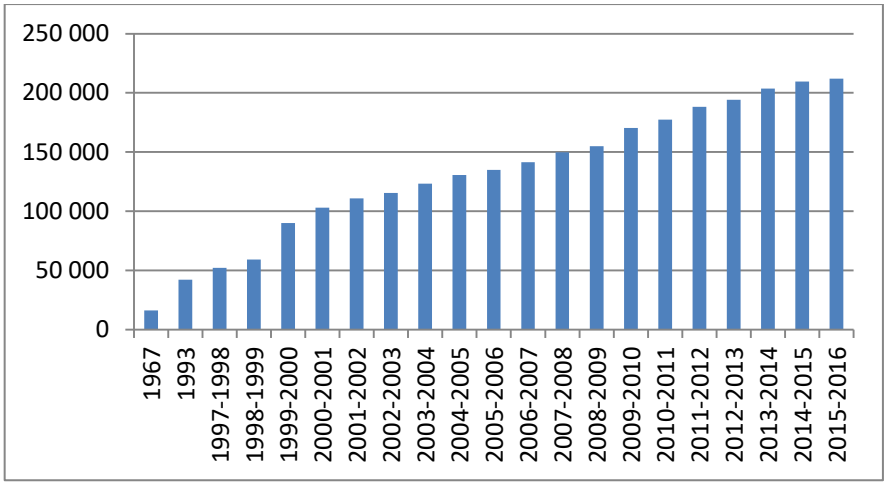
Source: Law of the Republic of Indonesia No.25 (1992), Suradisastra, K. (2006)

The current law in effect for cooperatives (No. 25/1992) was adopted in 1992. The law states that cooperatives, as pillars of the national economy, should possess certain characteristics such as:

1. A cooperative is a business entity consisting of persons and business activities by utilizing the capabilities of its members.

2. Cooperative principles are the base for cooperative activities. The highlight of the principles are (a) membership is voluntary, (b) democratic management, and (c) the distribution of remaining results of the operation (*Sisa Hasil Usaha – SHU*) is done fairly in proportion to a number of business services of each member.
3. A cooperative is a people's economic movement based on the principle of kinship. In the economic order of Indonesia, cooperatives are the economic strength that grows among the community as the growth of the national economy with the kinship principle.
4. Cooperatives aim to prosper members in particular and the society in general.

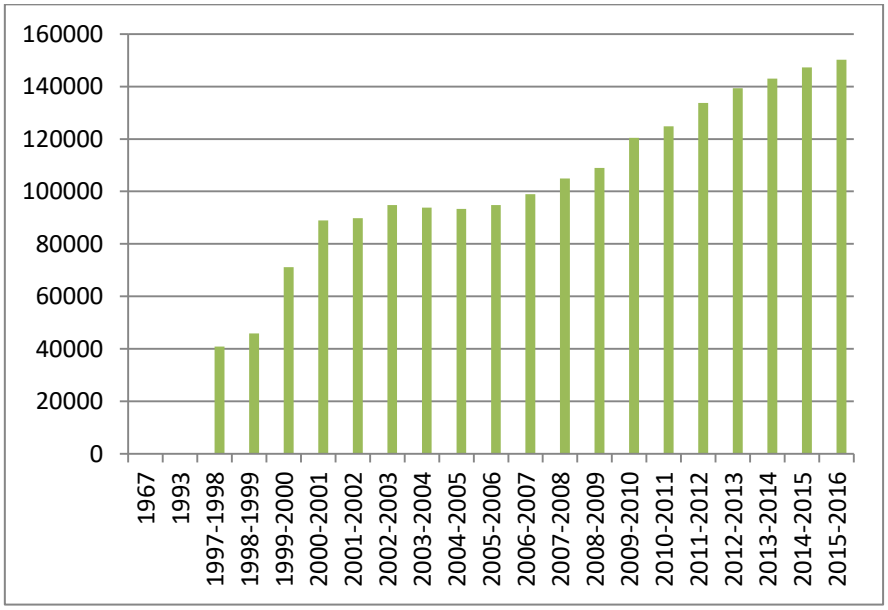
In 2012, a new law was introduced to replace the 1992 law and should be implemented by the cooperatives by 2015, though some cooperatives disagreed with the changes and went to Constitutional Court. Some cooperatives argued that the 2012 law attempts to make cooperatives no different than corporations. The nature of cooperatives in Indonesia is somewhat unique as they are based on common principles, called *gotong-royong*, or kinship, under which the welfare of members is prioritized, different to modern corporations which prioritize profit and income. This particular nature of cooperatives in Indonesia is considered essential for the preservation of the greater communal good. In the context of this nature, in a recent decision, the Constitutional Court has negated recent legislative developments on the management of cooperatives, especially under Law No. 17 of 2012 on cooperatives (2012 Cooperative Law). The Court has taken the view that the 2012 Cooperative Law encourages cooperatives to adopt a model that ignores the constitutional basis for cooperatives and is therefore inconsistent with the 1945 Constitution. In conclusion, the Constitutional Court took the view that the 2012 Cooperative Law encourages cooperatives to blend in with limited liability companies. This approach may result in the destruction of the democratic spirit of the cooperative as an economic entity that is unique to Indonesia based on the *gotong-royong* principle. As a result, this new legislation was revoked; Cooperative Law number 25 of 1992 remains as the constitutional basis for cooperatives until a new regulation is introduced (www.hukumonline.com).



Source: Indonesia Statistics Agency (Badan Pusat Statistik), 2017

Figure 11. Number of cooperatives in Indonesia from 1967 to 2015 (in units)

Fig. 11 shows the number of cooperatives in Indonesia, and the earliest possible data that could be obtained is from 1967. In 1967, the number of cooperatives in Indonesia was 16,263 units nationwide, and over the years the graph showed an increasing trend and in 2015 the number of cooperatives in Indonesia reached 212,135 units. It shows that despite changes and developments in the cooperative law, the number of cooperatives are still increasing, which signifies a positive trend.

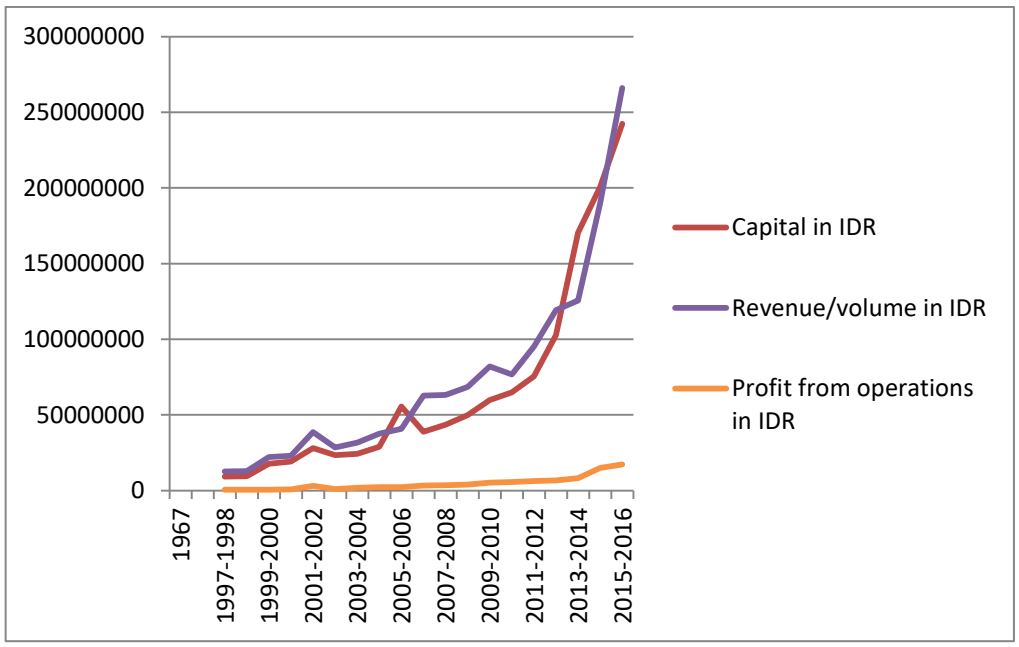


Source: Indonesia Statistics Agency (Badan Pusat Statistik), 2017

Figure 12. Number of active cooperatives in Indonesia from 1967 to 2015 (in units)

In *fig. 12*, the earliest data obtainable is only possible from 1967 and even then there were no data available for the number of active cooperatives. However, since 1997, there

was already some documentation on the number of cooperatives rises nationwide. It shows that the trend is also increasing from 40,908 in 1997 to 150,223 in 2015, a total increase of 27.23%.



Source: Indonesia Statistics Agency (Badan Pusat Statistik), 2017

Figure 13. Amount of capital, revenue and profit from operations from Indonesian cooperatives (in IDR), from 1967 to 2015

Fig. 13 compares the capital, revenue and profit from operations of cooperatives in Indonesia from 1967 to 2015. The capital in this case refers to internal capital (from members' contribution) and external capital (from third party loans and investments). The graph shows that capital and revenue have a significant increase over the years. Similar to *fig. 11* and *12*, *fig. 13* also shows the data from 1997 as there is no obtainable data before 1997. Capital increased from 9 million IDR in 1997 to 242 million IDR in 2015, meaning that cooperatives are interesting for investors to invest. Revenue increased from 12 million IDR in 1997 to 242 million IDR in 2015, which shows that the business of cooperatives can generate a considerable amount of revenue. However, it is not the case for profit, which does not have a significant increase. In 1997 the profit was only 619,050 IDR and 17 million IDR in 2015, which is only 3.64%. It indicates that there may be a management problem in the cooperatives. A recent study from Hasan, Azhari & Majid (2018) show that agriculture enterprises in Indonesia were enormously

inefficient. The agriculture enterprises should provide training for their staff, professional management, adopt advanced technology, and enlarge their size by mergers.

According to FAO (2020), some countries (e.g. Indonesia) have already announced that non-essential spending should be at least partially reallocated. In Indonesia, for example, social security spending and the health sector expenditures were given priority. It is inevitable that certain countries will reallocate their budgets and it is possible that this could lead to a decrease in agricultural investments/expenditures. The monetary implications could be large and it could delay the diffusion of vital agricultural technology.

2.2 The Cooperative Structure in Hungary

In 1845, the first cooperatives were established in Hungary. These first cooperatives were mainly found in dairy and credit sectors. In the interbellum the cooperative entrepreneurship grew considerably, in almost every village a so-called "*Hangya*" - agriculture cooperatives existed (Schilthuis & van Bekkum, 2000). According to Vizvári & Bacsi (2003), until 1945 large estates dominated the sector and beside them, smallholders existed. In 1945 the arable area of the former big estates was split up and distributed among the people of the villages. When the communist party took over the power in 1949, the first wave of "cooperativization" took place. The process was only partly successful as far as land and farm assets are concerned.

The government established at the end of the war the objective of radically changing land tenure. The parliamentary parties agreed on the dissolution of estates of landlords, churches, businesses and farmers who possessed more than 50 hectares. More than 3.2 million hectares were affected by the agrarian reform, of which 2.9 million hectares were arable land. A total of 642 thousand people received allotments, on the average approximately 3 hectares. The minimum allotment was 0.7 hectares, the maximum 8.6 hectares. Agricultural laborers and landless agricultural day-laborers living on large estates received the largest allotments, nearly 5 hectares each. Smallholders and small farmers received only complementary allotments. Simultaneously with the allotments to individuals, on about 800,000 hectares state forests and on about 300,000 hectares common pastures were established. Size structure of holdings as found by the census of agriculture in 1935 and that after the land reform is shown by table 5.

Later in the development, as a result of the 1956 revolution, a large part of agriculture cooperatives were demolished. Between 1959 and 1961 the second wave of

"cooperativization" took place. Then, between 1961 and 1990 the sector was dominated by agriculture cooperatives. However, in the end of the period, the agriculture cooperatives suffer losses, mainly from the agricultural activities. On the other hand, the industrial and service activities increased. When a new law on corporation was introduced in 1987, the industrial and service activities became independent corporations instead and separated themselves from the cooperatives, leaving the agricultural activities in the cooperative.

Table 5. The Timeline of Cooperative Developments in Hungary

Year	Description
1845	The first cooperative
1870	Trade law, cooperative chapter
1898	Act on Economic and Credit cooperatives
1920	National Central Credit Union (cooperatives), at the same time the cooperative headquarters for farmers and land tenants
1923	Act on the support of farmers' cooperatives
1927	*Hangya Fogyasztási Szövetkezet* ("Ant" Consumption Cooperative); 1,752 cooperatives, and 781,771 members.
	National representation of cooperatives in this period: the Association of Hungarian Cooperatives
1949	Soviet-type collective farms ("*Kolkhoz*")
1959-1961	Second wave of "cooperativization"; the rise of household farms. Household farms can produce and sell to make additional income
1961-1990	Agricultural sector dominated by agriculture enterprises. Workers are paid based on "labour units" but it did not work well due to financial motivations.
	In this period, the concentration of cooperatives were structured as follows:
	1 village – more cooperatives
	1 village – 1 cooperative
	More villages – 1 cooperative
After 1990	1st step: A law that allowed the members of the cooperative to quit before a given deadline and required the properties to be assigned to the members. 2nd step: the "law of recompensation": the state issued vouchers at a much smaller value than the value of the lost property; the original owners were given these vouchers in proportion to the amount of their lost property.

Source: Közgazdasági Enciklopédia (1930), Zsohár, A. (2008)

As a result, the majority of cooperatives fell into bankruptcy. The re-establishment of the market economy started in 1990 in Hungary. The first freely elected government made several attempts to demolish the cooperatives. These efforts have resulted in a farming structure mainly consisting of very small family farms. The success of the former Hungarian agriculture dominated by agriculture cooperatives was based on the following structural elements after 1961: Every agriculture cooperative farmed a large arable area, approximately 600-2,000 ha, or even more. The technology was adjusted to the size of the farmed land. A new concept of "household farming" was also set up in the

country. The members of the agriculture cooperatives, besides working in the cooperative, also had a small arable land to farm on their own.

Vizvári & Bacsi (2003) also mentioned the shift after 1990 that completely changed the course of agriculture cooperatives afterwards. The coalition coming into power after the free elections in 1990 opposed the existence of the agriculture cooperatives on an ideological basis. Two legal ways were found to demolish them. The Parliament accepted a law, which allowed the members of the agriculture cooperatives to quit before a given deadline. The same law required that the properties, including machinery, of the agriculture cooperatives, must be "nominated", i.e. assigned to the members. If a member quitted the agriculture cooperative, the property automatically became his/her private property. A drawback of this process was, that complete sets of machines and tools, which had had a special practical value exactly because of their completeness, were split up, and distributed among several owners of small new farms who were not obligated to help each other. Thus the machinery sets lost their effectiveness, as none of the small new farms owned a complete technology. The second step to demolish the agriculture cooperative was a so-called "Law of Recompensation". Many people had lost their properties during the communist regime. This law entitled agriculture cooperatives, or their inheritors for compensation caused by the loss. However, the formerly lost properties were not given back to the original owners. Instead, the state issued vouchers at a much smaller value than the value of the lost property, and the original owners were given these vouchers in proportion to the amount of their lost property. All former big farms (agriculture enterprises and state farms) were forced by the law to give up a specific portion of their land for this purpose. These lands were privatized on special auctions. As a result of these two laws, the agriculture cooperatives lost a significant part of their equipment and land. The farms created on the land bought for compensation vouchers are usually too small for efficient farming, and in many cases, the new properties were too small for any agricultural activity. Many owners are not residents in the village, or in the neighborhood of which the land is situated. The structure of the farm property system has been drastically changed from a system dominated by big farms, to a set of small farms. There are two crucial negative consequences of this change. First, the creditworthiness of the small, poorly equipped farms is practically zero. Therefore investments in agriculture drastically decreased. Second, the technology of farming has not been renewed at the appropriate time. Thus, the future competitiveness of Hungarian agriculture cooperatives is in jeopardy.

According to Eurostat (2017), there are about 5000 agriculture cooperatives in Hungary. The share of agriculture cooperatives in agriculture is relatively high although their number is decreasing. Agriculture enterprises connected to agriculture or to rural areas are active in retail (e.g. AFÉSZ-Coop Group), agricultural (e.g. POs, PGs and transformed "production type" agriculture cooperatives etc.) and credit sector (savings agriculture cooperatives). From the year of EU accession (2004) till 2009 the number of agricultural cooperatives has decreased by 700.

There are three main types of agricultural cooperatives in Hungary:

1. "Production type" agriculture cooperatives (in Hungarian "TSZ") which are most of the time multipurpose agriculture cooperative as well and transformed many times due to the ever changing agriculture cooperative laws. With the exemption of some minor tax advantages, they do not get any support at present (2011 data).
2. Supply and Marketing Agriculture cooperatives (in Hungarian "BÉSZ") organized on territorial bases (e.g. integrating more activities and marketing channels) which has not got any support at present (2011 data).
3. Marketing or "new", western type agriculture cooperatives, like POs (in Hungarian "TÉSZ") and PGs (in Hungarian *"termelői csoport"*), which are often single purposed ones focused on one marketing channel and got support from EU and/or national budget. These are mostly marketing and/or supply agriculture cooperatives which does not carry out production, but they supplement the farmers' production activity.

In addition, the article of Szabó (2012) states that even for both Producer Organisations (POs) and Producer Groups (PGs), the situation in Hungary can be summarised as follows:

a. Significant uncertainty in Hungarian agriculture of transition economies due to deficiency of market institutions – black market and shadow economy.
b. Fragmented productions structure (esp. in fruit & vegetable production) and atomistic ownership structure of land.
c. Very low level of trust and willingness to cooperate.
d. Lack of financial resources
e. Multinationals and other large companies can coordinate up to a certain level, but it this is not sufficient.
f. Cooperatives and other producers' owned organisations can solve the market vulnerability of producers and increase their income.

The black or grey trade is also a very important problem for the cooperatives who do everything legally. In some sectors, e.g. in fruit, vegetable and cereals, the combined share of black and grey markets is about 40%. From that point the decrease of VAT from 27% would be an important step, but there is not much chance due to the current financial crisis. Independent privately owned farm organisations cannot countervail the market power of their business partners. Therefore, coordination seems an appropriate solution to solve one of the most crucial problems in Hungarian agricultural development. Two main types of coordination do exist in market economy:

1. By the state (EU):
    a. Regulations, administrative rules, etc.,
    b. Support measures and cooperative "incentive schemes",
    c. Taxation
2. By private institutions:
    a. Established by the processors/retailers (by contracts)
    b. Producer owned organisations: cooperatives, producers' organisations and producers' group

Table 6. Farm Structure, Key Indicators, Hungary, 2000 and 2010

HUNGARY	2000	2010*	Change (%)
Number of holdings	966,920	576,790	-40.3
Total UAA (ha)	4,555,110	4,612,360	1.3
Livestock (LSU)	3,097,540	2,483,790	-19.8
Number of persons working in farms (regular labor force)**	1,464,670	1,143,480	-21.9
Average area per holding (ha)	4.7	8.0	69.7
UAA per inhabitant (ha/person)	0.45	0.46	3.4

**Figures on common land not included*

***For values in labor force reference years are 2003 and 2010*

Source: Eurostat (ef_kvaareg) (ef_ov_kvaa) (demo_pjan) and FSS 2000 and 2010

As exhibited in table 6, the Hungarian population of agricultural holdings is dominated by two size classes: small holdings with less than 2 hectares of agricultural area, and farms with 50 hectares or more of agricultural land. Despite the fact that four out of five holdings (455,530) in Hungary fall into this category, holdings with less than 2 hectares of UAA were found to cover only 3 % of the Hungarian agricultural land in 2010. On the other end of the scale, farms with 50 hectares of agricultural land or more represented a marginal 2 % of the population of holdings (13,860) but were found to account for 75 % of the country's agricultural land (3.5 million ha) in 2010. This type of

polarization of the agricultural structure has been observed in other eastern European countries and partially derives from the process which took place in the 1990s, when the restoration of the land property to the former owners or a division among the members of the agricultural agriculture enterprises was implemented in many Eastern European Member States (Bánski, 2017). However, table 6 is taken from the agricultural census in 2010 as a formal report, so there are limitations to discover recent developments.

As agriculture enterprises become a set of small farms due to privatization, the organization structure also changed. In a survey by Kispál-Vitai et al. (2012), in the case of Hungary, the manager of the agriculture enterprise is usually the one who manages almost all of the agriculture enterprise activities related to member relationships, marketing, sales and purchases. All other management activities, such as bookkeeping, payroll and invoicing, were outsourced to professional service providers for cost-saving and efficiency reasons. The manager is the person who held the organization together, and the agriculture enterprise is likely to be transformed into a different legal form after his departure. Professional management in the agriculture enterprise has to be convinced about the agriculture enterprise's identity and values as lack of commitment towards the organization will otherwise likely lead to a push-over effect towards the investor-owned firm. Fertő & Szabó (2002) mentioned that agriculture enterprises carry out services for members, and that problems of farmers cannot be solved simply by government support. Therefore it is up to the agriculture enterprise to achieve potential advantages, including digitalization, and to serve members with continuous growth. A recent study from Lisányi (2018) emphasized optimism on the benefits of the cooperative system that can solve the low rate of employment, and the limited ability of rural areas to attract workers. Smallholder farmers who would not survive individually can increase the competitivemess through cooperating with each other. Therefore, agriculture cooperatives csn still play a major role in the agriculture sector.

2.3 Definitions

2.3.1 Cooperatives and Agriculture Enterprises

Throughout this research, the term "agriculture enterprise" will be used to refer to cooperative form of agriculture holdings, therefore the definition of a agriculture enterprise should be clear to focus on aspects that can be found in common, and explained in this section. There are many forms of agriculture enterprises, their legal aspects and structure, including cooperatives. Defining agriculture enterprises may not be

as simple, because an agricultural enterprise would have a different organization structure to a credit union or a dairy cooperative. However, there is a common ground on which agriculture enterprises have the same fundamental principles, such as collective ownership, democratic governance and benefits for members, and as a consequence it leads to a differentiation of agriculture enterprises from investor-owned firms (IOF) and non-profit organizations (NGO).

According to the ICA (International Coooperative Alliance), the definition of a cooperative is as follows:

"An autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise." (ICA, 2012).

Cooperatives can be differentiated from IOF and NFP organizations by five characteristics (Birchall, 2004):

1. Cooperatives are voluntary in relation to how members join and leave;
2. Cooperatives are democratic with most having a one-member-one-vote system of governance;
3. Cooperatives should be independent of the control of governments and religious organizations, with ownership vesting in the hands of their members;
4. Cooperatives are associations of individuals or organizations and form a collaborative network;
5. The cooperative exists for the benefits of its members and not for any other purpose.

Valentinov (2006), also in Tortia, Valentinov, & Iliopoulos (2013), mentioned that cooperatives play a prominent role in the agricultural sector, both in developed and developing countries. Agricultural cooperatives emerged from a collection of family farms. Family farms have limited ability to efficiently achieve large production scale, leading to the creation of agricultural cooperatives.

In Hungary, the term "agriculture enterprise" was based on rather on historical conditioning than on rational consideration. In the course of a 30-year period – since the former socialist system collapsed in Hungary (and in other former socialist countries in Central and Eastern Europe) a continuous debate has been going on about the issue of the farm and property structure of farmlands, or with other words: the big estates or the smaller, family based farms should rather develop and get preference (Vasa, 2003). According to Neszmélyi (2020), the process of compensation (of the former land owners

whose assets were previously nationalized by the communist regime) was failed, estates of medium size up to big estates were created in private ownership. In parallel of this also farms of very small sizes emerged in mass (several hundred thousand units), being under one hectare, which could not be proven to be viable). Neszmélyi (2020), also stated that he conceptual determination of family-based farms was not at all synonymous in the period of the changing of regime. Several debated questions arose, for example what was the limit of the property size till it could be considered as "family based"; how many family members have to work in the farm in person in full time. The answer was given to the question – among Hungarian circumstances – by the law – Act No. LV. 03.05 of 1994 which determined the dimension of family farm up to 300 hectares (Act No. LV of 1994). This law brought up several definitions about the issue of which enterprises and what kind of entrepreneurial models could be considered as a "cooperative".

Szabó (2010) emphasized that in the agricultural cooperation, two basic trends could be distinguished from each other, which considerably differ from each other. In the first case the basic material production (the classical agricultural production) is also a part of the cooperative activity (like it used to be in the cooperatives during the previous socialist era in the Central and East European countries), while in the second case, the integration is not extended to the common use of lands and production equipment, but developed with its supporting services to nearly all other parts of the supply chain, e.g. common marketing, procurement, food processing, warehousing, etc. Although it was insisted with predilection at the level of fundamental declaration by all the Hungarian governments in power, that they support the development of the small family based farms, however effectively this intention was not always visible, since sometimes it strongly appeared that the major farms being considered as more and more competitive could rather get priority (Baranyai et al, 2012). Looking back even to the period since 2010 it is not completely clear whether the Hungarian government intended to assign determinant or only supplementary role to the family-based farms. In addition, the term "cooperative" does not have a positive image in Hungary due to the bad experience during the socialist era, although many previous research support the idea that the term "agriculture enterprise" would be suitable to describe the farms and the organizations working in the agriculture sector, as there is no clear differentiation on the structure of family farms, cooperatives and corporations.

In contrast, in Indonesia the cooperative structure is defined clearly in the law and agriculture cooperatives still exist in most parts of the country. According to Suparnyo (2019), in Indonesia, cooperatives are the only body specifically referred to in the national constitution (Sugarda, 2016). In one of the most well-known articles in the constitution, namely Article 33 of the 1945 Constitution, it is stated that the national economy is structured as a joint effort based on the principle of kinship (Subroto, 2015). Moreover, regarding cooperatives, there is also the Ministry of Cooperatives and Small Medium Enterprises. However, according to Suradisastra (2006), there is a decline in agriculture cooperatives, due to governance and management performances. Therefore, the development of agriculture cooperatives in Indonesia needs revitalization of the existing agricultural cooperative, which should be in line with the need of the stakeholder of agriculture development. A revitalization process should be carried out in an organic way which avoids conflict with the existing norms and institutions. It should also consider the structure of the imposed cooperative institution, the potential to utilize the available resources, the legitimating process of the leadership, and the management style. These aspects are in fact have already exist within the farming communities. Flexibility is also one positive aspect of why cooperatives are still favorable in Indonesia, although the majority of cooperatives now are more into the non-agriculture sector.

From the literature study about agriculture cooperatives in Indonesia and Hungary, the term “agriculture cooperative” can have a totally different meaning between Indonesia and Hungary. This is mainly because of the historical background, culture and socio-economic aspects underlying the definition in both countries. Therefore the term “agriculture enterprise” is used throughout the research, which by definition, incorporates a cooperative as a form of agriculture enterprise.

Agriculture enterprises offer a lot of potential, and in most cases, agriculture enterprises responded more effectively to financial crisis situations compared to investor-owned enterprises. Yet agriculture enterprises have not received as much attention from the business world or from governments. There is a lack of public understanding about the role and impact of agriculture enterprises, and agriculture enterprises are not widely recognized as an important form of an entrepreneurial activity (Borzaga & Galera, 2012). Borzaga & Galera (2012) also mentioned the main reason for the success and longevity of agriculture enterprises is that they focus more on the needs of communities, rather than the motivation to maximize profit. Even though profit is not the main objective,

agriculture enterprises have succeeded in surviving economic crises better than any other types of enterprises.

As the ICA defined it, there are many different types of agriculture enterprises based on the needs of their members. All of them, share the same idea to provide and procure goods and services. Profit is never a top priority, although patronage (a share proportionate to use) is often paid from the available budget. Usually, profit accumulates over a specific period of time and then is allocated among the members according to their participation. The range of industries covered by agriculture enterprise is vast: from providing utilities, groceries, labor services, housing, to credit unions and agricultural enterprises. Agricultural producers, suppliers, traders form agriculture enterprises to get access to more supplies and markets at a reasonable cost. Their goal is to reduce cost by increasing the scale of their economies. In other words, the more agro-producers combine their efforts in a agriculture enterprise, the cheaper the total cost of production becomes. Similarly, the traders united under a agriculture enterprise can compete in an open market with large industrial corporations in a fair way (EOS, 2020).

The FAO (2012) mentioned that agriculture, which includes farming, forestry, fisheries and livestock, is the main source of employment and income in rural areas, where most of the world's poor and hungry people live. Agricultural enterprises play an important role in supporting small agricultural producers and marginalized groups such as young people and women. They empower their members economically and socially and create sustainable rural employment through business models that are resilient to economic and environmental shocks. Agriculture enterprises offer small agricultural producers opportunities and a wide range of services, including improved access to markets, natural resources, information, communications, technologies, credit, training and warehouses. They also facilitate smallholder producers' participation in decision-making at all levels, support them in securing land-use rights, and negotiate better terms for engagement in contract farming and lower prices for agricultural inputs such as seeds, fertilizer and equipment. Through this support, smallholder producers can secure their livelihoods and play a greater role in meeting the growing demand for food on local, national and international markets, thus contributing to poverty alleviation, food security and the eradication of hunger. A study by Abate, Francesconi & Getnet (2014) shows that on average, farmers belonging to agriculture enterprises are more efficient than independent or individual farmers. The results in this study suggests that through agriculture enterprises, farmers achieved a 5 percentage point of increase in the output,

given the sets of inputs used. In line with the increased efficiency, the agriculture enterprise itself is likely to make productive technologies accessible and provide embedded support service, such as training, information and extension linkages.

Previous empirical research has emphasized the importance of agriculture enterprises and the most of the literature stated the positive aspects in joining an agriculture enterprise which affect farm production (Wang, et al., 2019). In addition, Borzaga & Galera (2012) implied that the future holds challenges for agriculture enterprises as global crisis has proven that agriculture enterprises are more resilient than IOFs. Agriculture enterprises will become increasingly important to ensure the survival of farmers and agriculture production, considering that population growth means increasing food demands. Agriculture enterprises also play an important role in the future, i.e. ensuring food security, environmental protection, and promoting a sustainable development model. Therefore the importance of rural development to improve technological and investment opportunities in the agriculture sector should be a national policy (Udovecz et al., 2008). However, due to the rapid development in the digital age, not many studies emphasized how digitalization could keep up or improve the operations of the agriculture enterprise itself. This study contributes to bridge the gap by estimating the impact of digital finance on the farm profits of agriculture enterprises.

2.3.2 Digital Financial Services

The development of digital based economics is one of the driving force to use digital finance in businesses. Digital financial services (DFS) refer to the technologies available to perform financial services from a widespread range of providers to an extensive category of recipients through the use of digital means including e-money, mobile money, card payments, and electronic funds transfers (Asian Development Bank, 2016). In general, digital finance should improve the welfare of individuals and businesses that have formal bank accounts and have funds in their bank accounts to complete multiple financial transactions. However, the expected benefits of digital finance can only be fully realised if the cost of providing digital financial services is negligible or zero (Ozili, 2018).

Ozili (2018) mentioned that there are many definitions for digital finance, but there is no standard definition, only some consensus about the meaning of digital finance. From a practitioner's viewpoint, the concept for digital finance is "financial services delivered through mobile phones, personal computers, the internet or cards linked to a reliable digital payment system." (Manyika et al, 2016, as cited in Ozili, 2018). According to

Gomber, Koch, & Siering (2017), digital finance "encompasses a magnitude of new financial products, financial businesses, finance-related software, and novel forms of customer communication and interaction, delivered by FinTech companies and innovative financial service providers." The development of the internet has lead to digitalization in all aspects of business, including finance. Business stakeholders have discovered that digital finance is more effective than traditional channels. To use digital financial services (DFS), users will require an existing bank account (or third-party accounts with approved permission to use them) and should have available funds in their accounts to make cash payments (outflows) or to receive revenue (cash inflow) via digital platforms including mobile devices, personal computers or the internet (Ozili, 2018).

One important implication that digital finance plays an important role is in invoicing and taxes, mostly used in daily business transactions. In Indonesia, as from July 1, 2015, taxable companies registered in Indonesia are required to use electronic invoices. The Indonesian Minister of Finance, through the Directorate General of Taxation (DGT) expects a succesful electronic invoice implementation to raise the value-added tax or VAT revenue. Indonesia currently has a weak tax revenue system, mainly due to fictitious invoices that cause a large tax restitution volume, with a negative impact to the total Indonesian VAT revenue. The electronic invoicing regulation has been implemented in Indonesia since January 1, 2016 (Deloitte, 2020). In Hungary, based on the new rules effective as of 1 January 2021, taxpayers are obliged to report data to the online invoice system of the Hungarian Tax and Customs Authority in relation to each invoice issued under a Hungarian VAT number, i.e. invoices issued to foreign taxpayers, as well as to private individuals will also be in scope. The State Secretary announced on 7 September 2020 that the purpose of the extension of the real-time invoice reporting obligation is to reduce the size of the underground economy, as well as to enable the Tax Authority to prepare and propose draft VAT returns to taxpayers next year, in line with the authorities' previous plans (KPMG, 2020). Both countries show examples on how digital finance is now applied in businesses. The objective of e-invoice in both countries is that the government would like to see the flow of inputs and outputs in terms of money. Transport of goods should also be available in the electronic system so the government could make the tax reports, especially on the VAT statements. According to Shofawati (2019), Indonesia has a potential for more DFS application by obtaining online banking login and other forms of digital access credentials to carry out basic financial services.

As the term used in this research is more specific to digital financial services, the definition used throughout the text is taken from the Alliance for Financial Inclusion (AFI) published Guideline Note No. 19 in 2016 for the basic terminology in digital financial services (DFS) to provide universal definitions of key digital financial service terms. According to AFI (2016), digital financial services (DFS) can be defined as "the broad range of financial services accessed and delivered through digital channels, including payments, credit, savings, remittances and insurance. The digital financial services (DFS) concept includes mobile financial services (MFS)." In this context, the term "digital channels" refers to the internet, mobile phones (both smartphones and digital feature phones), ATMs, POS (point of sales) terminals, Near-Field Communication or NFC-enabled devices, chips, electronically enabled cards, biometric devices, tablets, and any other digital system.

Digital financial services (DFS) are mainly about saving money, accessing credit and insurance, and performing transactions via digital channels, e.g. mobile phones, cards, computers, tablets, etc. "Mobile money" is also a term used to express the utilization of mobile phones as the most widely distributed and most functionally adaptable device to access DFS (USAID, 2018).

Mattern & Ramirez (2017) mentioned that applications of DFS in the agriculture sector help smallholder farmers make efficient payments, which can lower the costs and risks of distributing cash in rural areas where most farms are located. For example, branchless banking and the rise of mobile devices are making payments to and from farmers more effieicnt. Connecting isolated smallholder farmers to markets is also possible through digital technology. All of these contribute to efficiency, which leads to reducing costs and increasing profitability. It is important to note that DFS is not the main drive for agriculture development. However, DFS is important to address specific challenges that have significant impacts in agriculture, such as profitability. DFS has the potential to significantly change the availability and accessibility of financial services in the agriculture sector.

2.3.3 Profitability Evaluation

There are many literature written about profitability in agriculture and other industries which expressed a large number of possible ways to measure profitability. The literature is abundant on strengths, weaknesses and conceptual nuances of different options. Since almost all of the studies on agriculture calculate rates of return based on market values and

this paper focuses on profitability, only selected papers that relate to the research question will be selected.

In finance literature, there is a difference between the term “profit” and “profitability”. Financial textbooks and financial academic journals clarify the differences. However, Evans (2014) made a straightforward definition that distinguishes the two. According to Evans (2014), profit is the excess of revenue/income above the costs/expenses incurred in the process of producing the revenue/income. Profit is an absolute measure of the positive gain from an investment or business operation after subtracting all expenses. It is the absolute amount of money a business makes after accounting for all expenses, and is calculated using the formula:

$$\text{Profit} = \text{Total Revenue} - \text{Total Expenses} \quad \ldots\ldots (1)$$

as part of an Income Statement. Making a profit is what all businesses strive to do because without profit, the business will not survive in the long run.

Meanwhile, profitability is the size of the profit relative to the size of the business. Profitability measures how efficient the business is in using its resources to produce profit (calculated using rate of returns). Unlike profit, profitability is a relative measure of the success or failure of a business. It has more to do with the rate of return expected on an investment (capital), or the size of the return, compared to what could have been obtained from an alternative investment (such as investment in digital finance or investment in modern agriculture technology). It is important to note is that it is possible for a business to generate a profit but not be profitable. In other words, profit is essential but not necessarily a factor for a business to be profitable (Evans, 2014).

Agriculture enterprises are commonly found in the agricultural sector, and previous work regarding how to assess agriculture enterprise performance focuses mostly on available financial accounting measures commonly used to evaluate investor owned firms (Franken & Cook, 2015, as cited in Windsperger et al., 2015). It shoud be considered that unlike investor owned firms (IOF), agriculture enterprises serve dual objectives as it is a distinct form of business, given the background of the agriculture enterprise structure itself. Soboh et al. (2009) mentioned that agriculture enterprises have to obtain profitability as a business, and simultaneously, member benefits. This is supported by the results from Takacsne et al. () where profitability is the main driver towards agriculture technology development, in this case, precision agriculture.

Franken & Cook (2015) as cited in Windsperger et al. (2015), mentioned that evaluating agriculture enterprise performance in the context of profit maximizing depends on the structure of the agriculture enterprise itself. If the agriculture enterprise is in the form of investor-owned firms (IOF), then profit maximizing would likely neglect the dual objectives of the agriculture enterprise (profitability and member benefits) in most of agriculture enterprise literature. However, profitability is used more often as a performance measurement as it facilitates achievement of other agriculture enterprise objectives.

According to Obst et al. (2007), most agricultural businesses are made up of more than one enterprise, each with its own distinct source of income and expenses that contribute to the overall profitability of the business. One of the most common methods of analyzing enterprise performance in an agricultural business is through the revenue, total variable costs, and gross margin. Gross margin provides a measure of the profitability of each enterprise, so they can be compared based on how effectively each uses the resources allocated. Gross margin also makes it possible to compare enterprise performance with other businesses conducting similar enterprises. Gross margins are important for financial analysis as it indicates the cost efficiency of a company that can be used for trend analysis and peer comparison. However, gross margin can be manipulated to reflect overstated margins and it does not include overhead costs. For example, the implementation of DFS would result in an increase of overhead costs. As gross margin only calculated production costs (in this case, variable costs), DFS implementation costs are not captured in the gross margin, so it may not reflect the validity of comparisons. The validity of these comparisons depends upon the use of consistent accounting methods for the determination of the gross margins. If different assumptions and approaches are used, any comparison will be meaningless. However, for the use of the study, it is also important to consider the availability of data. Most of the secondary data available are presented in total revenue, total variable costs, and gross margin. The calculations of total revenue, total variable costs, and gross margin may also be different depending on the size of the agriculture enterprise. To make comparison easier, the assumption will consider that gross margin = total revenue – total variable costs, as used in some related literature, and that the calculations of the gross margin is based on income calculations for investor-owned firms. As a result, the variables used in this study is total revenue, total variable costs, and gross margin as components of the profitability measured.

Obst, et al. (2007) also mentioned that enterprise gross margins are determined by deducting operating expenses, also known as variable costs (those costs which change in proportion to changes in the level of production), from the income of the enterprise.

Enterprise gross margin = Enterprise operating income – enterprise operating expenses ……. (2)

Enterprise operating income is the total value of the enterprise output for one growing season, and therefore includes the value of all production, any change in the value of enterprise inventories and transfers from other enterprises. Calculation of total enterprise gross margin, is of little value in analyzing enterprise performance, because total gross margins cannot be compared to each other or industry averages. To make the total gross margin more useful for management purposes, it is necessary for the gross margin to be related to the factors limiting production in the business (for example, land, livestock numbers, water for irrigation or enterprise capital). When gross margins are presented as a return to the most limiting resource, the utilization of business resources by different enterprises can then be compared. For example, a cropping and a livestock enterprise could be compared based on their respective gross margins per hectare. For example: GM per ha, GM per DSE (dry sheep equivalent), GM per $ invested, or GM per mg.

As land is commonly the most significant limiting resource in agribusiness, the calculation of a gross margin per hectare for land used is a valuable measure of how effectively an enterprise utilizes the land available. This measure of performance can then be used to compare the performance of different enterprises in utilizing the land available. Care must be taken when comparing gross margins per hectare of enterprises that use the land in different ways (for example, cropping compared to grazing enterprises), because these different enterprises may have different long-term effects on the productivity of the business.

Gross margin provides valuable comparative information to assist management with the following:

1. Relative profitability of various business enterprises can be analyzed. Gross margin analysis assists managers to identify the important factors influencing profitability as each individual cost can be analyzed and compared.
2. Industry comparisons can be made that enable the identification of industry best practices.

3. The strengths and weaknesses of an enterprise can be identified so strategies can be developed that improve performance.
4. A profitable enterprise combination can be planned within the technical limits of each enterprise, and which maximizes the effective use of limited business resources.

Gross margin is also used by Mugula & Mishili (2018) to analyze the profitability of sustainable agriculture practices (SAP). Mugula & Mishili (2018) used gross margin to measure the difference of profitability between SAP adopters and non-adopters in Tanzania. In their study, the decision to adopt SAPs was influenced by the gross margin between different practices and that farmers were likely to adopt SAPs after comparing the returns. Similarly, this study is about applying digital financial services (DFS) in agriculture enterprises as well as comparing returns – before and after DFS application. To determine the application of DFS, the following model was modified from the study of Mugula & Mishili (2018):

$$Application\ level = \frac{Number\ of\ agriculture\ enterprises\ using\ DFS}{Total\ number\ of\ agriculture\ cooperatives} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Whereas the gross margin calculation is given by this equation:

$$GM = P_i Y_i - R_i C_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where:

GM = Gross margin
P_iY_i = Total revenue
R_iC_i –Total variable cost
P_i = Farm price of produce (aggregate)
Y_i = Output of produce (aggregate)
R_i = Price of variable input used (kg)
C_i = Quantity of the variable input used (kg)
TVC = Total variable cost

$$TVC = X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where:

X_1 = Cost of seedlings
X_2 = Cost of fertilizers
X_3 = Cost of labor
X_4 = Cost of transport
X_5 = Cost of herbicides

X_6= Cost of pesticides
X_7 = Other variable cost
Gross margin = TR – TVC

Similarly, this study also uses the gross margin as a measure of profitability. The formula used for this research is quite straightforward, regarding the availabllity of secondary data, and the underlying assumptions that makes the calculation understandable for analysis. Most sectors use generally accepted accounting principles when reporting their financial position, including the use of balance sheets and income statements. Assets used in producing the calculation of the return on total assets and the return on equity are based on historic cost of these. In the case of the agriculture sector most farm businesses are unincorporated and do not produce a balance sheet on a regular basis (Caldwell & Murray, 2005). The reasons underlying the choice of the measurements is adjusted to the availability of data, as not many agriculture enterprises have financial statements available for each business. The secondary data obtained from the statistical offices are national data, or data divided by each agriculture sector, and the profitability evaluation will be adjusted accordingly.

2.4 The Link between Agriculture Value Chain and DFS

The Digital Financial Services for Agriculture Handbook from the World Bank (2017) also provides the framework to present the relationship between various agricultural value chains and the DFS product needs of smallholder farmers. It examines the following value chains: (1) cereal, (2) perishable crops, (3) dairy, (4) livestock.

The following table (table 7) from the handbook is designed to identify potential DFS based on specific needs generated by the requirements of the production cycle. Table 7 shows the multiple phases in on-farm production stages. The information and financial services listed are indicative, not exhaustive. The phases provide the starting points on the patterns and assumptions made at each farming cycle. As farmers progress through the planting and growing phases, there are recurring but often unpredictable needs for labor or inputs. These needs trigger payments between farmers and other individuals or enterprises, as well as the potential need for finance or leasing for production-related activities. The information services that a farmer might find most relevant – such as weather updates, best practices reminders, or outbreak alerts – would support improved planning and timing of these payments. It could also help the farmer

more quickly and accurately purchase the right kind of inputs, from reliable sources, in the appropriate amounts and applied in the correct manner.

Table 7. Agricultural Production Cycle: Schedule, Requirements and Relevance for DFS

Production cycle	Harvest/Production cycle	Production Requirements	Post-Production Requirements
Cereals	1-2 per year	Land preparation: intensive Inputs: intensive Tools/equipment: intensive	Harvesting: intensive Transport: intensive Storage/processing: intensive
Relevance for DFS	▪ Access to quality seeds and fertilizer impacts yields – digital financing mechanisms can enable farmers to purchase inputs at reasonable rates of interest and on more flexible terms ▪ Yields are also tied to weather conditions – insurance can guarantee minimum income levels ▪ Market information on pricing and market linkages are not well-established – remote payments and digitally linking sellers and payers can optimize trading activity		
Perrenials, tree-based	1-2 per year	Land preparation: light Inputs: moderate Tools/equipment: light	Harvesting: moderate Transport: intensive Storage/processing: intensive
Relevance for DFS	▪ Ability to hire and pay day laborers is typically important in this value chain ▪ Sufficient funds for pest control tied to affordable credit mechanism ▪ Availability of leasing instruments for equipment can improve yields and post-harvest handling		
Perishables	6-8 per year	Land preparation: moderate Inputs: intensive Tools/equipment: moderate	Harvesting: moderate Transport: intensive Storage/processing: moderate
Relevance for DFS	▪ Produce price volatility places a premium on market information and speed of payments ▪ Storage mechanisms can improve produce pricing to the farmer ▪ Sufficient funds for pest control tied to affordable credit mechanism		
Dairy	Daily	Land preparation: light Inputs: moderate Tools/equipment: intensive	Harvesting: intensive Transport: intensive Storage/processing: intensive
Relevance for DFS	Digital payments to farmers reduces cost of cash burdens to buying agriculture enterprises		
Livestock	Varies based on type and desired buyer demand	Land preparation: light Inputs: moderate Tools/equipment: light	Harvesting: light Transport: moderate Storage/processing: moderate
Relevance for DFS	▪ Market pricing and transportation information are key revenue drivers ▪ Funds for feed and new animals are often financed ▪ Savings mechanisms are important to smooth income flow		

Source: Digital Financial Services for Agriculture, World Bank, 2017, modified

When farmers enter the harvesting phase, the need for labor and some degree of equipment rental or transportation triggers another round of payments. These payments may be made multiple ways depending on the transaction relationships linking the various parties. Payments might be made pre-harvest sale, post-harvest sale, or deducted from the harvest sale. Innovations such as satellites, sensors, data analytics, and improved means of connectivity impact the way agricultural activities take place along the value chain. Among these innovations is a range of digital financial services (such as alternative credit scoring, payments, insurance and savings) as well as digital tools for agricultural information.

2.5 Empirical Evidence for Impact

An empirical study by Clark et al. (2015) from EPAR (Evans School of Policy Analysis and Research), University of Washington, conducted some insights for the empirical evidence. According to the study, which focused on Rural and Agricultural Finance (RAF), there are four outcome areas as the main points of interest: (1) production, (2) income and wealth, (3) consumption and food security, (4) resilience. Point (3) is related to this research, and even if the EPAR report is not the only literature used in this research, it provides the complementary information required, especially for the use of impact. The EPAR report stated that the empirical evidence base for agriculture finance is limited. It is notably difficult to aggregate lessons from the available studies because definitions of impact vary significantly. The available academic evidence to date is suited to examine the direct relationship between inputs and outputs/outcomes/impact more than exploring the factors and qualities related. Studies that investigate the impact may choose to measure impact in terms of agricultural revenue, consumption expenditure, or production, which are not easily comparable. Clark et al. (2015) summarized the literature review about impact, and the available studies suggest that financial products can make an impact on agriculture, but the impact is far from guaranteed. According to Clark et al. (2015), the two most commonly studied types of impact are increases in income or consumption, which is often used as a proxy measure of income. Studies find that financial solutions generally have a positive – although not always significant effect indicators in these categories. Dogandjieva, et al. (2015) mentioned about the little quantitative evidence around some factors that contribute to the assessment of impact, therefore there are research gaps that could be prospects for future studies. Some of the challenges for the measurement, evaluation and

learning (MEL) includes the design, implementation, and results. Therefore, the experiences from practitioners and researchers highlight possible solutions to measurement challenges. In some cases, these solutions include the adoption of different evaluation techniques or data collection tools. Overall, the evidence suggests rural and agricultural financial products are generally associated with modest positive impacts on consumption, food security, income, production, and resilience, however the magnitude of impact is debatable. In addition, the lack of consistent measures makes comparison and generalization difficult.

2.6 Summary of Literature Review

The main points found in the literature review summarizes the definitions of agriculture cooperatives, DFS, profitability, and evidence of impact. One thing that needs to be highlighted is the definition of agriculture cooperatives versus agriculture enterprises, and which one is appropriate to use in this research. In conclusion, for the ease of understanding, the term “agriculture cooperatives” are redefined as “agriculture enterprises” to give the same perspective in the discussions that follow.

In this study, profitability is measured by total revenue, total variable costs and gross margin. Based on a similar study by Mugula and Mishili (2018), the measure for profitability commonly used in agriculture is the gross margin. It indicates the cost of production of alternative agriculture, which helps to make farm management decisions. Gross margin is useful in analyzing the performance of the use of agriculture technology, including DFS, and will discover areas where one could possibly make improvements (Mugala & Mishili, 2018). Although gross margin provides the information about how much mark up to make on sales, it is not the best measure of profitability of an enterprise as a whole because it excludes many costs such as financing costs and overhead expenses. However, gross margin is a term that is easily understood by farmers and the data can be found easily, so this is the reason why gross margin is taken as one of the measures of profitability.

The research questions are developed based on the summary of the literature review, which found a research gap as a starting point for this research. The summary of the literature review is presented in table 8.

Table 8. Summary of the Main Literature Review

Authors	Topic	Result
Dogandjieva, et al. (2015)	How to measure the impact of rural and agricultural finance on clients.	There is little quantitative evidence around some factors that contribute to the assessment of impact, therefore there are research gaps that could be prospects for future studies.
Franken & Cook (2015)	Informing measurement of agriculture enterprise performance.	The measurement commonly used is the typical financial ratios for investor-owned firms. The nature of business and the dual objective of agriculture enterprises (member benefits vs. profit) are challenges that need to be answered in future studies.
Gomber, et al. (2017)	Digital finance and fintech: current research and future research directions.	Reviews the current state of research in digital finance that deals with these novel and innovative business functions. The concept should support researchers and practitioners in the field of digital finance, which allows academic research relatively to each other, and enables for the revelation of the gaps in research.
Hasan, Azhari, & Majid (2018)	How efficient and productive are co-operatives in Indonesia? Empirical evidence from data envelopment analysis.	This study empirically measured total factor productivity level of the agriculture enterprises in 33 provinces nationwide. The results show that agriculture enterprises were enormously inefficient. Of 33 provinces, only agriculture enterprises in 14 provinces were found to experience an increase in their total factor productivity. The agriculture enterprises should provide training for their staff, professional management, adopt advanced technology, and enlarge their size by mergers.

Source: Researcher's own summary, 2020

Table 8. (continued)

Lisányi (2018)	Integration efforts in Hungarian agriculture after regime change.	The break-up of large agri-cultural holdings had serious negative impacts on food production and on the export of agricultural products. Capital intensive profit-seeking intermediaries dominate the trading of agricultural goods that has injurious effects in terms of downward pressure on production prices and an increase in consumer prices. Agriculture enterprises have a key role in effectively tackling the common challenges that small-scale producers have to face.
McIntosh & Mansini (2018)	The use of financial technology in the agricultural sector.	The finance sector allows agriculture to contribute to economic growth and poverty reduction. A rapidly evolving technological landscape opened up new possibilities to target and price credit, share risk, and use information technology to expand agricultural productivity. However, many obstacles are not technological, so it is important to look for strategic places where policy and investment can help to improve outcomes for agricultural households.
Nur Syechalad, M. A. et al. (2017)	A description of the performance and expectations of agriculture enterprises in Indonesia.	One of the focus in this paper is on financial access and business development of agriculture enterprises. The limitation of this research is in its use of aggregate level of agriculture enterprise data as a whole, regardless of agriculture enterprise type. Future researchers are advised to identify which types of agriculture enterprises contribute more to the Indonesian economy.

Source: Researcher's own summary, 2020

Table 8. (continued)

Mugula & Mishili (2018)	Profitability analysis of sustainable agriculture practices to smallholder maize farmers in Kilosa district, Tanzania.	The study assessed smallholder farmer's decision to adopt sustainable agriculture practices (SAPs) based on the profitability margin among smallholders. The decision to adopt SAPs was largely influenced by the profit margin between different practices and that a farmer was likely to adopt SAPs after comparing the returns obtained to a number of agriculture practices.
Ozili (2018)	The impact of digital finance on financial inclusion stability.	The digital finance area has not been critically addressed in literature. Digital finance and financial inclusion has several benefits to financial services users, digital finance providers, governments and the economy. There are still a number of issues, which if addressed, can make digital finance work better for individuals, businesses and governments.
Shofawati (2019)	The role of digital finance to strengthen financial inclusion and the growth of SME in Indonesia.	The literature study in this paper mostly refers to Ozili (2018). The results show if the excluded population of Indonesia are willing to actively participate in financial data inclusion by obtaining online banking login and other forms of digital access credentials, they will be able to use digital channels to carry out basic financial services, leading to greater financial inclusion.
Szabó (2012)	Support for farmers' cooperatives: case study report Performance and sustainability of new emerging cooperatives in Hungary	Regarding performance and sustainability, it is extremely important for cooperatives to get EU and national support. However, collective action problems of farmers and coordination issues in food chains cannot depend on the EU and/or government support.The other most important factor is reletad to the „human factor" of cooperation.

Source: Researcher's own summary, 2020

Those literature review presented in table 8 are the main sources that made up the basis of this research. The results found in table 8 disclosed a research gap: DFS as one aspect of digital innovation in agriculture enterprises could have a more significant role in order to increase the profitability of the agriculture enterprises as a whole.

CHAPTER 3: RESEARCH METHODOLOGY

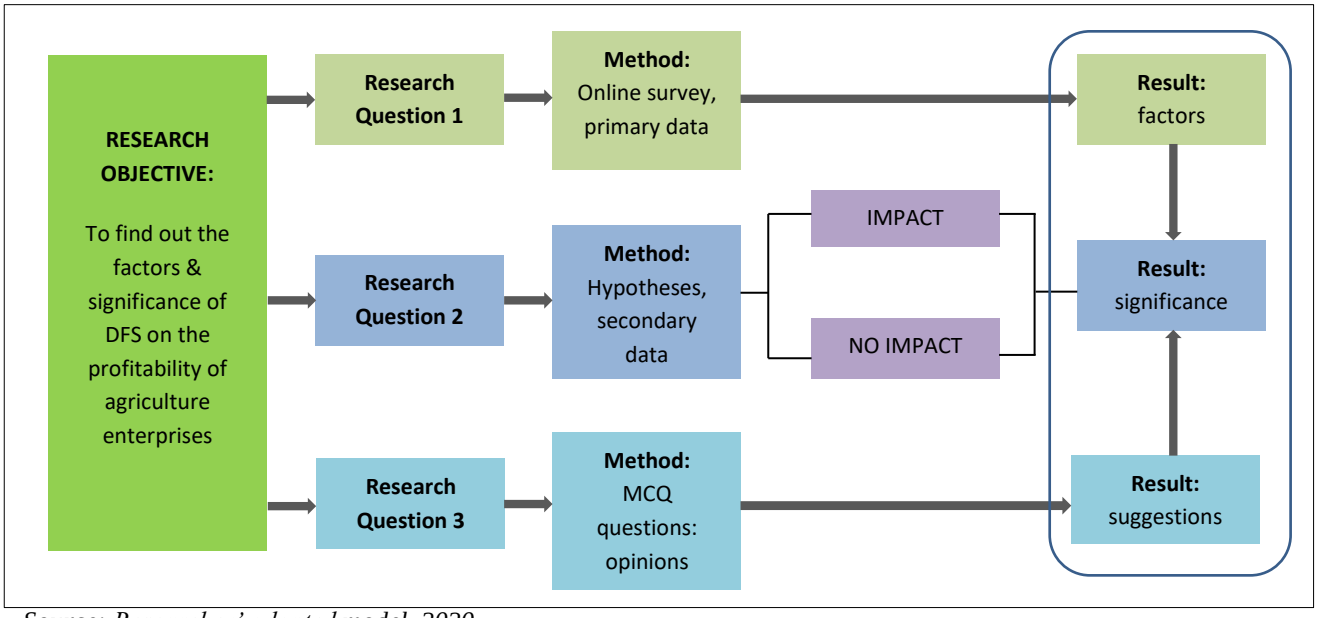
3.1 Research Questions

This research is designed to highlight and document current priorities for the application of DFS on the profitability of agriculture enterprises, supported by a methodology that is primarily quantitative. In that context, the research objectives renew a theme on which some previous research have been made to understand the determinants of DFS and the application in agriculture enterprises. The research objectives are as follows:

(1) To identify and map factors that are significant to the application of DFS in agriculture enterprises;

(2) To find out whether the application of DFS, given the digital and agriculture landscape in Hungary and Indonesia, could have an impact, or significance, on the profitability of agriculture enterprises.

The following figure (*fig. 14*) is a summary on how the research methodology is constructed. It begins with the research objective, followed by the research questions, the methods used, and the expected results.



Source: Researcher' adopted model, 2020

Figure 14. Flow of the Research Steps

The research questions are developed based on the summary of the literature review (table 8, p.56), which are the main sources that made up the basis of this research. The

results found in table 8 disclosed a research gap: DFS as one aspect of digital innovation in agriculture enterprises could have a more significant role in order to increase the profitability of the agriculture enterprises as a whole.

Summarizing the results of the list in table 8 (p.56), in addition to other literature review, the research questions are developed as follows:

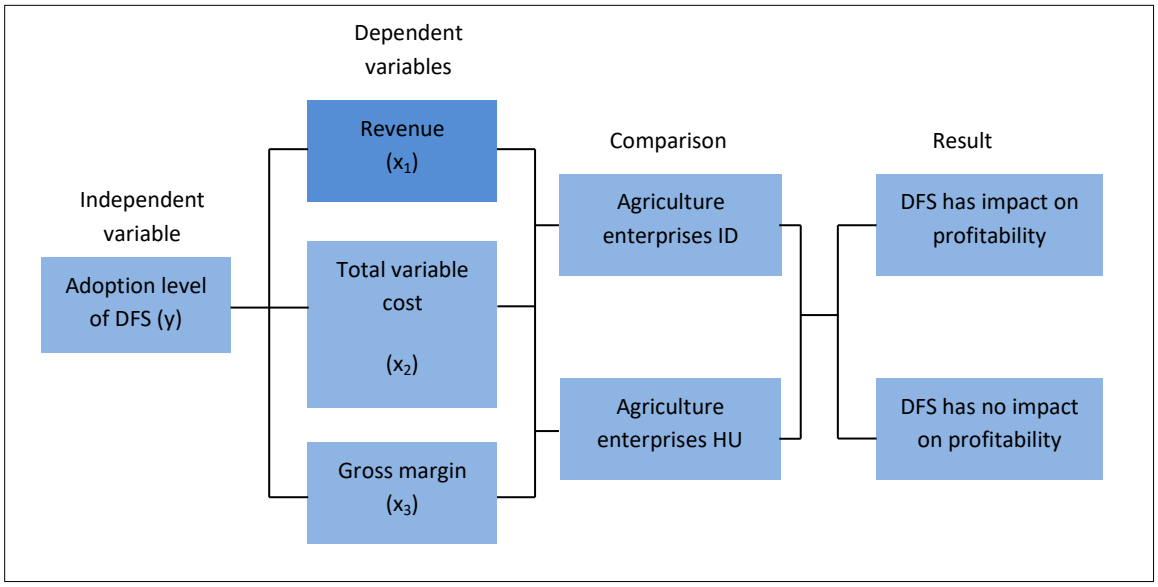
RQ1: What are the factors affecting the application of digital financial services in agriculture enterprises?

RQ2: In the real situation, is there an impact on the profitability regardless of the agriculture enterprises use or do not use digital financial services?

RQ3: What suggestions are useful to bridge the gap between DFS application and increasing the profitability in agriculture enterprises?

3.2 Hypotheses

From the research questions, the variables are determined as digital financial services (DFS), profitability (in this case gross margin, total variable cost and net margin), and impact. The independent variable (y) in this case is the digital financial services (DFS), with impact as the moderating variable and the dependent variables: gross margin (x_1), total variable costs (x_2) and net margin (x_3).



Source: Researcher's adopted model, 2020

Figure 15. Theoretical Framework of the Research

Fig. 15 shows the summary of the theoretical framework. The impact is not part of the variables, but instead it is separate as the research sees the impact as a preliminary

mapping of the DFS situation in agriculture enterprises. The hypotheses is to test whether DFS has an impact or no impact on profitability. Based on *fig. 15*, the equation can be summarized as y = a + b*x, where y = estimated dependent variable score, which is DFS, a = constant, b = regression coefficient, and x = score on the independent variable: total revenue (x_1), total variable cost (x_2) and gross margin (x_3).

From the theoretical framework, the hypotheses are constructed as follows:

H_{01}: There is no impact in the application of DFS on the total revenue of agriculture enterprises in Indonesia

H_{A1}: There is an impact in the application of DFS on the total revenue of agriculture enterprises in Indonesia

H_{02}: There is no impact in the application of DFS on the total revenue of agriculture enterprises in Hungary

H_{A2}: There is an impact in the application of DFS on the total revenue of agriculture enterprises in Hungary

H_{03}: There is no impact in the application of DFS on the total variable cost of agriculture enterprises in Indonesia

H_{A3}: There is an impact in the application of DFS on the total variable cost of agriculture enterprises in Indonesia

H_{04}: There is no impact in the application of DFS on the total variable cost of agriculture enterprises in Hungary

H_{A4}: There is an impact in the application of DFS on the total variable cost of agriculture enterprises in Hungary

H_{05}: There is no impact in the application of DFS on the gross margin of agriculture enterprises in Indonesia

H_{A5}: There is an impact in the application of DFS on the gross margin of agriculture enterprises in Indonesia

H_{06}: There is no impact in the application of DFS on the gross margin of agriculture enterprises in Hungary

H_{A6}: There is an impact in the application of DFS on the gross margin of agriculture enterprises in Hungary

3.3 Methodology

The analysis for this research uses an empirical research, which is based on observation and measurement of phenomena, as directly experienced by the researcher. The research questions aim to find out the impact of digital financial services (DFS) on

the profitability of agriculture enterprises, comparing Indonesia and Hungary. The data gathered may be compared against a theory or hypothesis, but the results are still based on real life experience. The type of data required for this research is quantitative data, which consists of primary data from surveys, and secondary data from agriculture databases in Indonesia and Hungary to support the theoretical background. This is the most suitable approach to answering the research question as numbers are measurable, and would result in an objective conclusion. A quantitative approach is a standard methodology for this field, considering the time frame, number of respondents and availability of secondary data to support the results taken from the primary data.

Typically, empirical research includes the following elements:

1. A *research question*, which will determine research objectives.
2. A particular and planned *design* for the research, which will depend on the question and which will find ways of answering it with appropriate use of resources.
3. The gathering of *primary data*, which is then analysed.
4. A particular *methodology* for collecting and analysing the data, such as an experiment or survey.
5. The limitation of the data to a particular group, area or time scale, known as a sample: for example, a specific number of employees of a particular company type, or all users of a library over a given time scale. The sample should be somehow representative of a wider population.
6. The ability to *recreate* the study and test the results. This is known as *reliability*.
7. The ability to *generalize* from the findings to a larger sample and to other situations.

This study uses a quantitative method, which emphasizes objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques. Quantitative research focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon (Babbie, 2010). The goal in a quantitative research study is to determine the relationship between an independent variable and a dependent or outcome variable within a population. Overall, a quantitative research study is to classify features, count them, and construct statistical models in an attempt to explain what is observed. Quantitative research designs can be descriptive, where subjects are usually measured once, or experimental, where subjects are measured before and after a treatment. A descriptive study establishes only associations

between variables; an experimental study establishes causality. This study involves a descriptive study from the conducted survey to find out about the association between variables, and also an exploratory study whether DFS has an impact or not on profitability.

3.4 Survey and Collecting Data

The research uses quantitative method, which allows hypothesis testing by systemically collecting and analyzing data. Data collection is done by conducting a survey and also analyzing secondary data to support the analysis. The objective of the survey is to find out the activities of agriculture enterprises and the use of DFS in general for mapping purposes. When the survey is completed, there will be more points to add in order to find out more about the extent and the impact of DFS on the profitability of agriculture agriculture enterprises by using secondary data.

The sampling procedure used in this research is nonprobability sampling, using purposive sampling. The sampling here is limited to specific types of people who can provide the desired information, either they are the ones with the knowledge and experience, or they conform to the criteria set by the researcher. In this case, the type of purposive sampling for this study is judgmental sampling, where it involves the choice of subjects who are in the position to provide the information required. The sample is taken from a particular group, who are agriculture enterprises or agriculture stakeholders, in Indonesia and Hungary.

Surveys represent one of the most common types of quantitative, social science research. In survey research, the researcher selects a sample of respondents from a population and administers a standardized questionnaire to them. The questionnaire, or survey, can be a written document that is completed by the person being surveyed, an online questionnaire, a face-to-face interview, or a telephone interview. Using surveys, it is possible to collect data from large or small populations (sometimes referred to as the universe of a study). Ultimately, there are limitations to design a survey and designing the perfect survey questionnaire is impossible. However, researchers can still create effective surveys. To determine the effectiveness of a survey questionnaire, it is necessary to pretest it before actually using it. Pretesting can help determine the strengths and weaknesses of the survey concerning question format, wording and order.

Table 9. Sample size for a given population size

N	S	N	S	N	S
10	10	55	48	100	80
15	14	60	52	110	86
20	19	65	56	120	92
25	24	70	59	130	97
30	28	75	63	140	103
35	32	80	66	150	108
40	36	85	70	160	113
45	40	90	73	170	118
50	44	95	76	180	123

Source: Krejcie & Morgan (1970)

The questions constructed in the questionnaire is based on Brat, Martinez, & Ouchene (2016), Mugula & Mishili (2018), Wulandari et al. (2017), and researcher's own field observation. The survey consisted of a questionnaire, with 23 questions, which consist of 20 multiple-choice questions and 3 questions that were measured on a 5-point Likert scale. The questionnaire is divided into 3 parts: socio-economic aspects, agriculture agriculture enterprise and farming activities, and DFS. The socio-economic section include demographic information, such as gender, age, education, involvement in agriculture, years involved in agriculture, and whether agriculture is a primary occupation or not. The agriculture agriculture enterprise section includes the main products of the farm, land area, farm turnover. The DFS section include financial channels used in daily operations, taking into account traditional, internet and mobile banking. To determine the sample size, this study used the sample size table from Krejcie & Morgan (1970) as a guideline (table 9).

The objective was to conduct the survey with a population size of 300 in Indonesia and Hungary combined, mostly by online survey and direct survey (in the case that the respondent is not technology-savvy) from June to November 2019. The respondents are divided into two groups based on geographical scope, which is the whole country in general. One group is any area in Indonesia, and any area in Hungary, but only those involved in agriculture, or stakeholders of agriculture. The constraints faced for both geographical area are based on these considerations: Indonesia is a vast country and it is difficult to conduct a survey for the whole country, while for Hungary, the language barrier and the willingness of the respondents were the limitations taken into account. The respondent was defined as a stakeholder in agriculture, including entities/individuals (companies, research centers, farmers, associations, academicians, etc.) who are either participating in an agriculture enterprise or are connected to agriculture in general.

Respondents gave written consent to take part in the survey and were given approximately 10 minutes to fill in the survey anonymously. The target population for Indonesia is 300, with a confidence level of 95% and a 5% margin of error, the ideal sample size is 169. For Indonesia, the survey received 189 respondents,with 5 non responses, so only 183 is used in the analysis. For Hungary, the target population is 100, with a confidence level of 95% and 5% margin or error, the ideal sample size is 80. The survey managed to get 103 respondents, with 2 non responses, so only 101 is used in the analysis. So from both countries, excluding the non responses, the final sample size is 284 (183 from Indonesia and 101 from Hungary) included in the analysis.

Table 10. Advantages and Disadvantages of Using Secondary Analysis

	Advantages	Disadvantages
1	Considerably cheaper and faster than doing original studies.	Since many surveys deal with national populations, if the objective is a study of a well-defined minority subgroup, it will be more difficult to find relevant data.
2	Secondary analysis can benefit from the research from some of the top scholars in the field, which for the most part ensures quality data.	Secondary analysis can be used in irresponsible ways. If variables are not exactly those intended in the study, data can be manipulated and transformed in a way that might lessen the validity of the original research.
3	If there are limitations in funds and time, other surveys may have the advantage of samples drawn from larger populations.	Much research, particularly of large samples, can involve large data files and difficult statistical packages.
4	How much previously collected data used is flexible; it might only extract a few figures from a table, or use the data in a subsidiary role in the research, or even in a central role.	
5	A network of data archives in which survey data files are collected and distributed is readily available, making research for secondary analysis easily accessible.	

Source: Johnston, 2014

In addition to the survey, secondary data is also used in the research especially for the profitability section. It includes material or statistical data from statistical offices in Indonesia and Hungary, Eurostat, Asian Development Bank statistics, Ministry of SME and Agriculture enterprises of Indonesia, Ministry of Agriculture of Indonesia. Secondary analysis of survey data is an accepted methodology which applies previously collected survey data to new research questions. Table 10 summarizes the advantages and disadvantages of using secondary analysis. For the secondary data, the time frame used is

from 2014 to 2019, which is the latest data available. So the time frame spans for 6 years for both Indonesia and Hungary. The secondary data used in the research are total revenue, total variable costs, and gross margin, which can be found in the national statistics websited from Indonesia and Hungary. This methodology using secondary data is particularly useful to researchers who do not have the time or money to conduct an extensive survey, but may be looking at questions for which some large survey has already collected relevant data.

3.5 Methods and Analysis

The method for this research is a quantitative method considering the use of numbers in the questionnaires and secondary data. The software used to analyze the data is SPSS. Data were entered and analyzed using the Statistical Package for Social Sciences (version 20.0) (SPSS Inc., Chicago, IL, USA). The data could be analyzed in a number of ways, and for the research purpose, the statistical tests used are the chi-square test and the t-test. The chi-square test was used in establishing whether the variables differed significantly between the two groups ($p < 0.05$), and linear regression was employed to determine the impact of DFS on profitability between the groups means ($p < 0.001$).

The analysis is divided into two parts: the questionnaire and the profitability hypotheses. For the questionnaire, a non-parametric test, which is the chi-square statistic, is used for testing relationships between categorical variables. The objective of the questionnaire analysis is to find out about the factors that impact the agriculture sector in both Indonesia and Hungary. The chi-square statistic is most commonly used to evaluate tests of independence when using a crosstabulation (also known as a bivariate table). The null hypothesis of the chi-square test is that no relationship exists on the categorical variables in the population; they are independent.

Crosstabulation presents the distributions of two categorical variables simultaneously, with the intersections of the categories of the variables appearing in the cells of the table. The test of independence assesses whether an association exists between the two variables by comparing the observed pattern of responses in the cells to the pattern that would be expected if the variables were truly independent of each other. Calculating the chi-square statistic and comparing it against a critical value from the chi-square distribution allows the researcher to assess whether the observed cell counts are significantly different from the expected cell counts (Cortinhas & Black, 2013).

The calculation of the chi-square statistic is quite straightforward and intuitive:

$$x^2 = \sum \frac{(f_0 - f_e)^2}{f_e} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where:

f_o = the observed frequency (the observed counts in the cells)

f_e = the expected frequency if NO relationship existed between the variables

As depicted in the formula, the chi-square statistic is based on the difference between what is actually observed in the data and what would be expected if there was truly no relationship between the variables. It can be written as a hypothesis as follows:

H_0*:* [Variable 1] is not associated with [Variable 2]

H_1*:* [Variable] is associated with [Variable 2]

A chi-square test allows the result to say either "we can reject the null hypothesis of no relationship at the 0.05 level" or "we have insufficient evidence to reject the null at the 0.05 level." The questionnaire analysis is used to find out which variables have an association on the application of DFS in agriculture enterprises in Indonesia and Hungary.

It is difficult to field online studies at the agriculture enterprises without using a secondary data analysis, as agriculture enterprises are usually underrepresented. So for the profitability aspects, the analysis used secondary data from the agriculture websites in Indonesia and Hungary, and based on that, the variables have been developed along with the hypotheses. The objective of the analysis is to find out about the impact on profitability in agriculture enterprises in Indonesia and Hungary. The analysis uses linear regression, which is a basic and commonly used type of predictive analysis. The overall idea of regression is to examine two things: (1) does a set of predictor variables do a good job in predicting an outcome (dependent) variable? (2) Which variables in particular are significant predictors of the outcome variable, and in what way do they impact the outcome variable? These regression estimates are used to explain the relationship between one dependent variable and one or more independent variables. The simplest form of the regression equation with one dependent and one independent variable is defined by the formula y = a + b*x, where y = estimated dependent variable score, c = constant, b = regression coefficient, and x = score on the independent variable.

There are three major uses for regression analysis are (1) determining the strength of predictors, (2) forecasting an effect, and (3) trend forecasting. First, the regression might be used to identify the strength of the effect that the independent variable(s) have on a dependent variable. Typical questions are what is the strength of relationship between

dose and effect, sales and marketing spending, or age and income. Second, it can be used to forecast effects or impact of changes. That is, the regression analysis helps us to understand how much the dependent variable changes with a change in one or more independent variables.

CHAPTER 4: RESULTS AND DISCUSSIONS

4.1 The Questionnaire Analysis

The questionnaire analysis is to find out about the factors that influence the application of DFS in agriculture enterprises in Indonesia and Hungary, while the hypothesis analysis is to find out if DFS has an impact on profitability in agriculture enterprises in Indonesia and Hungary, using main profitability measurements such as total revenue, total cost and gross margin. The questionnaire analysis uses the chi-square test, and the hypothesis analysis uses a simple linear regression.

For the chi-square test:

H_0*:* [Variable 1] is not associated with [Variable 2]

H_1*:* [Variable 1] is associated with [Variable 2]

The main variables in the hypothesis analysis is a dependent variable (y), and three independent variables (x) which are revenue (x_1), total cost (x_2) and gross margin (x_3). The equation is presented as y = a + b*x, where y = estimated dependent variable score, which is DFS, a = constant, b = regression coefficient, and x = score on the independent variable: total revenue (x_1), total variable cost (x_2) and gross margin (x_3). The normality test uses the KS test which is a non-parametric and distribution-free test: It makes no assumption about the distribution of data. The KS test can be used to compare a sample with a reference probability distribution, or to compare two samples. Suppose we have observations `x1, x2, …xn` that we think come from a distribution P. The KS test is used to evaluate:

- Null Hypothesis: The samples do indeed come from P
- Alternative Hypothesis: The samples do not come from P

The chi-square test of independence determines whether there is an association between categorical variables (i.e., whether the variables are independent or related). It is a nonparametric test. The chi-square test is most useful when analyzing cross tabulations of survey response data. Because cross tabulations reveal the frequency and percentage of responses to questions by various segments or categories of respondents (gender, profession, education level, etc.), the chi-square test informs researchers about whether or not there is a statistically significant difference between how the various segments or categories answered a given question.

This test utilizes a contingency table to analyze the data. A contingency table (also known as a cross-tabulation, crosstab, or two-way table) is an arrangement in which data is classified according to two categorical variables. The categories for one variable appear in the rows, and the categories for the other variable appear in columns. Each variable must have two or more categories. Each cell reflects the total count of cases for a specific pair of categories. Cross-tabulation is a mainframe statistical model that follows similar lines. It helps to make informed decisions regarding the research by identifying patterns, trends, and the correlation between the study parameters. Researchers use cross-tabulation to examine the relationship within the data that is not readily evident. It is quite useful in market research studies and surveys. A cross-tab report shows the connection between two or more questions asked in the study. The advantage of using a cross tabulation in a survey is its simplicity to compute and understand. Even if the researcher does not have an in-depth knowledge of the concept, it is effortless to interpret the results. It eliminates confusion as raw data can sometimes be challenging to understand and interpret. Even if there are small data sets, there might be confusion if the data is not arranged in an orderly manner. Cross-tabulation offers a simple way of correlating the variables that help minimize confusion related to data representation. The most important advantage of using cross-tabulation for survey analysis is the ease of using any data, whether it is nominal, ordinal, interval, or ratio.

The survey was conducted to provide an overview or preliminary mapping about the respondents' view based on the questionnaire, which are divided into 3 parts: socio-economic aspects, agriculture enterprises and farming activities, and digital financial services. The survey is divided into respondents in two countries, Indonesia and Hungary as a comparison.

The cross tabulations from the survey questions are presented below, with the complete cross tabulations in the appendix section. The number in brackets in the title of each table represents the number related in the questionnaire. The questionnaire summarizes a final sample size of 183 respondents from Indonesia and 101 respondents from Hungary, a total of 284. The chi-square analysis compares the answers between the two respondent groups to see whether it is significant or not. The difference is significant if the p-value is less than 0.05 ($p < 0.05$), with a confidence level of 95%.

Part 1. Socio-economic variables

Table 11. Gender (1)

Gender	Nationality		Total	p-value
	Indonesia	Hungary		
Male	**111 (61%)**	**89 (88%)**	**200 (70%)**	0.000
Female	72 (39%)	12 (12%)	84 (30%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Based on table 11, respondents from both countries (Indonesia and Hungary) are predominantly male, although the proportion of female respondents in Indonesia (39%) are more than Hungary (15%). Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and gender. The p-value indicates that these variables are not independent of each other and that there is a statistically significant relationship between country and gender.

Table 12. Age (2)

Age	Nationality		Total	p-value
	Indonesia	Hungary		
Less than 25 years old	12 (7%)	0 (0%)	12 (4%)	0.001
25 to 50 years old	**135 (74%)**	**93 (92%)**	**228 (80%)**	
More than 50 years old	36 (20%)	8 (8%)	44 (15%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Based on table 12, the dominant age group of respondents in both countries (Indonesia and Hungary) is in the 25-50 years. Since the p-value = 0.001 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and age group. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and age group.

Table 13. Education (3)

Education	Nationality		Total	p-value
	Indonesia	Hungary		
High school	6 (3%)	0 (0%)	6 (2%)	0.015
Vocational	24 (13%)	14 (14%)	38 (13%)	
University degree (undergraduate) - BS, BA	39 (21%)	**39 (39%)**	78 (27%)	
University degree (graduate) - MA, MSc	**90 (49%)**	36 (36%)	**126 (44%)**	
University degree (graduate) - PhD	12 (7%)	4 (4%)	16 (6%)	
Other academic or scientific degree	12 (7%)	8 (8%)	20 (7%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Based on table 13, the respondents in Indonesia are mostly university graduates (MA or MSc), while in Hungary the education of respondents are university graduates (BS or BA level). Since the p-value = 0.015 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and education level. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and education level.

Table 14. Involved in agricultural production or agriculture business (4)

Involved in agricultural production or agriculture business	Nationality		Total	p-value
	Indonesia	Hungary		
Yes	57 (31%)	**101 (100%)**	**158 (56%)**	0.000
No	**126 (69%)**	0 (0%)	126 (44%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Based on table 14, the majority of respondents in Indonesia is not actively involved in agricultural production or agricultural business (69%). While in Hungary, all of the respondents are involved in agriculture production or agriculture business (100%). Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and involvement in agricultural production or agriculture business. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and involvement in agriculture.

Table 15. Connection to the farm area as (5)

Connected to the farm area as	Nationality		Total	p-value
	Indonesia	Hungary		
Individual farmer	**118 (65%)**	21 (21%)	**139 (49%)**	0.000
Family	26 (7%)	**67 (34%)**	93 (33%)	
Cooperative farm	9 (5%)	0 (0%)	9 (3%)	
Private company	3 (2%)	0 (0%)	3 (1%)	
Public corporation	12 (7%)	9 (9%)	21 (7%)	
Government enterprise	9 (5%)	4 (4%)	13 (5%)	
Buyer	3 (2%)	0 (0%)	3 (1%)	
Other	3 (2%)	0 (0%)	3 (1%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 15 shows that the percentage of Indonesian respondents connected to the agriculture is as an individual farmer (65%), while in Hungary the respondents are connected to the farm area as family (34%). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is **an association** between country and connection to the farm. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and connection to the farm.

Table 16. Years of involvement in agriculture (6)

Years of involvement in agriculture	Nationality		Total	p-value
	Indonesia	Hungary		
Less than 1 year	6 (4%)	0 (0%)	6 (2%)	0.000
1 to 5 years	15 (8%)	22 (22%)	37 (13%)	
6 to 10 years	15 (8%)	**43 (43%)**	58 (20%)	
11 to 15 years	0 (0%)	16 (16%)	16 (5%)	
16 to 20 years	0 (0%)	8 (8%)	8 (2%)	
More than 20 years	**147 (80%)**	12 (12%)	**159 (59%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 16 above shows the years of involvement in agriculture. The Indonesian respondents' answer highest percentage is more than 20 years (80%), while Hungarian respondents highest percentage are in the range of 6 to 10 years (43%). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and years of involvement in agriculture. The p-value indicates that these variables are not independent of each other

and there is a statistically significant relationship between country and connection to the farm.

Table 17. Farming as a primary occupation (7)

Is farming a primary occupation?	Nationality		Total	p-value
	Indonesia	Hungary		
Yes	54 (30%)	**59 (58%)**	113 (40%)	0.000
No	**129 (70%)**	42 (42%)	171 (60%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Tabel 17 above shows that the Indonesian respondents stated farming is not a primary occupation (70%) while the majority of the Hungarian respondents work in farming as a primary occupation (58%). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and farming as a primary occupation. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and farming as a primary occupation.

Part 2. Agriculture Cooperative and Farming Activities

Table 18. The main agriculture products in farm (8)

The main agriculture product in farms	Nationality		Total	p-value
	Indonesia	Hungary		
Plant products	**146 (80%)**	**92 (91%)**	**238 (83%)**	0.307
Animal products	27 (15%)	1 (1%)	28 (10%)	
Both plant and animal products	10 (5%)	8 (8%)	18 (7%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Based on table 18, the highest percentage of respondents' answer in both countries (Indonesia and Hungary) state that the main agriculture products is plant products, which the difference in proportion is not significant ($p > 0.05$). Since the p-value = 0.307 is more than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is no association between country and main agriculture products in farm. The p-value indicates that these variables are independent of each other and there is a no statistically significant relationship between country and the main agriculture products in farms.

Table 19. Types of agriculture enterprise involved in farming activities (9)

Types of agriculture enterprise involved in farming activities	Nationality		Total	p-value
	Indonesia	Hungary		
Producers cooperative	32 (17%)	0 (0%)	32 (11%)	0.000
Consumers cooperative	9 (5%)	0 (0%)	9 (3%)	
Credit cooperative	6 (4%)	4 (4%)	10 (4%)	
Input supply	32 (17%)	31 (31%)	63 (22%)	
Producer cooperative	0 (0%)	12 (12%)	12 (4%)	
Product sales and marketing	12 (7%)	**38 (38%)**	**50 (18%)**	
Not involved	**92 (50%)**	16 (16%)	108 (38%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 19 above shows that 50% of respondents in Indonesia are not involved in agriculture enterprises, but in Hungary 38% of respondents are involved in product sales and marketing type of agriculture enterprise. Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and type of agriculture enterprise involved in farming activities. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and type of agriculture enterprises involved in farming activities.

Table 20. Farm inputs purchased from agriculture enterprises (10)

Farm inputs purchased from agriculture enterprises	Nationality		Total	p-value
	Indonesia	Hungary		
Agro-chemicals	22 (12%)	23 (23%)	**45 (16%)**	0.008
Animal food	6 (3%)	0 (0%)	6 (2%)	
Farm implements and spare parts	6 (3%)	12 (12%)	18 (6%)	
Fertilizers	**64 (35%)**	23 (23%)	87 (31%)	
Machine service	0 (0%)	4 (4%)	4 (1%)	
Seeds	**64 (35%)**	**35 (35%)**	99 (35%)	
Other	6 (3%)	4 (4%)	10 (4%)	
Not involved	15 (9%)	0 (0%)	15 (5%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 20 shows that in Indonesia, respondents purchased fertilizers (35%) and seeds (35%) as the main farm inputs, while in Hungary, seeds (35%) are the main farm input purchased from agriculture enterprises. Since the p-value = 0.008 is less than the chosen

significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and farm inputs purchased from agriculture enterprises. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and farm inputs purchased from agriculture enterprises.

Table 21. Farm size (11)

Farm size	Nationality		Total	p-value
	Indonesia	Hungary		
0 - 10 ha	**68 (37%)**	24 (24%)	**92 (32%)**	0.000
10.01 - 50 ha	**68 (37%)**	20 (20%)	88 (31%)	
50.01 - 100 ha	31 (17%)	8 (8%)	39 (14%)	
100.01 - 250 ha	12 (7%)	20 (20%)	32 (11%)	
250.01 - 500 ha	0 (0%)	**25 (25%)**	25 (9%)	
500.01 - 1,000 ha	4 (2%)	4 (4%)	8 (3%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 21 above shows that Indonesian respondents have a farm size of 0 to 10 hectares (10%) and 10.01 to 50 hectares (10%). Hungarian respondents own a farm size of 250.01 to 500 hectares (23%). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and farm size. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and farm size.

Table 22. Farm turnover (in EUR) (12)

Farm turnover (in EUR)	Nationality		Total	p-value
	Indonesia	Hungary		
0 - 1.000.000	29 (15%)	0 (0%)	29 (10%)	0.000
1.000.001 - 50.000.000	**136 (74%)**	**57 (57%)**	**193 (68%)**	
50.000.001 - 100.000.000	12 (7%)	20 (20%)	32 (11%)	
100.000.001 - 150.000.000	3 (2%)	16 (16%)	19 (7%)	
250.000.001 - 300.000.000	3 (2%)	8 (8%)	11 (4%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 22 above show the percentage of farm turnover in both countries (Indonesia and Hungary) and the highest percentage for both countries is at the turnover range of 1.000.001 to 50.000.000 euros (Indonesia 74%, Hungary 57%). However, there is a bigger

percentage for the 50.000.001 to 100.000.000 euros range in Hungary (20%) compared to Indonesia (7%). Since the p-value = 0.000 is more than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and farm turnover. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and farm turnover.

Table 23. Opinion about the costs of farming activities compared to the turnover (13)

Opinion about the costs for farming activities in comparison with the turnover	Nationality		Total	p-value
	Indonesia	Hungary		
Low	0 (0%)	4 (4%)	4 (2%)	0.000
Moderate	45 (25%)	0 (0%)	45 16%)	
High	**93 (50%)**	**81 (80%)**	174 (61%)	
Very High	45 (25%)	16 (16%)	61 (21%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 23 shows in both countries (Indonesia and Hungary), respondents opinion about costs of farming activities are high compared to the turnover (Indonesia 50%, Hungary 80%). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and opinion about the costs of farming activities in comparison with the turnover. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the costs of farming activities compared with the turnover.

Tables 24 to 33 shows the benefit of members provided by agriculture enterprises, which is explained in 9 indicators as follows:

8. Better possibilities to expand the agriculture production
9. The agriculture enterprise operates in the nearby region
10. The agriculture enterprise offers good service for the members
11. The agriculture enterprise pays a competitive producer price
12. The agriculture enterprise offers a stable market channel
13. Membership secures the marketing of products
14. The agriculture enterprise provides easy access to credit to members
15. The agriculture enterprise increases the income of members
16. The agriculture enterprise provides education and training for its members

Table 24. Benefits to members provided by the agriculture enterprise: Better possibilities to expand the agricultural production (14.1)

1.Benefit : Better possibilities to expand my agricultural production	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	12 (12%)	15 (5%)	0.020
2. Less important	15 (8%)	16 (16%)	31 (11%)	
3. Neutral	38 (21%)	**46 (46%)**	84 (30%)	
4. Important	**127 (69%)**	23 (23%)	**150 (53%)**	
5. Very important	0 (0%)	4 (4%)	4 (1%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 24 shows that in Indonesia, the respondents consider important (69%) to the indicator of "better possibilities to expand my agricultural production", while in Hungary the respondents are neutral (46%) to this indicator. Since the p-value = 0.020 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the importance for possibilities to expand the agricultural production. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the benefits of agriculture production expansion.

Table 25. Benefits to members provided by the agriculture enterprise: The agriculture enterprise operates in the nearby region (14.2)

2.Benefit : The agriculture enterprise operates in the nearby region	Nationality		Total	p-value
	Indonesia	Hungary		
2. Less important	15 (8%)	4 (4%)	19 (6%)	0.000
3. Neutral	35 (19%)	**61 (61%)**	96 (34%)	
4. Important	**98 (54%)**	32 (32%)	**130 (46%)**	
5. Very important	35 (19%)	4 (4%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 25 shows that the majority of Indonesian respondents (54%) consider the indicator of "the agriculture enterprise operates in the nearby region" as important, while Hungarian respondents are divided into neutral (61%) and important (32%). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and benefits if the agriculture enterprise operates in the nearby region. The p-value indicates that these variables are not independent of each other and there is a statistically significant

relationship between country and the benefits of agriculture enterprises being closer to the farm.

Table 26. Benefits to members provided by the agriculture enterprise: The agriculture enterprise offers good service for the members (14.3)

3.Benefit : The agriculture enterprise offers good service for the members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	8 (8%)	8 (3%)	0.056
2. Less important	13 (7%)	8 (8%)	21 (7%)	
3. Neutral	37 (20%)	38 (38%)	75 (26%)	
4. Important	**117 (64%)**	**35 (35%)**	**152 (54%)**	
5. Very important	16 (9%)	12 (12%)	28 (10%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 26 shows that for respondents in Indonesia (64%) and Hungary (35%) answered that the indicator "the agriculture enterprise offers good service for the members" are important. However, since the p-value = 0.056 is more than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is no association between country and whether the agriculture enterprise offers good service for the members. The p-value indicates that these variables are independent of each other and there is no statistically significant relationship between country and whether the agriculture enterprise offers good services for the members.

Table 27. Benefits to members provided by the agriculture enterprise: The agriculture enterprise pays a competitive producer price (14.4)

4.Benefit : The agriculture enterprise pays a competitive producer price	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	4 (4%)	7 (2%)	0.589
2. Less important	12 (7%)	16 (16%)	28 (10%)	
3. Neutral	**121 (66%)**	**42 (42%)**	**163 (57%)**	
4. Important	25 (13%)	27 (27%)	52 (19%)	
5. Very important	22 (12%)	12 (12%)	34 (12%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 27 shows that respondents in Indonesia (66%) and Hungary (42%) consider the indicator of "the agriculture enterprise pays a competitive producer price" as neutral. Since the p-value = 0.589 is more than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is no association between country and

whether the agriculture enterprise pays a competitive producer price. The p-value indicates that these variables are independent of each other and there is no statistically significant relationship between country and whether the agriculture enterprise pays a competitive producer price.

Table 28. Benefits to members provided by the agriculture enterprise The agriculture enterprise offers a stable market channel (14.5)

5.Benefit : The agriculture enterprise offers a stable market channel	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	4 (4%)	4 (1%)	0.021
2. Less important	12 (6%)	8 (8%)	20 (7%)	
3. Neutral	25 (14%)	**46(46%)**	71 (25%)	
4. Important	**121 (66%)**	16 (16%)	**137 (48%)**	
5. Very important	25 (14%)	27 (27%)	52 (19%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 28 shows that Indonesian respondents (66%) consider the indicator "the agriculture enterprise offers a stable market channel" as important, while Hungarian respondents (46%) consider the indicator as neutral. Since the p-value = 0.021 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and whether the agriculture enterprise offers a stable market channel. The p-value indicates these variables not independent of each other and there is a statistically significant relationship between country and a stable market channel offered by the agriculture enterprise.

Table 29. Benefits to members provided by the agriculture enterprise: Membership secures the marketing of products (14.6)

6.Benefit : Membership secures the marketing of products	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	8 (8%)	8 (3%)	0.003
2. Less important	6 (3%)	12 (12%)	18 (6%)	
3. Neutral	38 (21%)	**54 (54%)**	92 (33%)	
4. Important	**124 (68%)**	19 (19%)	**143 (50%)**	
5. Very important	15 (8%)	8 (8%)	23 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 29 shows that Indonesian respondents (68%) consider the indicator "membership secures the marketing of products" as important, while Hungarian

respondents (54%) are neutral. Since the p-value = 0.003 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and whether membership in an agriculture enterprise secures marketing of the products. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and being a member of an agriculture enterprise to secure the marketing of products.

Table 30. Benefits to members provided by the agriculture enterprise: The agriculture enterprise provides easy access to credit to members (14.7)

7.Benefit : The agriculture enterprise provides easy access to credit to members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	8 (8%)	11 (4%)	0.000
2. Less important	6 (3%)	16 (16%)	22 (8%)	
3. Neutral	**121 (66%)**	**65 (65%)**	**186 (65%)**	
4. Important	38 (21%)	4 (4%)	42 (15%)	
5. Very important	15 (8%)	8 (8%)	23 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 30 shows respondents in Indonesia (66%) and Hungary (65%) are neutral to the indicator "the agriculture enterprise provide easy acess to credit to members". Since the p-value = 0.000 is less more the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and whether the agriculture enterprise provides easy access to credit to members. The p-value indicates that these variables not independent of each other and there is a statistically significant relationship between country and easy aceess to credit as a member of an agriculture enterprise.

Table 31. Benefits to members provided by the agriculture enterprise: The agriculture enterprise increases the income of members (14.8)

8.Benefit : The agriculture enterprise increases the income of members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	4 (4%)	4 (1%)	0.028
2. Less important	16 (9%)	8 (8%)	24 (8%)	
3. Neutral	68 (37%)	**48 (48%)**	**116 (42%)**	
4. Important	**83 (45%)**	26 (26%)	109 (38%)	
5. Very important	16 (9%)	15 (15%)	31 (11%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 31 shows that both Indonesian respondents (45%) consider the indicator "the agriculture enterprise increases the income of members" as important, while Hungarian respondents (48%) consider the same indicator as neutral. Since the p-value = 0.028 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and whether the agriculture enterprise increases the income of members. The p-value indicates that these variables not independent of each other and there is a statistically significant relationship between country and a benefit of an increase in income as a member of an agriculture enterprise.

Table 32. Benefits to members provided by the agriculture enterprise: The agriculture enterprise provides education and training for its members (14.9)

9.Benefit : The agriculture enterprise provides education and training for its members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	17 (17%)	20 (8%)	0.001
2. Less important	12 (6%)	0 (0%)	12 (4%)	
3. Neutral	**121 (66%)**	**50 (50%)**	**171 (60%)**	
4. Important	22 (12%)	18 (18%)	40 (14%)	
5. Very important	25 (14%)	16 (16%)	41 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 32 shows that both Indonesian (66%) and Hungarian (50%) respondents consider the indicator "the agriculture enterprise provides education and training for its members" as neutral. Since the p-value = 0.001 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the importance of education and training. The p-value indicates that these variables not independent of each other and there is a statistically significant relationship between country and the importance of education and training for members of the agriculture enterprise.

Based on table 33, there are factors considered as constraints to the development of agriculture enterprises. In Indonesia the main constraint factor is government interference that has negative effects on the development (38%), whereas in Hungary, the main constraint factor is inadequate capital (46%).

Table 33. Constraints to agriculture enterprise development (15)

Constraints to agriculture enterprise development	Nationality		Total	p-value
	Indonesia	Hungary		
Government interference that has negative effects on the development	**70 (38%)**	7 (7%)	**77 (27%)**	0.000
Digital literacy rate of members	**46 (25%)**	1 (1%)	**47 (17%)**	
Inadequate capital	**45 (25%)**	**46 (46%)**	**91 (32%)**	
Lack of motivation	8 (4%)	**19 (19%)**	27 (10%)	
Lack of skills	7 (4%)	**19 (19%)**	26 (9%)	
Mismanagement	6 (3%)	3 (3%)	9 (3%)	
Unavailability of credits or loans	1 (1%)	6 (6%)	7 (2%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and constraints to agricultural development. The p-value indicates that these variables not independent of each other and there is a statistically significant relationship between country and the constraint of development. These constraints are likely to come from government policies and regulations.

Part 3. Digital Financial Services

Table 34. Do you, as an individual, or as a member of an agriculture enterprise, have a bank account? (16)

Do you, as an individual, OR as a member of an agriculture enterprise, have a bank account?	Nationality		Total	p-value
	Indonesia	Hungary		
Yes	**174 (95%)**	**101 (100%)**	**275 (96%)**	0.312
No	9 (5%)	0 (0%)	9 (4%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 34 shows that the majority of respondents in both countries (Indonesia and Hungary), as an individual, or as a member of an agriculture enterprise, have a bank account. However, since the p-value = 0.312 is more than the chosen significance level $\alpha = 0.05$, the null hypothesis is accepted and conclude that there is no association between country and owning a bank account. The p-value indicates that these variables are independent of each

other and there is no statistically significant relationship between country and having a bank account.

Table 35. Where do you get financial support (e.g. credits, loans, etc) to finance your activities? (17)

Where do you get financial support (e.g. credits, loans, etc) to finance your activities?	Nationality		Total	p-value
	Indonesia	Hungary		
National bank and/or EU funding	30 (17%)	8 (8%)	38 (13%)	0.000
Regional bank	24 (13%)	8 (8%)	32 (11%)	
Private bank	**94 (51%)**	**85 (85%)**	**179 (63%)**	
Own sources	30 (16%)	0 (0%)	30 (11%)	
Other	5 (3%)	0 (0%)	5 (2%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 35 shows that Indonesian respondents get financial support (e.g. credits, loans, etc.) to finance their activities through private banks (51%), national bank (17%), and own sources (16%). Hungarian respondents get financial support from private banks (85%), regional banks (8%) and national bank/EU funding (8%), and there are no sources other than these three financial insitutions. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and financial support/sources of funding. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and sources of funding.This is likely to differences in banking regulations in each country.

Table 36. What is the percentage of funds received from national bank and/or the EU? (17.1)

What is the percentage of funds received from national bank and/or the EU?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	**42 (22%)**	**38 (38%)**	**80 (28%)**	0.000
11-20%	12 (7%)	4 (4%)	16 (6%)	
21-30%	0 (0%)	28 (28%)	28 (10%)	
31-40%	3 (2%)	23 (23%)	26 (9%)	
61-70%	0 (0%)	4 (4%)	4 (1%)	
71-80%	6 (3%)	0 (0%)	6 (2%)	
81-90%	0 (0%)	4 (4%)	4 (1%)	
No Answer	120 (66%)	0 (0%)	120 (42%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 36 shows that Indonesian respondents receive 1 to 10% of funding from the national bank (22%), while Hungarian respondents receive funds from the national bankand/or EU funding at the 1 to 10% range (38%) and 21 to 30% range (28%). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and percentage of funds received from national banks and/or the EU. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and percentage of funds received from national banks and/or the EU, somewhere in the range of 1 to 30%. For Indonesia, there is no EU funding so it is solely from the national banks.

Table 37. What is the percentage of funds received from the regional bank? (17.2)

What is the percentage of funds received from the regional bank?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	**57 (31%)**	**69 (69%)**	**126 (45%)**	0.000
11-30%	15 (8%)	0 (0%)	15 (5%)	
51-60%	0 (0%)	4 (4%)	4 (1%)	
76-100%	3 (2%)	0 (0%)	3 (1%)	
No Answer	**108 (59%)**	28 (28%)	136 (48%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 37 shows that respondents in Indonesia (31%) and Hungary (69%) receive funds from the regional bank mostly at the 1 to 10% range. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and percentage of funds received from regional banks. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and percentage of funds received from regional banks in the range of 1 to 10%.

Table 38. What is the percentage of funds received from the private bank? (17.3)

What is the percentage of funds received from the private bank?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	24 (13%)	**46 (46%)**	70 (25%)	0.000
11-20%	**66 (35%)**	12 (12%)	78 (27%)	
21-30%	0 (0%)	11 (11%)	11 (4%)	
31-40%	0 (0%)	8 (8%)	8 (3%)	
41-50%	12 (7%)	8 (8%)	20 (7%)	
71-80%	0 (0%)	4 (4%)	4 (1%)	
81-100%	3 (2%)	0 (0%)	3 (1%)	
No Answer	78 (43%)	12 (12%)	90 (32%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 38 shows that Indonesian respondents (35%) receive 21 to 30% of funds from private banks, while Hungarian respondents (46%) receive 1 to 10% of funds from private banks. Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and percentage of funds received from private banks. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and percentage of funds received from private banks in the range of 1 to 20%.

Table 39. What is the percentage of funds received from own sources? (17.4)

What is the percentage of funds received from own sources?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	0 (0%)	**42 (42%)**	42 (15%)	0.000
11-20%	0 (0%)	23 (23%)	23 (9%)	
21-30%	15 (8%)	0 (0%)	15 (5%)	
31-40%	0 (0%)	4 (4%)	4 (1%)	
41-50%	15 (8%)	4 (4%)	19 (6%)	
51-60%	0 (0%)	8 (8%)	8 (3%)	
61-70%	45 (25%)	12 (12%)	57 (20%)	
81-90%	0 (0%)	8 (8%)	8 (3%)	
91-100%	**57 (31%)**	0 (0%)	**57 (20%)**	
No Answer	51 (28%)	0 (0%)	51 (18%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 39 shows that Indonesian respondents (31%) use mainly own sources (91 to 100%) to fund agriculture activities, while Hungarian respondents (42%) use only 1 to 10% of own sources to fund agriculture activities. Since the p-value = 0.000 is less than the chosen

significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and percentage of funds received from own sources. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and percentage of funds received from own sources, somewhere in the range of 1 to 100%. It shows that in Indonesia, agriculture activities rely mainly on own sources of funding, compared to Hungary.

Table 40. What is the percentage of funds received from other sources? (17.5)

What is the percentage of funds received from other sources?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	**21 (11%)**	**38 (38%)**	**59 (21%)**	0.000
11-30%	3 (2%)	0 (0%)	3 (1%)	
No Answer	159 (87%)	63 (63%)	222 (78%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 40 shows that respondents in both countries (Indonesia and Hungary) receive 1 to 10% of funds from other sources (excluding financial institutions and own sources). Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and percentage of funding from other sources, excluding financial institutions and own sources. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and percentage of funds received from own sources, somewhere in the range of 1 to 10%. Respondents from both countries refuse to disclose what are these "other sources".

Table 41. Primary Bank : Makes it easy for me to use their services (18.1)

Primary Bank : Makes it easy for me to use their services	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	6 (3%)	4 (4%)	10 (4%)	0.000
Disagree	12 (7%)	0 (0%)	12 (4%)	
Neutral	57 (31%)	12 (12%)	69 (24%)	
Agree	**81 (44%)**	**81 (81%)**	**162 (57%)**	
Strongly agree	27 (15%)	4 (4%)	31 (11%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 41 shows respondents in Indonesia (44%) and Hungary (81%) agree to the statement "the primary bank makes it easy to use the services". Since the p-value = 0.000

is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and whether the bank makes it easy for individuals to use bank services. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the ease of using bank services.

Table 42. Primary Bank: The good quality of the services of the bank (18.2)

Primary Bank : The good quality of of the services of the bank	Nationality		Total	p-value
	Indonesia	Hungary		
Disagree	18 (10%)	4 (4%)	22 (8%)	0.000
Neutral	**69 (38%)**	4 (4%)	73 (26%)	
Agree	63 (34%)	**85 (85%)**	**148 (52%)**	
Strongly agree	33 (18%)	8 (8%)	41 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 42 shows Indonesian respondents are neutral (38%) to the statement "the primary bank provides good quality of services" while Hungarian respondents agree (85%) to the same statement. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the good quality of services of the bank. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the quality of bank services.

Table 43. Primary Bank : Routinely looks for ways to improve my experience or deliver greater value (18.3)

Primary Bank : Routinely looks for ways to improve my experience or deliver greater value	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	6 (3%)	4 (4%)	10 (4%)	0.092
Disagree	18 (10%)	16 (16%)	34 (12%)	
Neutral	**90 (49%)**	**35 (35%)**	**125 (44%)**	
Agree	57 (31%)	**42 (42%)**	99 (35%)	
Strongly agree	12 (7%)	4 (4%)	16 (6%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 43 shows respondents in Indonesia (49%) are neutral to the statement "the primary bank routinely looks for ways to improve experience or deliver greater value", compared to Hungary (42%) which agree on the same statement. Since the p-value =

0.092 is more than the chosen significance level $\alpha = 0.05$, the null hypothesis is accepted and conclude that there is no association between country and whether the bank routinely looks for ways to improve or deliver greater value to customers. The p-value indicates that these variables are independent of each other and there is no statistically significant relationship between country and if banks routinely look for ways to improve customer's experience or to deliver more value to customers.

Table 44. Primary Bank: Offers the most value compared to the same types of services (18.4)

Primary Bank : Offers the most value compared to the same types of services	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	0 (0%)	4 (4%)	4 (1%)	0.000
Disagree	24 (13%)	8 (8%)	32 (11%)	
Neutral	**87 (48%)**	**69 (69%)**	**156 (56%)**	
Agree	54 (30%)	12 (12%)	66 (23%)	
Strongly agree	18 (9%)	8 (8%)	26 (9%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 44 shows respondents in Indonesia (48%) and Hungary (69%) are neutral to the statement "the primary bank offers the most value compared to the same types of services". Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and whether banks offer the most value to the same types of services. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and if banks offer the most value to the same types of services.

Table 45. Primary Bank: Is transparent on service fees (18.5)

Primary Bank : Is transparent on service fees	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	12 (7%)	8 (8%)	20 (7%)	0.719
Disagree	18 (10%)	15 (15%)	33 (12%)	
Neutral	**78 (43%)**	**42 (42%)**	**120 (42%)**	
Agree	66 (36%)	32 (32%)	98 (35%)	
Strongly agree	9 (4%)	4 (4%)	13 (5%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 45 shows respondents in Indonesia (43%) and Hungary (42%) are neutral to the statement "the primary bank is transparent on service fees". Since the p-value = 0.719 is more than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is no association between country and bank transparency on service fees. The p-value indicates that these variables are independent of each other and there is no statistically significant relationship between country and transparency on service fees from banks.

Table 46. Primary Bank : Know what the customer needs (18.6)

Primary Bank : Know what the customer needs	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	3 (2%)	4 (4%)	7 (2%)	0.209
Disagree	33 (18%)	15 (15%)	48 (17%)	
Neutral	**84 (46%)**	**50 (50%)**	**134 (47%)**	
Agree	51 (28%)	20 (20%)	71 (25%)	
Strongly agree	12 (7%)	12 (12%)	24 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 46 shows respondents in Indonesia (46%) and Hungary (50%) are neutral to the statement "the primary bank knows what the customer needs". Since the p-value = 0.209 is more than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is no association between country and whether the bank knows what the customer needs. The p-value indicates that these variables are independent of each other and there is no statistically significant relationship between country and banks' awareness on customers' needs.

Table 47. Most preferred channel for banking activities

What is your most preferred channel for banking activities?	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking	27 (15%)	**61 (61%)**	88 (31%)	0,000
Mobile banking	54 (30%)	4 (4%)	58 (20%)	
Both online and mobile banking	**75 (40%)**	24 (24%)	**99 (35%)**	
Personal contact	27 (15%)	12 (12%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 47 shows respondents in Indonesia (40%) prefer both online and mobile banking, while respondents in Hungary (61%) prefer online banking. Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and preferred channel for banking activities. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and preferred channel for banking activities.

Table 48. How often do you use the bank branch/office channel

Using Bank branch/office channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	9 (5%)	19 (19%)	28 (10%)	0.030
Once a month	**107 (58%)**	**62 (61%)**	**169 (60%)**	
2-5 times a month	62 (34%)	12 (12%)	74 (26%)	
6-9 times a month	3 (2%)	8 (8%)	11 (3%)	
10 or more times a month	2 (1%)	0 (0%)	2 (1%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 48 shows respondents in Indonesia (58%) go to the bank branch at least once a month, which is the same in Hungary (61%). Since the p-value = 0.030 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and use of bank branch/office channel. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the frequency of going to the bank branch/office.

Table 49. How often do you use the ATM channel

Using ATM channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	3 (2%)	4 (4%)	7 (2%)	0.005
Once a month	71 (39%)	**43 (43%)**	114 (40%)	
2-5 times a month	**101 (55%)**	42 (42%)	**143 (51%)**	
6-9 times a month	8 (4%)	4 (4%)	12 (4%)	
10 or more times a month	0 (0%)	8 (8%)	8 (3%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 49 shows respondents in Indonesia (55%) use the ATM channel 2 to 5 times a month compared to respondents in Hungary (43%) who use the ATM channel once a month. Since the p-value = 0.005 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and use of ATM channel. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the frequency of going to the ATM.

Table 50. How often do you use the call center channel

Using Call center channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	**158 (86%)**	**81 (81%)**	**239 (84%)**	0.148
Once a month	20 (11%)	12 (12%)	32 (12%)	
2-5 times a month	5 (3%)	4 (4%)	9 (3%)	
6-9 times a month	0 (0%)	4 (4%)	4 (1%)	
10 or more times a month	0 (0%)	0 (0%)	0 (0%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 50 shows respondents in Indonesia (86%) and Hungary (81%) never use the call center channel. Since the p-value = 0.148 is more than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is no association between country and use of call center channel. The p-value indicates that these variables are independent of each other and there is no statistically significant relationship between country and the frequency of using the call center.

Table 51.Frequency of using online banking channel

Using Online banking (PC, tablet, laptop) channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	5 (2%)	0 (0%)	5 (1%)	0.000
Once a month	56 (30%)	0 (0%)	56 (20%)	
2-5 times a month	**98 (54%)**	41 (41%)	**139 (49%)**	
6-9 times a month	12 (7%)	16 (16%)	28 (10%)	
10 or more times a month	12 (7%)	**44 (44%)**	56 (20%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 51 shows respondents in Indonesia (54%) use online banking 2 to 5 times a month compared to respondents in Hungary (44%) who use online banking 10 or more

times a month. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the frequency of using online banking channel. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the frequent use of online banking.

Table 52. Frequency of using mobile apps channel

Using Mobile apps (mobile phone) channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	24 (13%)	24 (24%)	**48 (17%)**	0.013
Once a month	5 (2%)	11 (11%)	16 (5%)	
2-5 times a month	22 (12%)	**32 (32%)**	54 (19%)	
6-9 times a month	**120 (66%)**	26 (26%)	**146 (51%)**	
10 or more times a month	12 (7%)	8 (8%)	20 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 52 shows respondents in Indonesia (66%) use mobile banking apps 6 to 9 times a month compared to respondents in Hungary (32%) who use mobile banking apps 2 to 5 times a month. Since the p-value = 0.013 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the frequency of using mobile banking apps channel. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the frequent use of mobile apps.

Table 53. Preferred channel to apply for credit card

Preferred channel to apply for credit card	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	66 (36%)	**47 (47%)**	113 (40%)	0.039
Mobile apps (mobile phone)	42 (23%)	22 (22%)	64 (23%)	
Personal contact	**75 (41%)**	32 (32%)	**107 (37%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 53 shows respondents in Indonesia (41%) prefer personal contact to apply for credit card, while respondents in Hungary (47%) prefer to use online banking to apply for credit card. Since the p-value = 0.039 is less than the chosen significance level α = 0.05,

the null hypothesis is rejected and conclude that there is **an association** between country and the preferred channel for credit card application. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for credit card application.

Table 54. Preferred channel to apply for debit card

Preferred channel to apply for debit card	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**75 (41%)**	**47 (47%)**	**122 (43%)**	0.032
Mobile apps (mobile phone)	46 (25%)	18 (18%)	64 (23%)	
Personal contact	62 (34%)	36 (36%)	98 (34%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 54 shows respondents in Indonesia (41%) and Hungary (47%) prefer to use online banking to apply for debit card. Since the p-value = 0.032 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the preferred channel for debit card application. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for debit card application.

Table 55. Preferred channel for transactions/checking accounts

Preferred channel for transaction/checking account	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**74 (40%)**	**93 (93%)**	**167 (59%)**	0.000
Mobile apps (mobile phone)	**74 (40%)**	4 (4%)	78 (27%)	
Personal contact	35 (20%)	4 (4%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 55 shows respondents in Indonesia use online banking (40%) and mobile banking apps to do transactions or checking accounts. Respondents in Hungary (93%) mainly use online banking to do transactions or checking accounts. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and

conclude that there is **an association** between country and the preferred channel for debit card application. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for transactions or checking accounts.

Table 56. Preferred channel for savings/deposit accounts

Preferred channel for savings/deposit account	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	66 (36%)	**77 (77%)**	**143 (50%)**	0.000
Mobile apps (mobile phone)	**68 (37%)**	8 (8%)	76 (27%)	
Personal contact	49 (27%)	16 (16%)	65 (23%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 56 shows respondents in Indonesia prefer to use mobile banking apps (37%) for savings/deposit accounts. Respondents in Hungary (77%) mainly use online banking for savings/deposit accounts. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the preferred channel for savings/deposit accounts. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for savings/deposit accounts.

Table 57. Preferred channel to apply for personal loans

Preferred channel to apply for personal loans	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	30 (16%)	27 (27%)	57 (20%)	0.010
Mobile apps (mobile phone)	24 (13%)	4 (4%)	28 (10%)	
Personal contact	**129 (71%)**	**70 (70%)**	**199 (70%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 57 shows respondents in Indonesia (71%) and Hungary (70%) prefer to use personal contact when applying for personal loans. Since the p-value = 0.010 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that

there is **an association** between country and the preferred channel for personal loan application. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used to apply for personal loans.

Table 58. Preferred channel for wealth management account

Preferred channel for wealth management account	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	45 (25%)	19 (19%)	64 (23%)	0.000
Mobile apps (mobile phone)	36 (20%)	0 (0%)	36 (13%)	
Personal contact	**102 (55%)**	**82 (82%)**	**184 (64%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 58 shows respondents in Indonesia (55%) and Hungary (82%) prefer to use personal contact to manage their wealth management account. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the preferred channel for wealth management account. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used to manage their wealth management account.

Table 59. Preferred channel to apply for house loans

Preferred channel to apply for house loan	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	33 (18%)	23 (23%)	56 (20%)	0.000
Mobile apps (mobile phone)	27 (15%)	0 (0%)	27 (10%)	
Personal contact	**123 (67%)**	**78 (77%)**	**201 (70%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 59 shows respondents in Indonesia (67%) and Hungary (77%) prefer to use personal contact to apply for a house loan. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the preferred channel to apply for house loans. The

p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for house loan applications.

Table 60. Preferred channel for mortgage/mortgage refinance service

Preferred channel for mortgage/mortgage refinance service	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	33 (18%)	19 (19%)	52 (18%)	0.000
Mobile apps (mobile phone)	27 (15%)	0 (0%)	27 (10%)	
Personal contact	**123 (67%)**	**82 (81%)**	**205 (72%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 60 shows respondents in Indonesia (67%) and Hungary (81%) prefer to use personal contact for mortgage/mortgage refinance service. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the preferred channel for mortgage/mortgage refinance service. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for mortgage/mortgage refinance service.

Table 61. Channel used to handle transfers within the same bank

Channel used to handle transfers from one account to another account in the same bank	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	72 (39%)	**93 (92%)**	**165 (58%)**	0.000
Mobile apps (mobile phone)	**81 (45%)**	8 (8%)	89 (31%)	
Personal contact	30 (16%)	0 (0%)	30 (11%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 61 shows respondents in Indonesia prefer to use mobile banking apps (45%) to manage transfers within the same bank, while respondents in Hungary (92%) prefer to use online banking. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used to handle transfers within the same bank. The p-value

indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for transfers within the same bank.

Table 62. Channel used to handle transactions with other banks

Channel used to transfer money to another account in a different bank	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	69 (38%)	**75 (74%)**	**144 (51%)**	0.000
Mobile apps (mobile phone)	**75 (41%)**	26 (26%)	101 (35%)	
Personal contact	39 (21%)	0 (0%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 62 shows respondents in Indonesia prefer to use mobile banking apps (41%) for transfers to other banks, while respondents in Hungary prefer to use online banking (74%). Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used for transfers to other banks. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used to manage transfers to other banks.

Table 63. Channels used to pay monthly bills

Channel used to pay bills	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	75 (41%)	**78 (77%)**	**153 (54%)**	0.000
Mobile apps (mobile phone)	**78 (43%)**	19 (19%)	97 (34%)	
Personal contact	30 (16%)	4 (4%)	34 (12%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 63 shows respondents in Indonesia prefer to use mobile banking apps (43%) to pay monthly bills, while respondents in Hungary (77%) prefer to use online banking. Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used to pay bills. The p-value indicates that these variables are not independent of

each other and there is a statistically significant relationship between country and the channel used to pay bills.

Table 64. Channel used for balance inquiries

Channel used for balance inquiries	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	70 (38%)	**64 (63%)**	**134 (48%)**	0.000
Mobile apps (mobile phone)	**86 (47%)**	23 (23%)	109 (38%)	
Personal contact	27 (15%)	14 (14%)	41 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 64 shows respondents in Indonesia prefer to use mobile banking apps (47%) for balance inquiries, while respondents in Hungary (63%) prefer to use online banking. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used for balance inquiries. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for balance inquiries.

Table 65. Channel used to update account details

Channel used to update account details	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**75 (41%)**	**71 (70%)**	**146 (52%)**	0.000
Mobile apps (mobile phone)	**73 (40%)**	4 (4%)	77 (27%)	
Personal contact	35 (19%)	26 (26%)	61 (21%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 65 shows respondents in Indonesia equally use online banking (41%) and mobile banking apps (40%) to update account details, while respondents in Hngary (70%) prefer to use online banking. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used to update account details. The p-value indicates that

these variables are not independent of each other and there is a statistically significant relationship between country and the channel used to update account details.

Table 66. Channel used to inquire about a bank service

Channel used to inquire about a bank service	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**69 (37%)**	**31 (31%)**	100 (35%)	0.000
Mobile apps (mobile phone)	54 (30%)	8 (8%)	62 (22%)	
Personal contact	**60 (33%)**	**62 (61%)**	**122 (43%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 66 shows respondents in Indonesia either use online banking (37%) or personal contact (33%) to inquire about a bank service, although online banking is more preferred. Respondents in Hungary either use online banking (31%) or personal contact (61%) to inquire about a bank service, although personal contact is more preferred. Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used to inquire about bank services. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used to inquire aboutbank services.

Table 67. Channel used to handle or file complaints

Channel used to handle or file a complaint	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	54 (30%)	8 (8%)	**62 (22%)**	0.000
Mobile apps (mobile phone)	30 (16%)	4 (4%)	34 (12%)	
Personal contact	**99 (54%)**	**89 (88%)**	188 (66%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 67 shows respondents in Indonesia (54%) and Hungary (88%) prefer to use personal contact when filing for complaints. Since the p-value = 0.000 is less than the chosen significance level $\alpha = 0.05$, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used to file complaints. The p-value

indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used to handle or file complaints.

Table 68. Channel used to apply for loans/credits

Channel used to apply for a loan/credit	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	24 (13%)	8 (8%)	32 (11%)	0.000
Mobile apps (mobile phone)	24 (13%)	0 (0%)	24 (9%)	
Personal contact	**135 (74%)**	**89 (88%)**	**224 (80%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 68 shows respondents in Indonesia (74%) and Hungary (88%) prefer personal contact to apply for loans/credits. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used to apply for loans/credits. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for loan/credit applications.

Table 69. Channel used to handle transaction disputes

Channel used to handle transaction disputes	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	48 (26%)	4 (4%)	52 (18%)	0.000
Mobile apps (mobile phone)	42 (23%)	0 (0%)	42 (15%)	
Personal contact	**93 (51%)**	**97 (96%)**	**190 (67%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 69 shows the respondents in Indonesia (51%) and the majority of respondents in Hungary (96%) use personal contact to handle transaction disputes. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the channel used to handle transactions disputes. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country and the channel used for transactions disputes.

Table 70. Channel used to report lost/stolen debit/credit cards

Channel used to report lost/stolen debit/credit card	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	39 (21%)	31 (31%)	**70 (25%)**	0.054
Mobile apps (mobile phone)	42 (23%)	16 (16%)	58 (20%)	
Personal contact	**102 (56%)**	**54 (53%)**	**156 (55%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

Source: SPSS from researcher's questionnaire, 2020

Table 70 shows respondents in Indonesia (56%) and Hungary (53%) prefer to use personal contact to report for lost/stolen debit/credit cards. Since the p-value = 0.054 is more than the chosen significance level α = 0.05, the null hypothesis is accepted and conclude that there is no association between country and the channel used to report for lost/stolen debit/credit cards. The p-value indicates that these variables are independent of each other and there is no statistically significant relationship between country and the channel used to report for lost/stolen debit/credit cards.

Table 71. Important features in using DFS

Important features in the use of online banking and mobile apps*	Nationality		Total	p-value
	Indonesia	Hungary		
Stronger online data security	**144 (79%)**	**81 (80%)**	**225 (79%)**	0.000
More real-time problem resolution	78 (43%)	20 (20%)	98 (35%)	
Making the login/authentication process easier	57 (31%)	**61 (60%)**	118 (42%)	
Ability to do more of regular banking transactions online or on the mobile apps	**90 (49%)**	40 (40%)	130 (46%)	
Costs/fees of making the transaction	**135 (74%)**	**85 (84%)**	**220 (77%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

** This is a multiple choice question and one respondent could answer max 3 choices, therefore the percentages may be bigger.*

Source: SPSS from researcher's questionnaire, 2020

Table 71 summarizes the three most important features when using DFS, i.e. online banking and mobile banking apps. This is a multiple choice question, and one respondent

is allowed to answer maximum 3 choices. As a result, the percentages may not be equal to 100%, but bigger. Respondents in Indonesia (79%) and Hungary (80%) consider stronger online data security as the most important feature in DFS. Respondents in Indonesia (74%) and Hungary (84%) also consider costs/fees of making the transaction as an important feature. Respondents in Indonesia (49%) would like to do more of regular banking transactions through online banking and mobile apps, while respondents in Hungary (6)%) would like the login/authentication process easier. Since the p-value = 0.000 is less than the chosen significance level α = 0.05, the null hypothesis is rejected and conclude that there is **an association** between country and the most important features in DFS. The p-value indicates that these variables are not independent of each other and there is a statistically significant relationship between country, e.g. important features in DFS that need to be improved by financial institutions.

4.2 Normality Test for Financial Data

The normality test for the data used in the linear regression analysis is by testing the residual value of the regression. The test for the residual value uses Kolmogorov-Smirnov (KS) method. If the resulting p-value is < 0.05, then it can be concluded that the data is normally distributed. Table 72 below summarizes the KS test for Indonesian data, which consist of revenue, cost and gross margin.

Table 72. One-sample Kolmogorov-Smirnov test for Indonesia data

		Unstandardized Residual Revenue	Unstandardized Residual Cost	Unstandardized Residual Gross Margin
N		6	6	6
Normal parameters[a,b]	Mean	.0000000	.0000000	.0000000
	Std. Deviation	64535044.36901	59349915.61354	5626746.05909
Most extreme differences	Absolute	.218	.230	.215
	Positive	.182	.204	.215
	Negative	-.218	-.230	-.166
Test Statistic		.218	.230	.215
Asymp. Sig. (2-tailed)		.200[cd]	.200[cd]	.200[cd]

a. Test distribution is normal
b. Calculated from data
c. Lilliefors significance correction
d. This is a lower bound of the true significance

Source: SPSS 20.0 (2020)

The summary of table 72 above is as follows: the residual value for the regression of DFS on total revenue in Indonesia results in a p-value of 0.200, which is > 0.05, so it can be concluded that the DFS-revenue data regression is normally distributed. From the

same table, the residual value of DFS on total cost in Indonesia results in a p-value of 0.200, which is > 0.05, so the DFS-cost data regression is normally distributed. The residual value of DFS on gross margin in Indonesia also results in a p-value of 0.200, which is > 0.05, so the DFS-gross margin data regression is normally distributed.

Table 73 below summarizes the KS test for Hungary data, which consist of revenue, cost and gross margin.

Table 73. One-sample Kolmogorov-Smirnov test for Hungary data

		Unstandardized Residual Revenue	Unstandardized Residual Cost	Unstandardized Residual Gross Margin
N		10	10	10
Normal parameters[a,b]	Mean	.0000000	.0000000	.0000000
	Std. Deviation	128805.9424840	67599.90106353	75995.6419181
Most extreme differences	Absolute	.203	.202	.173
	Positive	.166	.144	.106
	Negative	-.203	-.202	-.173
Test Statistic		.203	.202	.173
Asymp. Sig. (2-tailed)		.200[cd]	.200[cd]	.200[cd]

a. Test distribution is normal
b. Calculated from data
c. Lilliefors significance correction
d. This is a lower bound of the true significance

Source: SPSS 20.0 (2020)

The summary of table 73 above is as follows: the residual value for the regression of DFS on total revenue results in a p-value of 0.200, which is > 0.05, so it can be concluded that the DFS-revenue data regression is normally distributed. From the same table, the residual value of DFS on total cost results in a p-value of 0.200, which is > 0.05, so the DFS-cost data regression is normally distributed. The residual value of DFS on gross margin also results in a p-value of 0.200, which is > 0.05, so the DFS-gross margin data regression is normally distributed.

4.3 Hypothesis Testing for Revenue

The hypothesis analysis is to find out if DFS has an impact on profitability in agriculture enterprises in Indonesia and Hungary, using main profitability measurements such as total revenue, total cost and gross margin. Below is the SPSS result for the impact of DFS on the total revenue of agriculture enterprises in Indonesia.

Table 74. SPSS result of DFS on total revenue of agriculture enterprises in Indonesia

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.172[a]	.029	-.313	72152373.07

a. Predictors: (Constant), DFS_Indonesia

Coefficients[a]

Model		Unstandardized B	Coefficients Std Error	Standard Coefficients Beta	t	Sig.
1	(Constant)	262416100.7	294618718.4		.891	.423
	DFS_Indonesia	-3319760572	9522766821	-.172	-.349	.745

a. Dependent Variable: Revenue_Indonesia

Source: SPSS 20.0 (2020)

From table 74 above, the equation for the simple linear regression is as follows:

Total Revenue Indonesia = 262,416,100.7 – 3,319,760,572 DFS

Which means, an increase of 1 unit of DFS will result in a decrease of total revenue of 3,319,760,572.

The correlation coefficient (r) is 0.172, which shows there is a weak relationship between DFS and the total revenue of agriculture enterprises in Indonesia (interval 0,000 – 0,199). The coefficient of determination (R-square) is 0.029 or 2.9% which shows that the contribution of DFS on the total revenue of agriculture enterprises in Indonesia is low.

The hypothesis testing is as follows:

H_{01} : There is no impact of DFS in the total revenue of agriculture enterprises in Indonesia

H_{A1} : There is an impact of DFS in the total revenue of agriculture enterprises in Indonesia

Confidence level = 95%

The results show a t-count of -0.349 and a p-value of 0.745. From the distribution table of t, with α=0.05 and df=4, the t table is from -2.776 to 2.776. The t count (-0.349) is between the two values of the t table, so the result is accept H_0 and reject H_A. From the p-value = 0.745 > α = 0.05, the result is accept H_0 and reject H_A. Overall, the hypothesis

test shows that there is no impact of DFS in the total rvenue of agriculture enterprises in Indonesia.

Below (table 75) is the SPSS result for the impact of DFS on the total revenue of agriculture enterprises in Hungary.

Table 75. SPSS result of DFS on total revenue of agriculture enterprises in Hungary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.921[a]	.848	.829	136619.3331

a. Predictors: (Constant), DFS_Hungary

Coefficients[a]

Model		Unstandardized B	Coefficients Std Error	Standard Coefficients Beta	t	Sig.
1	(Constant)	-1088648.154	523184.909		-2.081	.071
	DFS_Hungary	6492346.241	970422.094	.921	6.690	.000

a. Dependent Variable: Revenue_Hungary

Source: SPSS 20.0 (2020)

From table 75, the equation for the simple linear regression is as follows:

Total Revenue Hungary = -1,088,648.154 + 6,492,346.241 DFS

Which means, an increase of 1 unit of DFS will result in a increase of total revenue of 6,492,346.241.

The correlation coefficient (r) is 0.921, which shows there is a strong relationship between DFS and the total revenue of agriculture enterprises in Hungary (interval 0,900 – 0,999). The coefficient of determination (R-square) is 0.848 or 84.8% which shows that the contribution of DFS on the total revenue of agriculture enterprises in Hungary is high.

The hypothesis testing is as follows:

H_{02} : There is no impact of DFS in the total revenue of agriculture enterprises in Hungary

H_{A2} : There is an impact of DFS in the total revenue of agriculture enterprises in Hungary

Confidence level = 95%

The results show a t-count of 6.690 and a p-value of 0.000. From the distribution table of t, with α=0.05 and df=4, the t table is from -2.306 to 2.306. The t count (6.690) is outside the two values of the t table, so the result is reject H_0 and accept H_A. From the p-value = 0.000 < α = 0.05, the result is reject H_0 and accept H_A. Overall, the hypothesis test shows that there is an impact of DFS in the total revenue of agriculture enterprises in Hungary.

4.4 Hypothesis Testing for Total Variable Cost

Below is the SPSS result for the impact of DFS on the total variable cost of agriculture enterprises in Indonesia.

Table 76. SPSS result of DFS on total variable cost of agriculture enterprises in Indonesia

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.156[a]	.024	-.219	66355222.89

a. Predictors: (Constant), DFS_Indonesia

Coefficients[a]

Model		Unstandardized B	Coefficients Std Error	Standard Coefficients Beta	t	Sig.
1	(Constant)	236865379.7	270947300.8		.874	.431
	DFS_Indonesia	-2772541031	8757651177	-.156	-.317	.767

a. Dependent Variable: Cost_Indonesia

Source: SPSS 20.0 (2020)

From table 76 above, the equation for the simple linear regression is as follows:

Total Variable Cost Indonesia = 23,685,379.7 – 2,772,541,031 DFS

Which means, an increase of 1 unit of DFS will result in a decrease of total variable cost of 2,772,541,031.

The correlation coefficient (r) is 0.156, which shows there is a weak relationship between DFS and the total variable cost of agriculture enterprises in Indonesia (interval 0,000 – 0,199). The coefficient of determination (R-square) is 0.024 or 2.4% which shows that the contribution of DFS on the total variable cost of agriculture enterprises in Indonesia is low.

The hypothesis testing is as follows:

H_{03} : There is no impact of DFS in the total variable cost of agriculture enterprises in Indonesia

H_{A3} : There is an impact of DFS in the total variable cost of agriculture enterprises in Indonesia

Confidence level = 95%

The results show a t-count of -0.317 and a p-value of 0.767. From the distribution table of t, with α=0.05 and df=4, the t table is from -2.776 to 2.776. The t count (-0.317) is between the two values of the t table, so the result is accept H_0 and reject H_A. From the p-value = 0.767 > α = 0.05, the result is accept H_0 and reject H_A. Overall, the hypothesis test shows that there is no impact of DFS on the total variable cost of agriculture enterprises in Indonesia.

Below is the SPSS result for the impact of DFS on the total variable cost of agriculture enterprises in Hungary.

Table 77. SPSS results for DFS on total variable cost of agriculture enterprises in Hungary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.876[a]	.768	.739	71700.52267

a. Predictors: (Constant), DFS_Hungary

Coefficients[a]

Model		Unstandardized B	Coefficients Std Error	Standard Coefficients Beta	t	Sig.
1	(Constant)	51588.803	274577.767		.188	.856
	DFS_Hungary	2621566.726	509296.669	.876	5.147	.001

a. Dependent Variable: Cost_Hungary

Source: SPSS 20.0 (2020)

From table 77 above, the equation for the simple linear regression is as follows:

Total Variable Cost Hungary = 51,588.803 + 2,621,566.726 DFS

Which means, an increase of 1 unit of DFS will result in a increase of total variable cost of 2,621,566.726.

The correlation coefficient (r) is 0.876, which shows there is a strong relationship between DFS and the total variable cost of agriculture enterprises in Hungary (interval

0,700 – 0,899). The coefficient of determination (R-square) is 0.768 or 76.8% which shows that the contribution of DFS on the total variable cost of agriculture enterprises in Hungary is high.

The hypothesis testing is as follows:

H_{04} : There is no impact of DFS in the total variable cost of agriculture enterprises in Hungary

H_{A4} : There is an impact of DFS in the total variable cost of agriculture enterprises in Hungary

Confidence level = 95%

The results show a t-count of 5.417 and a p-value of 0.001. From the distribution table of t, with α=0.05 and df=4, the t table is from -2.306 to 2.306. The t count (5.417) is outside the two values of the t table, so the result is accept H_0 and reject H_A. From the p-value = 0.001 < α = 0.05, the result is accept H_0 and reject H_A. Overall, the hypothesis test shows that there is an impact of DFS on the total variable cost of agriculture enterprises in Hungary.

4.5 Hypothesis Testing for Gross Margin

Below is the SPSS result for the impact of DFS on the gross margin of agriculture enterprises in Indonesia.

Table 78. SPSS results for DFS on gross margin of agriculture enterprises in Indonesia

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.313[a]	.098	-.128	6290893.340

a. Predictors: (Constant), DFS_Indonesia

Coefficients[a]

Model		Unstandardized B	Coefficients Std Error	Standard Coefficients Beta	t	Sig.
1	(Constant)	25550721.00	25687511.79		.995	.376
	DFS_Indonesia	-547219541	830280527.5	-.313	-.659	.546

a. Dependent Variable: GrossMargin_Indonesia

Source: SPSS 20.0 (2020)

From table 78 above, the equation for the simple linear regression is as follows:

Gross Margin Indonesia = 25,550,721 – 547,219,541 DFS

Which means that an increase of 1 unit in DFS will result in a decrease of gross margin of 547,219,541.

The correlation coefficient (r) is 0.313, which shows there is a weak relationship between DFS and the gross margin of agriculture enterprises in Indonesia (interval 0,200 – 0,399). The coefficient of determination (R-square) is 0.098 or 9.8% which shows that the contribution of DFS on the gross margin of agriculture enterprises in Indonesia is low.

The hypothesis testing is as follows:

H_{05} : There is no impact of DFS in the gross margin of agriculture enterprises in Indonesia

H_{A5} : There is an impact of DFS in the gross margin of agriculture enterprises in Indonesia

Confidence level = 95%

The results show a t-count of -0.659 and a p-value of 0.546. From the distribution table of t, with α=0.05 and df=4, the t table is from -2.776 to 2.776. The t count (-0.659) is between the two values of the t table, so the result is accept H_0 and reject H_A. From the p-value = 0.546) > α = 0.05, so the result is accept H_0 and reject H_A. Overall, the hypothesis test shows that there is no impact of DFS in the gross margin of agriculture enterprises in Indonesia. Below is the SPSS result for the impact of DFS on the gross margin of agriculture enterprises in Hungary.

Table 79. SPSS results for DFS on gross margin of agriculture enterprises in Hungary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.923[a]	.851	.832	80605.55061

a. Predictors: (Constant), DFS_Hungary

Coefficients[a]

Model		Unstandardized B	Coefficients Std Error	Standard Coefficients Beta	t	Sig.
1	(Constant)	-1140236.959	308679.648		-3.694	.006
	DFS_Hungary	3870779.516	572550.059	.923	6.761	.000

a. Dependent Variable: GrossMargin_Hungary

Source: SPSS 20.0 (2020)

From table 79 above, the equation for the simple linear regression is as follows:

Gross Margin Hungary = -1,140,236.959 + 3,870,779.516 DFS

Which means that an increase of 1 unit in DFS will result in a increase of gross margin of 547,219,541.

The correlation coefficient (r) is 0.923, which shows there is a strong relationship between DFS and the gross margin of agriculture enterprises in Hungary (interval 0,900 – 0,999). The coefficient of determination (R-square) is 0.851 or 85.1% which shows that the contribution of DFS on the gross margin of agriculture enterprises in Hungary is high.

The hypothesis testing is as follows:

H_{06}: There is no impact of DFS in the gross margin of agriculture enterprises in Hungary

H_{A6}: There is an impact of DFS in the gross margin of agriculture enterprises in Hungary

Confidence level = 95%

The results show a t-count of 6.761 and a p-value of 0.000. From the distribution table of t, with α=0.05 and df=4, the t table is from -2.306 to 2.306. The t count (6.761) is outside the two values of the t table, so the result is reject H_0 and accept H_A. From the p-value = 0.000) < α = 0.05, so the result is reject H_0 and accept H_A. Overall, the hypothesis test shows that there is an impact of DFS in the gross margin of agriculture enterprises in Hungary.

4.6 Results

From the questionnaire analysis, the results are used to find out about the factors affecting the application of DFS in agriculture enterprises in Indonesia and Hungary. The results show the significant factors of DFS application in agriculture cooperatives in Indonesia and Hungary, and summarized in table 80. The results also show what are the main constraints of agriculture enterprise development and also the important features of DFS.

Table 80. Summary of the questionnaire analysis

No	Section	Variables	Sub variables	Significance
1	Socio-economic factors	Gender		Yes
		Age		Yes
		Education		Yes
		Involvement in agriculture		Yes
		Connection to farm		Yes
		Years of involvement in agriculture		Yes
		Farming as a primary occupation		Yes
2	Agriculture enterprises and farming activities	Main agriculture products		No
		Types of agriculture enterprises		Yes
		Farm inputs		Yes
		Farm size		Yes
		Farm turnover		Yes
		Costs of farming compared to turnover		Yes
		Benefits from the agriculture enterprise	Better possibilities to expand the agriculture production	Yes
			The agriculture enterprise operates in a nearby region	Yes
			The agriculture enterprise offers good service for the members	No
			The agriculture enterprise offers a stable market price	No
			The agriculture enterprise offers a stable market channel	Yes
			Membership secures the marketing of products	Yes
			The agriculture enterprise provides easy access to credit to members	Yes
			The agriculture enterprise increases the income of members	Yes
			The agriculture enterprise provides education and training to members	Yes
		Constraints		Yes

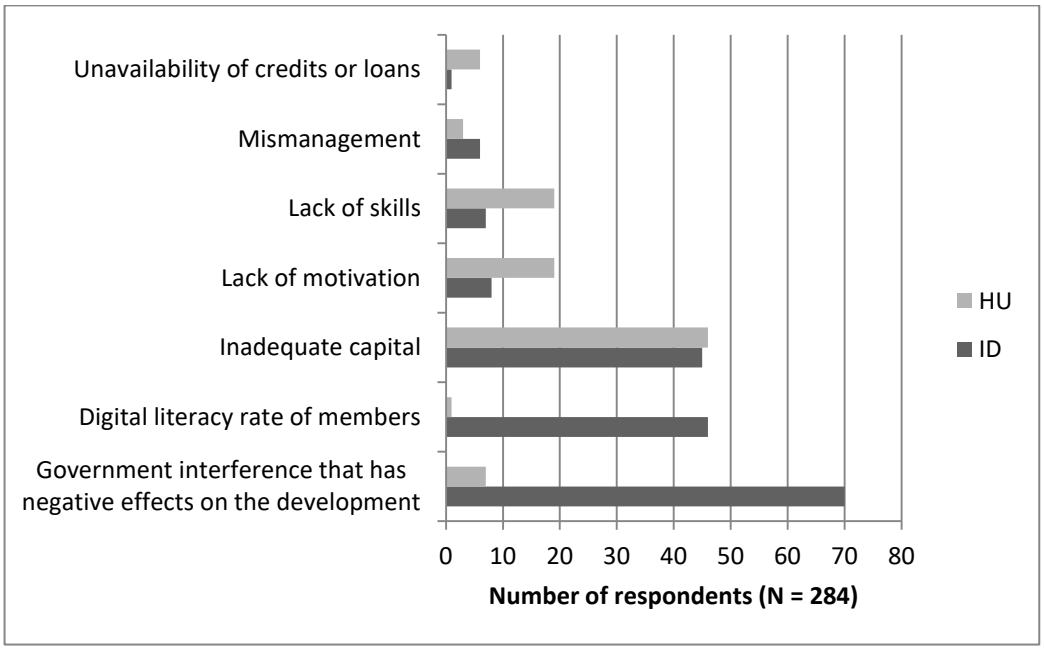
Table 80. (continued)

		Own a bank account		No
		Financial support for funding agriculture activities		Yes
		Percentage of funds	National bank and/or EU	Yes
			Regional bank	Yes
			Private bank	Yes
			Own source	Yes
			Other source	Yes
		Benefits from banks	Easy to use service	Yes
			Quality of service	Yes
			Greater value from banks	No
			Own bank offers the most value compared to other banks	Yes
			Transparency on fees	No
			Bank knows the customers' needs	No
		Frequency of use	Bank branch office	Yes
			ATM	Yes
			Call center	No
			Online banking	Yes
			Mobile apps	Yes
3	DFS	Preferred channel	Credit cards	Yes
			Debit cards	Yes
			Transaction/checking accounts	Yes
			Savings/deposit accounts	Yes
			Personal loans	Yes
			Wealth management	Yes
			House loans	Yes
			Mortgage/mortgage refinance	Yes
		Types of transactions	Transfers within same bank	Yes
			Transfers with other banks	Yes
			Bill payments	Yes
			Balance inquiries	Yes
			Update account details	Yes
			Inquiry of bank services	Yes
			File complaints	Yes
			Apply for loans/credits	Yes
			Transaction disputes	Yes
			Lost/stolen cards	No
		Important features of DFS		Yes

Source: Researcher's questionnaire, 2020

From the questionnaire analysis result summary (table 80), it shows that in Indonesia, being a member of an agriculture enterprise helps increase income as well as provide good service for the members, such as providing marketing channels and with competitive product pricing. For the members, the most important aspect they look for as

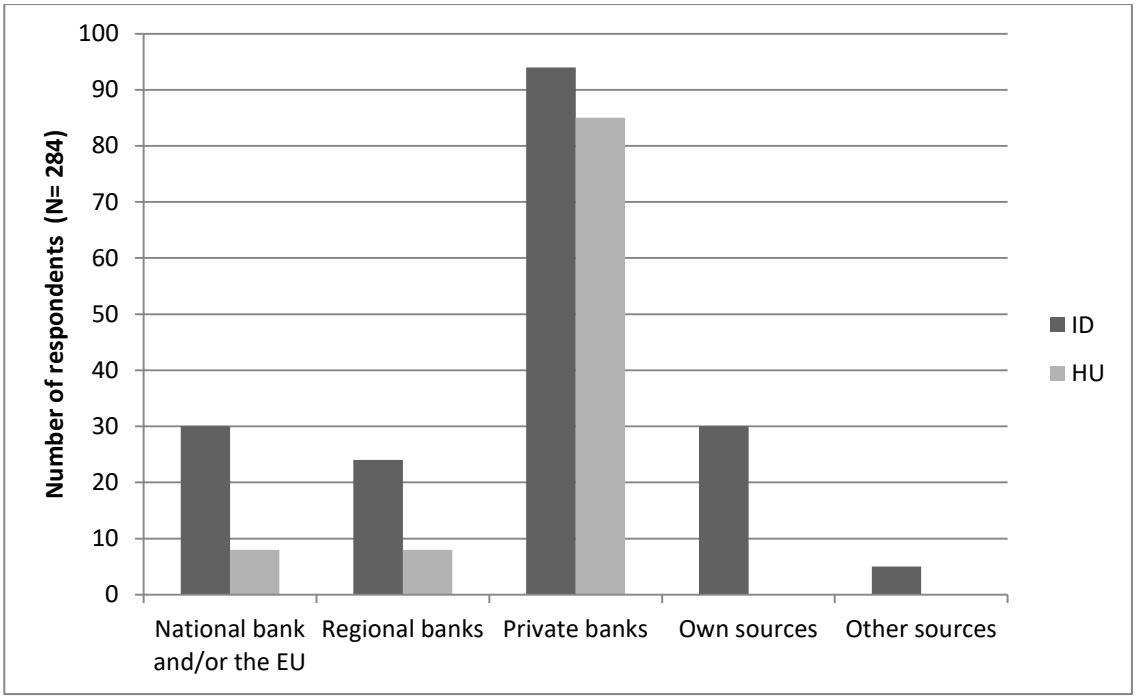
a member of an agriculture enterprise is a secure market for the agriculture products with a fair price. Agriculture enterprises in the form of cooperatives have a positive image and respondents' answers show that there are benefits to be a member of the agriculture enterprises in general. However, there are constraints to the development of agriculture enterprises, which is highlighted in *fig. 16*.



Source: Researcher's survey

Figure 16. Constraints to Agriculture Enterprise Development

Also, the role of financial institutions to promote digital finance and access to credits are important, especially as most agriculture smallholder farms are located in rural areas. It is important that financial insitutions are able to reach out to these areas and the use of digital finance will certainly help the rural areas to gain more access. Wulandari et al. (2017) has mentioned that farmers generally have little knowledge of the requirements, which are important to each type of finance provider. It can be seen in the source of funding for agriculture enterprises, where respondents in both countries, Indonesia and Hungary, go to private banks. In Indonesia, respondents also consider source of funding from own sources and other sources (although they do not want to be disclosed what type ot other sources of funding in detail) in contrast to Hungary, which had none. *Fig. 17* highlights the majority of source of funds for agriculture enterprises.

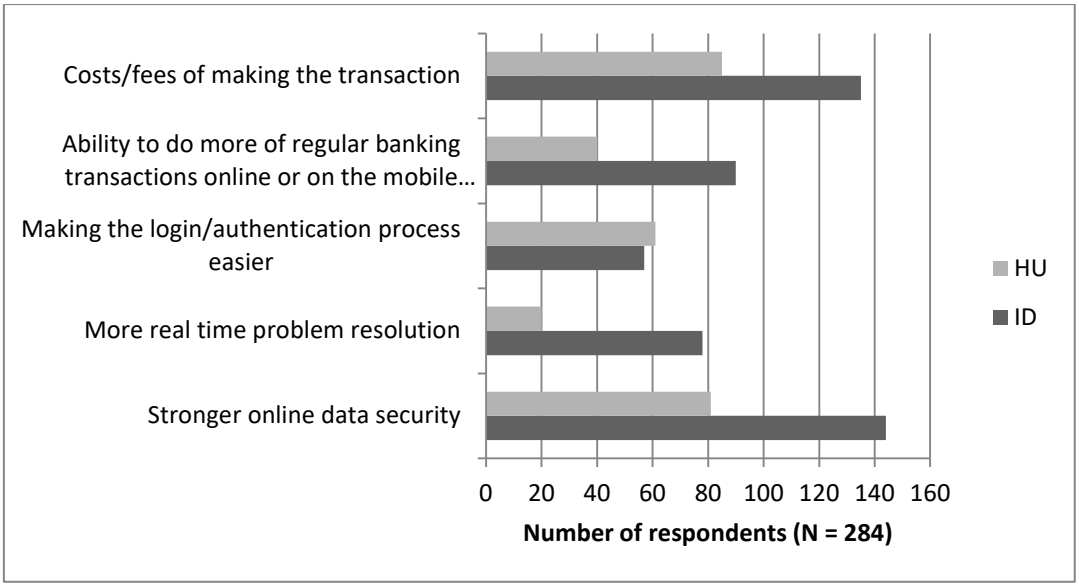


Source: Researcher's survey

Figure 17. Sources of Funding for Agriculture Enterprises

Regarding the constraints in agriculture and farming activities, respondents in Indonesia mentioned that government interference sometimes have a negative effect on the development of agriculture. While for the three most important features of DFS (*fig. 18*), respondents in Indonesia would like (1) a stronger online security, (2) costs or fees of making the transactions, i.e. the transparency of the banks to disclose transactions fees beforehand, and (3) availability of more features in online banking or mobile apps.

In Hungary, respondents acknowledged that agriculture enterprises actually help to provide a stable market channel, competitive producer prices and should be able to provide good services for members. In Hungary's case, the agriculture enterprise is in the form of corporations and smallholder farms. Despite the image in Hungary that agriculture enterprises in the form of cooperatives are not really positive, respondents in this survey said that there are still benefits in joining an agriculture enterprise. However, there are also constraints in Hungary for the development of agriculture enterprises, mainly from inadequate capital. Respondents in Hungary (*fig. 18*) also mentioned the three most important features of DFS that they would like to see improvements, such as: (1) stronger online security, (2) costs or fees of making the transactions, i.e. the transparency of the banks to disclose transactions fees beforehand, and (3) easier login/authentication process.



Source: Researcher's survey

Figure 18. Important Features of DFS

For the hypotheses testing, the results are as follows. For Indonesia, the results concluded that there is no impact in the application of DFS on the total revenue, total variable costs and gross margin of agriculture enterprises, as the regression accepted all of the null hypotheses. While for Hungary, the regression results concluded that there is an impact in the application of DFS on the total revenue, total variable cost and gross margin of agriculture enterprises, as the regression accepted all alternate hypotheses. Table 81 presents a summary of the hypotheses results.

In summary, the DFS application in agriculture enterprises is significant in Hungary, while in Indonesia, the DFS application in agriculture enterprises in not significant. The results complement the article by Trendov et al. (2019) regarding significant disparities in the adoption of digital agriculture technologies between developing countries and developed countries. Factors include financial resources and education levels, which have a great influence in the adoption of modern agriculture technologies. Smallholder farmers in rural areas are at a disadvantage with limited access to infrastructure, networks, and technology.

Table 81. Summary of Acceptance of Hypotheses

No	Hypotheses	Result
1	H_{01}: There is **no impact** of DFS in the **total revenue** of agriculture enterprises in Indonesia	**Accepted**
2	H_{A2}: There is **an impact** of DFS in the **total revenue** of agriculture enterprises in Hungary	**Accepted**
3	H_{03}: There is **no impact** of DFS in the **total variable cost** of agriculture enterprises in Indonesia	**Accepted**
4	H_{A4}: There is **an impact** of DFS in the **total variable cost** of agriculture enterprises in Hungary	**Accepted**
5	H_{05}: There is **no impact** of DFS in the **gross margin** of agriculture enterprises in Indonesia	**Accepted**
6	H_{A6}: There is **an impact** of DFS in the **gross margin** of agriculture enterprises in Hungary	**Accepted**

Source: Researcher's own construction

The low and relatively constant percentage of DFS use in agriculture enterprises in Indonesia derived from the following issues:

1. Although the development of the internet is very fast with a growing number of internet users annually, the application of DFS is more widespread in urban areas compared to rural areas, where agriculture enterprises are mostly located.
2. DFS in agriculture enterprises are still in development, and some are still in tryouts for smallholder farmers up to 5 hectares of farmland area. In addition, smallholder farmers think neither sources of funding from physical banks nor through DFS has made any difference. From the survey results, backed up by the report of APEC Minister Process Report on Agriculture (2017), unsurprisingly farmers in Indonesia expressed a distrust in banks and mobile money, and preferred to continue to be paid in cash. This also explains the hypotheses results for Indonesia that showed DFS has no impact on the profitability of agriculture enterprises. However, agriculture enterprises are interested in DFS, particularly digital payments, By working as a link to the farmers and finance providers, the agriculture enterprise could build a digital ecosystem and use existing information services to educate farmers about digital literacy, as well as the time and cost savings by using DFS.
3. There are also structural problems, as cited by Adam (2012), such as (a) the dissemination of information to rural areas and communication problems between the bank and the agriculture sector, (b) the difference in funding schemes for modern agribusiness corporations versus smallholder farmers, and (c) financial policies from banks that are not supporting the agriculture sector.

With an estimated 57m ha of agricultural lands, farming has long been the backbone of Indonesia's economy. From small-scale farming to large commercial plantations, the sector employs around one-third of the workforce, is an important source of income for local households and has contributed much-needed export revenue. While the implementation of dynamic reforms has triggered an increase in farming output, progress in the sector continues to be hindered by an underdeveloped downstream segment, as well as the inability of smallholder farmers to capture growing international demand. In terms of structure, Indonesia's agricultural sector consists of two types of production: large-scale plantations under the guidance of the government or private investors, and smallholders using traditional farming methods. The latter tend to focus on horticultural commodities, while large plantations dominate leading exports such as palm oil, although a recent shift has seen smallholders increasingly account for a dominant share in other exports such as rubber. As it stands, rural income is predominately generated by small-scale growers who lack access to finance and technology, which hinders their commercial viability. In terms of the labour market, agriculture has historically played a pivotal role in the economy, though data from Statistics Indonesia (BPS) indicates that the percentage of Indonesians working in the sector is decreasing, falling from 55.1% in 1990 to 31.9% in February 2017. Even though Indonesia already applied an Agricultural Innovation System, it has not yet been maximized.

Agriculture is a traditionally important sector in the Hungarian economy, as the country has favorable conditions for many types of farming, and about 70% of the land area is suitable for agricultural production. Despite these facts, the share of agriculture in the economy has been decreasing. However, Hungary's 4.3% agriculture value added is still the third highest among EU-countries, and the sector employs 5.2% of the work force. Internet usage is high among the population, and the majority of households have an internet subscription. The country is lagging behind in terms of mobile broadband subscription, mainly caused by the affordability of the service. However, according to FAO report in 2018, in terms of DFS, Hungary has applied the Hungarian Integrated Administration and Controls System (IACS) which is set up and operated by the ARDA (Agricultural and Rural Development Agency = Hungarian paying agency). The IACS data system consists of the Land Parcel Identification System (MePAR), Identification system for farmers, Identification system for payment entitlements, System for identification and registration of animals (cattle, sheep, and goat). The Integrated control system supports administrative control, Control with Remote Sensing (CwRS) and on the

spot checks with area measurement. In Hungary the ARDA also operates the customer recording system, the recording and checking systems aimed at managing the measures, the national GIS records on vinelands, the intervention store register, the records system of low amount agricultural supports, the monitoring data recording system. Promoting the benefits of digital transformation, focusing on SMEs and major sectors that lag a long way behind is also mentioned by Novak et al. (2018) stated in the digital challenges in Central and Eastern Europe.

4.7 New Scientific Contribution

The analysis of DFS impact in profitability reveals that the application of DFS in agriculture enterprises has an impact on profitability. This makes sense in the comparison of Indonesia and Hungary. The survey supported the theses, where it gave indications that DFS in Indonesian agriculture sector is still in its preliminary stage and not widely used, while in Hungary, DFS is applied in the agriculture sector for most of the daily agriculture operations. The challenge of DFS development for Indonesia and Hungary is to use mobile apps to be more cost-efficient, and it is an opportunity for the internet or phone providers to expand the scope of internet infrastructure to reach the rural areas with lower subscription rates.

The new scientific contribution is a summary from the hypotheses results, survey, literature review, and researcher's own observation. It can be listed as follows:

1. Smallholder farmers in Indonesia and Hungary are the main stakeholders for DFS. Farmers lack reliable, cost-effective methods for storing, transferring, or moving with their funds. Cash-based transactions are likely the norm. **Access to digital technology is made possible only via mobile devices, which are usually low-cost basic or feature phones.**
2. As the DFS in the agriculture sector in Indonesia is still in its preliminary phase, the first step is to introduce DFS for smallholder/family farmers in Indonesia and in the form of **digital payments**. This is also applicable to Hungary. The survey showed that sources of funding for agriculture enterprises mainly come from private banks (Indonesia 51%, Hungary 85%). Therefore private banks should take advantage of the opportunities to reach this agriculture customer group. Particularly in rural markets, payment service providers (banks) and mobile money operators (phone and internet providers) could integrate payment platforms to the rural economies by adding value to DFS offerings targeting the agriculture sector. As a consequence, **digital payments**

are the crucial step to provide financial services in a sustainable, profitable manner.

3. The survey showed main constraints to overcome in agriculture enterprise development. Governments and international stakeholders have important roles to play in agricultural productivity, efficiency and resilience to the stresses of climate change, the private sector and especially financial service providers are essential. The government, particularly ministries of agriculture and finance, should include in their policies to develop agriculture areas (i.e. rural areas), which is more achievable in the short run. **Policies to reinforce DFS and improving farmers' skills** to manage production will be a contribution to long-term agricultural productivity growth and poverty reduction. Without the introduction of capital and investment in financial services for the agriculture sector, it will continue to underperform.
4. Based on the results of the hypotheses analysis, there are 4 factors that influence the impact of DFS in agriculture enterprises: adoption level of DFS, total revenue, total variable cost, and gross margin. So it can be concluded that the higher the adoption level of DFS, the bigger the impact on profitability. Respondents in the survey mentioned that low adoption level of DFS is caused by digital inequalities, such as the lack of information, training and advice on the use of DFS, access to financial services, lack of financial resources, and the adoption of technical components/internet infrastructure. The most feasible way to improve the profitability of agriculture enterprises is to **familiarize the farmers with DFS through education and training**, as well as **expanding the internet infrastructure to be accessible in rural areas.**
5. Promoting the benefits of digital transformation is one of the digital challenges mentioned by Novak et al. (2018) regarding the digital challenges in Central and Eastern Europe. Hungary's method of using agriculture enterprises to promote training for farmers could be helpful in the case of Indonesia, as agriculture enterprises still have a major role in the agriculture sector. The 'secret' of this success is that the majority of the farmers are assisted or fully served by the state village agents' network and the private advisors, i.e. agriculture enterprises. The method used in Hungary could be applied to Indonesia by enhancing the role of **agriculture enterprises as a link between DFS and the smallholder /family farmers** to introduce and apply digital technologies.

4.8 Limitations

In the framework of the situation, there is a constraint in the definition of cooperatives and agriculture enterprises. The definition, the structure, and the law of cooperatives are different in Indonesia and Hungary. In Indonesia it is stated in the consitution and also in the laws regarding cooperatives, and the definition is quite clear. In Hungary, there is no clear definition of a precise business form regarding cooperatives. Even though in practice the term “cooperatives” are used in most situations, the way people run the agriculture business is somewhat similar to an enterprise or corporation, rather than pure cooperatives. It is due to the situation in Hungary where people have a negative image with cooperatives during the socialist era. However, to make a general understanding about the research, the term “agriculture enterprise” is applied to all types of business forms involved in agriculture, including cooperatives.

There is also a limitation to gross margin as a profitability measure. The calculation of a gross margin is the essential first step in agriculture budgeting and planning. It enables direct comparison to the relative profitability of similar enterprises, and consequently provides a starting point for decision-making. Gross margins can be used to analyse actual enterprise performance. Major differences may be explained by particular farm characteristics, but may also indicate areas of potential improvement. Gross margins are a valuable aid in agriculture planning but they should be by no means the sole determinant of profitability. However, due to the availability of secondary data, gross margin is accounted for in farm databases, so it is also the reason why gross margin is taken as a measurement.

As for the survey, it was relatively easier to get respondents from Indonesia compared to Hungary. One main constraint was the language, and even though the survey questions have been translated to Hungarian, convincing people to fill in the online survey proved to be difficult. For Indonesia, the target respondents usually work in the rural areas and therefore may not be able to fill in online surveys. It is required to meet face-to-face meetings with these people, and the researcher only spent two months’ time in Indonesia during the study period, which was insufficient to go to rural areas and organize direct interviews on the survey. The data collected in the survey is conducted from online surveys in several agriculture cooperatives in the area where the researcher lives, and it was a bit difficult to get feedback from online surveys.

Regarding the secondary data, in Hungary there is a limited possibility to obtain relevant and recent data on agriculture enterprises in general and especially regarding agriculture. The literature review for agriculture and digital finance are mostly written in Hungarian, and it presents difficulties in this study to explore further. In terms of secondary data, data regarding agriculture enterprises are available (published by CSO for example) only together by other "economic organisations" (in Hungarian "*gazdasági szervezetek*") which category includes investor oriented firms (e.g. corporations, Ltd etc.). It is not good from many points, one of the pitfalls is that some agriculture enterprises are not competitors to (family) farms, but they extend the farmers' activities and help them to compete exactly against the share holding companies. To get the right number of agriculture enterprises per sector is also very hard. For Indonesia, secondary data obtained from the Ministry of Agriculture and the statistics office are not updated accoardingly; Indonesia is a huge country and to collect data from all 34 provinces is not easy even though the provinces have their own statistics office to compile all the agriculture data for the year. Besides agriculture data, the statistics office in each province also compiles data from other sectors and to send it to the central statistic office in Jakarta. The whole process may take a lot of time and it is impossible to get the most recent data for the use of this research.

It is also a huge problem, that data on agriculture enterprises from different sources may not be the same in most of cases. For example, data accessed through the Research Institute of Agricultural Economics (AKI) and the Ministry of Rural Development are different. However, according to the researchers of AKI, there is no statistics regarding each sector and also they can not differentiate between production and marketing type agriculture enterprises.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From the analysis in chapter 4, the conclusions are the answers to the following research questions in chapter 3:

RQ1: What are the factors affecting the application of DFS in agriculture enterprises?

From the questionnaire analysis, the affecting factors are as follows: For the **socio-economic section,** all of the factors are **significant** in the application of DFS in agriculture enterprises in Indonesia and Hungary.

In the agriculture enterprises and farming activities section, for Indonesia and Hungary, all of the factors are **significant**, except for: (1) main agriculture products, (2) the agriculture enterprise does not provide good service, and (3) the agriculture enterprise does not provide a stable market price. The main constraint for agriculture and farming activities in Indonesia is government interference that has negative effects for the agriculture development, while in Hungary the main constraint is inadequate capital.

In the DFS section, for Indonesia and Hungary, all of the factors are **significant**, except for: (1) owning a bank account, (2) banks do not deliver greater value, (3) banks are not transparent in fees, (4) banks do not know what the customers need, (5) the frequency of using call centers is low or non-existent, and (6) reports for lost/stolen debit/credit cards. It indicates that banks, or finance providers, are not connected to the agriculture sector, especially in rural areas.

The most important features for the development of DFS application in Indonesia are:

1. Stronger online security;
2. Costs or fees to make transactions, i.e. transparency of banks to disclose transaction fees;
3. More features in online banking and mobile apps.

For Hungary, the most important features for the development of DFS application are:

1. Stronger online security;
2. Costs or fees to make transactions, i.e. transparency of banks to disclose transaction fees;
3. Making the login/authentication process easier.

RQ2: In the real situation, is there an impact on the profitability regardless of the agriculture enterprises use or do not use digital financial services?

The results for Hungary show that the application of DFS in agriculture enterprises is **significant**, which means that DFS has an impact on profitability. On the other hand, for Indonesia, the application of DFS in agriculture enterprises is **not significant**, which means that the application of DFS has very little or no impact on the profitability. The hypotheses were justified by the current situation in Hungary and Indonesia. As Hungary has a functional e-agriculture strategy and a digital platform for agriculture, clearly the application of DFS has an impact on profitability. The use of DFS in Indonesia's agriculture sector has not been fully implemented. According to the survey, there is a distrust on digital payments and mobile money among smallholder farmers which explains their indifference to DFS, thus justifies the hypotheses that DFS has no impact on profitability.

RQ3: What suggestions are useful to bridge the gap between DFS application and increasing the profitability in agriculture enterprises?

One of the main benefits of DFS in Hungary is the elimination of administrative or technical error in the submitted claims, which also means that the farmers can receive the agriculture subsidies in a timely manner. However, Hungary is lagging behind in terms of mobile broadband subscription, mainly caused by the affordability of the service. The survey results showed that the majority of respondents prefer online banking to mobile apps, as opposed to Indonesia. For Hungary this is considered as a constraint to the expansion of DFS and it is suggested that the government could provide affordability of mobile broadband services to better serve the rural areas.

On the other hand, Indonesia already has a good internet base and a strong agriculture enterprise base, and also the image of agriculture enterprises remains positive among farmers. However, in rural areas where the majority of farmlands is located and banks are not easily accessible. Therefore internet access combined with training and funding schemes for smallholders through digital payments is a step towards DFS. Farmers could receive payments and government subsidies faster without going through a lot of bureaucracy which creates potential corruption, and using hi-tech could attract younger people to work in the agriculture sector.

5.2 Recommendations

The research does not state that DFS in agriculture must lead to positive impacts regardless of geographic location or other factors. At the same time, there are reasons to be optimistic as encouraging trends continue to emerge across a range of market contexts. The main motivation for this research comes from a practical value of promoting deeper comprehension and capacity to better serve the agriculture sector through DFS offerings in the markets where they operate.

For Indonesia, the long-term challenge is to establish agriculture banks, as mentioned by Adam (2012) which has proved successful in reaching the smallholder farmers in countries such as Malaysia, Taiwan, Thailand, Nigeria, the Netherlands and France. Agriculture banks, which are located in rural areas, should provide a proximity to the users, who are farmers, for easy and formal access to agriculture funding. One way to promote the development of agriculture banks is to have a complete database of smallholder farmers in the country. This will be a big challenge as Indonesia is a big country in terms of area and population. A more feasible solution is applying the DFS system in Hungary to fit the DFS implementation in Indonesia as a future research project between Indonesia and Hungary, which could enhance bilateral cooperation. In addition, some farmers in Indonesia also mentioned that they would participate if agriculture enterprises provide education and training for digital farming.

In order to get more insight of the study, it is preferable to conduct a further research as a research project involving a team of researchers from Indonesia and Hungary. There is also a possibility for more in-depth studies on what factors influence the application of DFS, or factors that involves financial institutions into giving funds for the agriculture sector. If the research would use a survey again, it would be more feasible to do it as a team of Indonesian and Hungarian researchers, and with external research funding to achieve a broader scope, e.g. how to apply Hungary's model of DFS application in Indonesia. It could be a joint project for bilateral cooperation. However, it is not possible to do that for the dissertation due to the constraints mentioned and limited resources.

The practical implication is that this research can be used as a reference for decision makers to facilitate the process of rejuvenating agriculture enterprises with supporting incentives and regulations. In addition, this research could help the idea to build further research in the agriculture sector so that agriculture enterprises remain relevant to the changing times.

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APPENDICES

Appendix 1: Survey Questions

QUESTIONNAIRE FOR DOCTORAL THESIS:

The Impact of Digital Financial Service on the Profitability of Agriculture Enterprises
A Comparison Study in Hungary and Indonesia

Survey: Online questionnaire, direct surveys, interviews (complementary)

Geographical scope: Hungary and Indonesia

Who should complete the survey: stakeholders in agriculture, including entities/individuals (companies, research centers, farmers, associations, academicians, etc.) who are either participating in an agriculture cooperative or are connected to agriculture in general.

The objective of the survey is to find out the activities of agriculture enterprises and the use of digital financial services in general for mapping purposes.

More information
Digital financial services (DFS) have emerged as a powerful tool to expand access to the formal financial system, building on of the rapid growth of digital and mobile telephone infrastructure and the advent of branchless banking (which offers the ability to transact outside of a traditional bank branch). From this perspective, agriculture enterprises can utilize the potential to drastically reduce distances between financial institutions and the location of the agriculture regions, especially in hard-to-reach areas, enabling transactions at a fraction of the cost relative to conventional brick-and-mortar operations. DFS represents an opportunity for efficiency by cost reduction and therefore increase the profit margin for the agriculture enterprise.

Part 1: Socio-economic variables

1. Gender:
    - Male
    - Female

2. Age:
    - Less than 25 years old
    - 25 to 50 years old
    - More than 50 years old

3. Education:
    - Elementary school
    - High school
    - Vocational
    - University degree (undergraduate) – BS, BA
    - University degree (graduate) – MA, MS
    - Other academic or scientific degree: ……. (Please specify)

4. Are you involved in agricultural production? If your answer is NO, then jump to question number 16 (part 3: digital financial services).

- Yes
- No

5. Are you connected to the farm area as:
    - Individual farmer
    - Family
    - Cooperative farm
    - Private company
    - Public corporation
    - Government enterprise
    - Partnership
    - Other: ……. (please specify)

6. Years of involvement in agriculture:
    - Less than 1 year
    - 1 to 5 years
    - 6 to 10 years
    - 11 to 15 years
    - 16 to 20 years
    - More than 20 years

7. Is farming your primary occupation?
    - Yes
    - No

Part 2: Agriculture cooperative and farming activities

8. What is the main agriculture product in your farm?
    - Plant products
    - Animal products
    - Both plant products and animal products

9. Types of cooperatives involved in your farming activities:
    - Producers cooperative
    - Input supply
    - Product sales and marketing
    - Credit cooperative
    - Consumers cooperative
    - Other: ……. (please specify)
    - Not involved

10. Farm inputs purchased from cooperatives (if any):
    - Seeds
    - Fertilizers
    - Agro-chemicals
    - Farm implements and spare parts
    - Other: ……... (please specify)

11. Farm size in hectares (ha):
    - 0 to 10 ha
    - 10.01 to 50 ha
    - 50.01 to 100 ha

- 100.01 to 250 ha
- 250.01 to 500 ha
- 500.01 to 1,000 ha
- 1,000.01 to 1,500 ha
- > 1,500 ha

12. Farm turnover (in EUR):
    - 0 to 1.000.000
    - 1.000.001 to 50.000.000
    - 50.000.001 to 100.000.000
    - 100.000,001 to 150.000.000
    - 150.000.001 to 200.000.000
    - 200.000.001 to 250.000.000
    - 250.000,001 to 300,000.000
    - 300.000,001 to 350,000.000
    - 350.000,001 to 400.000,000
    - > 400.000.000

13. What is your opinion about the costs of farming activities in comparison with turnover?
    1. Very low 2. Low 3. Moderate 4. High 5. Very high

14. What does cooperative membership mean to you as a cooperative member or as an individual?
    Benefits to members provided by the cooperatives:

No	Benefits	1 Not important at all	2 Less important	3 Neutral	4 Important	5 Very important
1	Better possibilities to expand my agricultural production					
2	The cooperative operates in the nearby region					
3	The cooperative offers good service for the members					
4	The cooperative pays a competitive producer price					
5	The cooperative offers a stable market channel					
6	Membership secures the marketing of products					
7	The cooperative provides easy access to credit to members					
8	The cooperative increases the income of members					
9	The cooperative provides education and training for its members					

15. What do you think are the constraints to cooperative development? (You can choose MAXIMUM 3 answers which are the most important):
    - Inadequate capital accumulation
    - Unavailability of loans/credits

- Mismanagement
- Lack of skills
- Lack of motivation
- Government interference that has negative effects on the development
- Literacy rate of members (for Indonesia only)
- Digital literacy of members
- Other: ……. (please specify)

Part 3: Digital financial services

16. Do you, as an individual OR as a cooperative member, have a bank account?
    - Yes
    - No

17. Where do you get financial support (e.g. credits, loans, etc.) to finance your activities? Please state the approximate percentage in the box.

No	Source of financial support	%
1	National government or the EU	
2	Regional government	
3	Private banks	
4	Own sources	
5	Other sources (not 1,2,3 or 4)	
	Total	**100%**

18. How well do the following phrases describe your primary bank?

No	Description	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
1	Makes it easy for me to use their services					
2	The good quality of the services of the bank					
3	Routinely looks for ways to improve my experience of deliver greater value					
4	Offers the most value compared to the same types of services					
5	Is transparent on service terms and fees					
6	Knows what the customer needs					

19. What is your most preferred channel for banking activities?
    - Online banking
    - Mobile banking
    - Both online and mobile banking
    - Personal contact
    - Through a financial service provider or accountant

20. How often do you use these channels to access your bank? Tick (✓) on the appropriate options:

No	Frequency	Bank branch/ office	ATM	Call center	Online banking (PC, tablet, laptop)	Mobile apps (Mobile phone)
1	Never					
2	Once a month					
3	2-5 times a month					
4	6-9 times a month					
5	10 or more times a month					

21. Which channel would you prefer to use to apply for the following bank services? Tick (✓) on the appropriate options.

No	Bank services	A. Online banking (PC, tablet, laptop)	B. Mobile apps (Mobile phone)	C. Personal contact
1	Credit card			
2	Debit card			
3	Transaction/checking account			
4	Savings/deposit account			
5	Personal loans			
6	Wealth management account			
7	Home equity loan/mortgage top up			
8	Mortgage/mortgage refinance			

22. What channel do you use to handle the following activities? Tick (✓) on the appropriate options.

No	Activities	A. Online banking (PC, tablet, laptop)	B. Mobile apps (Mobile phone)	C. Personal contact
1	Transfer from one account to another account in the same bank			
2	Transfer money to another account in a different bank			
3	Pay bills			
4	Balance inquiry			
5	Update account details			
6	Inquire about a bank product			
7	File a complaint			
8	Apply for a loan (credit)			
9	Dispute a transaction			
10	Report lost/stolen debit/credit card			

23. Which of the following features are important to you in the use of online banking and mobile apps? (Choose 3 most important features).
    - o Stronger online data security
    - o Ability to do more of regular banking transactions online or on the mobile apps
    - o More real-time problem resolution
    - o Making the login/authentication process easier
    - o Costs of making the transaction

Appendix 2: Cross Tabulation

Part 1: Socio-Economic Variables

1. Gender

Gender	Nationality		Total	p-value
	Indonesia	Hungary		
Male	**111 (61%)**	**89 (88%)**	**200 (70%)**	0.000
Female	72 (39%)	12 (12%)	84 (30%)	
Total	183 (100%)	101 (100%)	284 (100%)	

2. Age

Age	Nationality		Total	p-value
	Indonesia	Hungary		
Less than 25 years old	12 (7%)	0 (0%)	12 (4%)	0.001
25 to 50 years old	**135 (74%)**	**93 (92%)**	**228 (80%)**	
More than 50 years old	36 (20%)	8 (8%)	44 (15%)	
Total	183 (100%)	101 (100%)	284 (100%)	

3. Education

Education	Nationality		Total	p-value
	Indonesia	Hungary		
High school	6 (3%)	0 (0%)	6 (2%)	0.015
Vocational	24 (13%)	14 (14%)	38 (13%)	
University degree (undergraduate) - BS, BA	39 (21%)	**39 (39%)**	78 (27%)	
University degree (graduate) - MA, MSc	**90 (49%)**	36 (36%)	**126 (44%)**	
University degree (graduate) - PhD	12 (7%)	4 (4%)	16 (6%)	
Other academic or scientific degree	12 (7%)	8 (8%)	20 (7%)	
Total	183 (100%)	101 (100%)	284 (100%)	

4. Involvement in agriculture

Involved in agricultural production or agriculture business	Nationality		Total	p-value
	Indonesia	Hungary		
Yes	57 (31%)	**101 (100%)**	**158 (56%)**	0.000
No	**126 (69%)**	0 (0%)	126 (44%)	
Total	183 (100%)	101 (100%)	284 (100%)	

5. Connection to the farm area

Connected to the farm area as	Nationality		Total	p-value
	Indonesia	Hungary		
Individual farmer	**118 (65%)**	21 (21%)	**139 (49%)**	0.000
Family	26 (7%)	**67 (34%)**	93 (33%)	
Cooperative farm	9 (5%)	0 (0%)	9 (3%)	

Private company	3 (2%)	0 (0%)	3 (1%)	
Public corporation	12 (7%)	9 (9%)	21 (7%)	
Government enterprise	9 (5%)	4 (4%)	13 (5%)	
Buyer	3 (2%)	0 (0%)	3 (1%)	
Other	3 (2%)	0 (0%)	3 (1%)	
Total	183 (100%)	101 (100%)	284 (100%)	

6. Years of involvement in agriculture

Years of involvement in agriculture	Nationality		Total	p-value
	Indonesia	Hungary		
Less than 1 year	6 (4%)	0 (0%)	6 (2%)	0.000
1 to 5 years	15 (8%)	22 (22%)	37 (13%)	
6 to 10 years	15 (8%)	**43 (43%)**	58 (20%)	
11 to 15 years	0 (0%)	16 (16%)	16 (5%)	
16 to 20 years	0 (0%)	8 (8%)	8 (2%)	
More than 20 years	**147 (80%)**	12 (12%)	**159 (59%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

7. Farming as a primary occupation

Is farming a primary occupation?	Nationality		Total	p-value
	Indonesia	Hungary		
Yes	54 (30%)	**59 (58%)**	113 (40%)	0.000
No	**129 (70%)**	42 (42%)	171 (60%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Part 2: Agriculture Enterprises and Farming Activities

8. Main agriculture products

The main agriculture product in farms	Nationality		Total	p-value
	Indonesia	Hungary		
Plant products	**146 (80%)**	**92 (91%)**	**238 (83%)**	0.307
Animal products	27 (15%)	1 (1%)	28 (10%)	
Both plant and animal products	10 (5%)	8 (8%)	18 (7%)	
Total	183 (100%)	101 (100%)	284 (100%)	

9. Types of agriculture enterprise

Types of agriculture enterprise involved in farming activities	Nationality		Total	p-value
	Indonesia	Hungary		
Producers cooperative	32 (17%)	0 (0%)	32 (11%)	0.000
Consumers cooperative	9 (5%)	0 (0%)	9 (3%)	
Credit cooperative	6 (4%)	4 (4%)	10 (4%)	

Input supply	32 (17%)	31 (31%)	63 (22%)	
Producer cooperative	0 (0%)	12 (12%)	12 (4%)	
Product sales and marketing	12 (7%)	**38 (38%)**	**50 (18%)**	
Not involved	**92 (50%)**	16 (16%)	108 (38%)	
Total	183 (100%)	101 (100%)	284 (100%)	

10. Farm inputs purchased from agriculture cooperatives

Farm inputs purchased from agriculture enterprises	Nationality		Total	p-value
	Indonesia	Hungary		
Agro-chemicals	22 (12%)	23 (23%)	**45 (16%)**	0.008
Animal food	6 (3%)	0 (0%)	6 (2%)	
Farm implements and spare parts	6 (3%)	12 (12%)	18 (6%)	
Fertilizers	**64 (35%)**	23 (23%)	87 (31%)	
Machine service	0 (0%)	4 (4%)	4 (1%)	
Seeds	**64 (35%)**	**35 (35%)**	99 (35%)	
Other	6 (3%)	4 (4%)	10 (4%)	
Not involved	15 (9%)	0 (0%)	15 (5%)	
Total	183 (100%)	101 (100%)	284 (100%)	

11. Farm size

Farm size	Nationality		Total	p-value
	Indonesia	Hungary		
0 - 10 ha	**68 (37%)**	24 (24%)	**92 (32%)**	0.000
10.01 - 50 ha	**68 (37%)**	20 (20%)	88 (31%)	
50.01 - 100 ha	31 (17%)	8 (8%)	39 (14%)	
100.01 - 250 ha	12 (7%)	20 (20%)	32 (11%)	
250.01 - 500 ha	0 (0%)	**25 (25%)**	25 (9%)	
500.01 - 1,000 ha	4 (2%)	4 (4%)	8 (3%)	
Total	183 (100%)	101 (100%)	284 (100%)	

12. Farm turnover

Farm turnover (in EUR)	Nationality		Total	p-value
	Indonesia	Hungary		
0 - 1.000.000	29 (15%)	0 (0%)	29 (10%)	0.000
1.000.001 - 50.000.000	**136 (74%)**	**57 (57%)**	**193 (68%)**	
50.000.001 - 100.000.000	12 (7%)	20 (20%)	32 (11%)	
100.000.001 - 150.000.000	3 (2%)	16 (16%)	19 (7%)	
250.000.001 - 300.000.000	3 (2%)	8 (8%)	11 (4%)	
Total	183 (100%)	101 (100%)	284 (100%)	

13. Opinion about costs in farming activities

Opinion about the costs for farming activities in comparison with the turnover	Nationality		Total	p-value
	Indonesia	Hungary		
Low	0 (0%)	4 (4%)	4 (2%)	0.000
Moderate	45 (25%)	0 (0%)	45 16%)	
High	**93 (50%)**	**81 (80%)**	174 (61%)	
Very High	45 (25%)	16 (16%)	61 (21%)	
Total	183 (100%)	101 (100%)	284 (100%)	

14. Benefits: better possibilities to expand agriculture production

1.Benefit : Better possibilities to expand my agricultural production	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	12 (12%)	15 (5%)	0.020
2. Less important	15 (8%)	16 (16%)	31 (11%)	
3. Neutral	38 (21%)	**46 (46%)**	84 (30%)	
4. Important	**127 (69%)**	23 (23%)	**150 (53%)**	
5. Very important	0 (0%)	4 (4%)	4 (1%)	
Total	183 (100%)	101 (100%)	284 (100%)	

15. Benefits: the agriculture enterprise operates in the region

2.Benefit : The agriculture enterprise operates in the nearby region	Nationality		Total	p-value
	Indonesia	Hungary		
2. Less important	15 (8%)	4 (4%)	19 (6%)	0.000
3. Neutral	35 (19%)	**61 (61%)**	96 (34%)	
4. Important	**98 (54%)**	32 (32%)	**130 (46%)**	
5. Very important	35 (19%)	4 (4%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

16. Benefits: the agriculture enterprise offers good service for members

3.Benefit : The agriculture enterprise offers good service for the members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	8 (8%)	8 (3%)	0.056
2. Less important	13 (7%)	8 (8%)	21 (7%)	
3. Neutral	37 (20%)	38 (38%)	75 (26%)	
4. Important	**117 (64%)**	**35 (35%)**	**152 (54%)**	
5. Very important	16 (9%)	12 (12%)	28 (10%)	
Total	183 (100%)	101 (100%)	284 (100%)	

17. Benefits: The agriculture enterprise pays a competitive price

4.Benefit : The agriculture enterprise pays a competitive producer price	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	4 (4%)	7 (2%)	0.589
2. Less important	12 (7%)	16 (16%)	28 (10%)	
3. Neutral	**121 (66%)**	**42 (42%)**	**163 (57%)**	
4. Important	25 (13%)	27 (27%)	52 (19%)	
5. Very important	22 (12%)	12 (12%)	34 (12%)	
Total	183 (100%)	101 (100%)	284 (100%)	

18. Benefits: The agriculture enterprise offers a stable market channel

5.Benefit : The agriculture enterprise offers a stable market channel	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	4 (4%)	4 (1%)	0.021
2. Less important	12 (6%)	8 (8%)	20 (7%)	
3. Neutral	25 (14%)	**46(46%)**	71 (25%)	
4. Important	**121 (66%)**	16 (16%)	**137 (48%)**	
5. Very important	25 (14%)	27 (27%)	52 (19%)	
Total	183 (100%)	101 (100%)	284 (100%)	

19. Benefits: Membership secures the marketing of products

6.Benefit : Membership secures the marketing of products	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	8 (8%)	8 (3%)	0.003
2. Less important	6 (3%)	12 (12%)	18 (6%)	
3. Neutral	38 (21%)	**54 (54%)**	92 (33%)	
4. Important	**124 (68%)**	19 (19%)	**143 (50%)**	
5. Very important	15 (8%)	8 (8%)	23 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

20. Benefits: The agriculture enterprise provides access to credit

7.Benefit : The agriculture enterprise provides easy access to credit to members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	8 (8%)	11 (4%)	0.000
2. Less important	6 (3%)	16 (16%)	22 (8%)	
3. Neutral	**121 (66%)**	**65 (65%)**	**186 (65%)**	
4. Important	38 (21%)	4 (4%)	42 (15%)	
5. Very important	15 (8%)	8 (8%)	23 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

21. Benefits:The agriculture enterprise increases the income of members

8.Benefit : The agriculture enterprise increases the income of members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	0 (0%)	4 (4%)	4 (1%)	0.028
2. Less important	16 (9%)	8 (8%)	24 (8%)	
3. Neutral	68 (37%)	**48 (48%)**	**116 (42%)**	
4. Important	**83 (45%)**	26 (26%)	109 (38%)	
5. Very important	16 (9%)	15 (15%)	31 (11%)	
Total	183 (100%)	101 (100%)	284 (100%)	

22. Benefits: The agriculture enterprise provides education and training

9.Benefit : The agriculture enterprise provides education and training for its members	Nationality		Total	p-value
	Indonesia	Hungary		
1. Not important at all	3 (2%)	17 (17%)	20 (8%)	0.001
2. Less important	12 (6%)	0 (0%)	12 (4%)	
3. Neutral	**121 (66%)**	**50 (50%)**	**171 (60%)**	
4. Important	22 (12%)	18 (18%)	40 (14%)	
5. Very important	25 (14%)	16 (16%)	41 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

23. Constraints to agriculture enterprise development

Constraints to agriculture enterprise development	Nationality		Total	p-value
	Indonesia	Hungary		
Government interference that has negative effects on the development	**70 (38%)**	7 (7%)	**77 (27%)**	0.000
Digital literacy rate of members	**46 (25%)**	1 (1%)	**47 (17%)**	
Inadequate capital	**45 (25%)**	**46 (46%)**	**91 (32%)**	
Lack of motivation	8 (4%)	**19 (19%)**	27 (10%)	
Lack of skills	7 (4%)	**19 (19%)**	26 (9%)	
Mismanagement	6 (3%)	3 (3%)	9 (3%)	
Unavailability of credits or loans	1 (1%)	6 (6%)	7 (2%)	
Total	183 (100%)	101 (100%)	284 (100%)	

Part 3: Digital Financial Services

24. Bank account ownership

Do you, as an individual, OR as a member of an agriculture enterprise, have a bank account?	Nationality		Total	p-value
	Indonesia	Hungary		
Yes	**174 (95%)**	**101 (100%)**	**275 (96%)**	0.312
No	9 (5%)	0 (0%)	9 (4%)	
Total	183 (100%)	101 (100%)	284 (100%)	

25. Source of financial support

Where do you get financial support (e.g. credits, loans, etc) to finance your activities?	Nationality		Total	p-value
	Indonesia	Hungary		
National bank and/or EU funding	30 (17%)	8 (8%)	38 (13%)	0.000
Regional bank	24 (13%)	8 (8%)	32 (11%)	
Private bank	**94 (51%)**	**85 (85%)**	**179 (63%)**	
Own sources	30 (16%)	0 (0%)	30 (11%)	
Other	5 (3%)	0 (0%)	5 (2%)	
Total	183 (100%)	101 (100%)	284 (100%)	

26. Percentage of funds from national bank and/or the EU

What is the percentage of funds received from national bank and/or the EU?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	**42 (22%)**	**38 (38%)**	**80 (28%)**	0.000
11-20%	12 (7%)	4 (4%)	16 (6%)	
21-30%	0 (0%)	28 (28%)	28 (10%)	
31-40%	3 (2%)	23 (23%)	26 (9%)	
61-70%	0 (0%)	4 (4%)	4 (1%)	
71-80%	6 (3%)	0 (0%)	6 (2%)	
81-90%	0 (0%)	4 (4%)	4 (1%)	
No Answer	120 (66%)	0 (0%)	120 (42%)	
Total	183 (100%)	101 (100%)	284 (100%)	

27. Percentage of funds from regional banks

What is the percentage of funds received from the regional bank?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	**57 (31%)**	**69 (69%)**	**126 (45%)**	0.000
11-30%	15 (8%)	0 (0%)	15 (5%)	
51-60%	0 (0%)	4 (4%)	4 (1%)	
76-100%	3 (2%)	0 (0%)	3 (1%)	
No Answer	**108 (59%)**	28 (28%)	136 (48%)	
Total	183 (100%)	101 (100%)	284 (100%)	

28. Percentage of funds from private banks

What is the percentage of funds received from the private bank?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	24 (13%)	**46 (46%)**	70 (25%)	0.000
11-20%	**66 (35%)**	12 (12%)	78 (27%)	
21-30%	0 (0%)	11 (11%)	11 (4%)	
31-40%	0 (0%)	8 (8%)	8 (3%)	
41-50%	12 (7%)	8 (8%)	20 (7%)	
71-80%	0 (0%)	4 (4%)	4 (1%)	
81-100%	3 (2%)	0 (0%)	3 (1%)	
No Answer	78 (43%)	12 (12%)	90 (32%)	
Total	183 (100%)	101 (100%)	284 (100%)	

29. Percentage of funds from own sources

What is the percentage of funds received from own sources?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	0 (0%)	**42 (42%)**	42 (15%)	0.000
11-20%	0 (0%)	23 (23%)	23 (9%)	
21-30%	15 (8%)	0 (0%)	15 (5%)	
31-40%	0 (0%)	4 (4%)	4 (1%)	
41-50%	15 (8%)	4 (4%)	19 (6%)	
51-60%	0 (0%)	8 (8%)	8 (3%)	
61-70%	45 (25%)	12 (12%)	57 (20%)	
81-90%	0 (0%)	8 (8%)	8 (3%)	
91-100%	**57 (31%)**	0 (0%)	**57 (20%)**	
No Answer	51 (28%)	0 (0%)	51 (18%)	
Total	183 (100%)	101 (100%)	284 (100%)	

30. Percentage of funds from other sources

What is the percentage of funds received from other sources?	Nationality		Total	p-value
	Indonesia	Hungary		
1-10%	**21 (11%)**	**38 (38%)**	**59 (21%)**	0.000
11-30%	3 (2%)	0 (0%)	3 (1%)	
No Answer	159 (87%)	63 (63%)	222 (78%)	
Total	183 (100%)	101 (100%)	284 (100%)	

31. Primary bank: easy to use services

Primary Bank : Makes it easy for me to use their services	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	6 (3%)	4 (4%)	10 (4%)	0.000
Disagree	12 (7%)	0 (0%)	12 (4%)	
Neutral	57 (31%)	12 (12%)	69 (24%)	
Agree	**81 (44%)**	**81 (81%)**	**162 (57%)**	

Strongly agree	27 (15%)	4 (4%)	31 (11%)	
Total	183 (100%)	101 (100%)	284 (100%)	

32. Primary bank: quality of services

Primary Bank : The good quality of of the services of the bank	Nationality		Total	p-value
	Indonesia	Hungary		
Disagree	18 (10%)	4 (4%)	22 (8%)	0.000
Neutral	**69 (38%)**	4 (4%)	73 (26%)	
Agree	63 (34%)	**85 (85%)**	**148 (52%)**	
Strongly agree	33 (18%)	8 (8%)	41 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

33. Primary bank: Delivering value

Primary Bank : Routinely looks for ways to improve my experience or deliver greater value	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	6 (3%)	4 (4%)	10 (4%)	0.092
Disagree	18 (10%)	16 (16%)	34 (12%)	
Neutral	**90 (49%)**	**35 (35%)**	**125 (44%)**	
Agree	57 (31%)	**42 (42%)**	99 (35%)	
Strongly agree	12 (7%)	4 (4%)	16 (6%)	
Total	183 (100%)	101 (100%)	284 (100%)	

34. Primary bank: more value compared to the same services

Primary Bank : Offers the most value compared to the same types of services	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	0 (0%)	4 (4%)	4 (1%)	0.000
Disagree	24 (13%)	8 (8%)	32 (11%)	
Neutral	**87 (48%)**	**69 (69%)**	**156 (56%)**	
Agree	54 (30%)	12 (12%)	66 (23%)	
Strongly agree	18 (9%)	8 (8%)	26 (9%)	
Total	183 (100%)	101 (100%)	284 (100%)	

35. Primary bank: transparent on service fees

Primary Bank : Is transparent on service fees	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	12 (7%)	8 (8%)	20 (7%)	0.719
Disagree	18 (10%)	15 (15%)	33 (12%)	
Neutral	**78 (43%)**	**42 (42%)**	**120 (42%)**	
Agree	66 (36%)	32 (32%)	98 (35%)	
Strongly agree	9 (4%)	4 (4%)	13 (5%)	
Total	183 (100%)	101 (100%)	284 (100%)	

36. Primary bank: know the customers' needs

Primary Bank : Know what the customer needs	Nationality		Total	p-value
	Indonesia	Hungary		
Strongly disagree	3 (2%)	4 (4%)	7 (2%)	0.209
Disagree	33 (18%)	15 (15%)	48 (17%)	
Neutral	**84 (46%)**	**50 (50%)**	**134 (47%)**	
Agree	51 (28%)	20 (20%)	71 (25%)	
Strongly agree	12 (7%)	12 (12%)	24 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

37. Preferred channel for banking activities

What is your most preferred channel for banking activities?	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking	27 (15%)	**61 (61%)**	88 (31%)	0,000
Mobile banking	54 (30%)	4 (4%)	58 (20%)	
Both online and mobile banking	**75 (40%)**	24 (24%)	**99 (35%)**	
Personal contact	27 (15%)	12 (12%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

38. Using branch offices

Using Bank branch/office channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	9 (5%)	19 (19%)	28 (10%)	0.030
Once a month	**107 (58%)**	**62 (61%)**	**169 (60%)**	
2-5 times a month	62 (34%)	12 (12%)	74 (26%)	
6-9 times a month	3 (2%)	8 (8%)	11 (3%)	
10 or more times a month	2 (1%)	0 (0%)	2 (1%)	
Total	183 (100%)	101 (100%)	284 (100%)	

39. Using ATM channel

Using ATM channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	3 (2%)	4 (4%)	7 (2%)	0.005
Once a month	71 (39%)	**43 (43%)**	114 (40%)	
2-5 times a month	**101 (55%)**	42 (42%)	**143 (51%)**	
6-9 times a month	8 (4%)	4 (4%)	12 (4%)	
10 or more times a month	0 (0%)	8 (8%)	8 (3%)	
Total	183 (100%)	101 (100%)	284 (100%)	

40. Using call center

Using Call center channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	**158 (86%)**	**81 (81%)**	**239 (84%)**	0.148
Once a month	20 (11%)	12 (12%)	32 (12%)	
2-5 times a month	5 (3%)	4 (4%)	9 (3%)	
6-9 times a month	0 (0%)	4 (4%)	4 (1%)	
10 or more times a month	0 (0%)	0 (0%)	0 (0%)	
Total	183 (100%)	101 (100%)	284 (100%)	

41. Use of online banking

Using Online banking (PC, tablet, laptop) channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	5 (2%)	0 (0%)	5 (1%)	0.000
Once a month	56 (30%)	0 (0%)	56 (20%)	
2-5 times a month	**98 (54%)**	41 (41%)	**139 (49%)**	
6-9 times a month	12 (7%)	16 (16%)	28 (10%)	
10 or more times a month	12 (7%)	**44 (44%)**	56 (20%)	
Total	183 (100%)	101 (100%)	284 (100%)	

42. Use of mobile apps

Using Mobile apps (mobile phone) channel	Nationality		Total	p-value
	Indonesia	Hungary		
Never	24 (13%)	24 (24%)	**48 (17%)**	0.013
Once a month	5 (2%)	11 (11%)	16 (5%)	
2-5 times a month	22 (12%)	**32 (32%)**	54 (19%)	
6-9 times a month	**120 (66%)**	26 (26%)	**146 (51%)**	
10 or more times a month	12 (7%)	8 (8%)	20 (8%)	
Total	183 (100%)	101 (100%)	284 (100%)	

43. Preferred channel for credit card

Preferred channel to apply for credit card	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	66 (36%)	**47 (47%)**	113 (40%)	0.039
Mobile apps (mobile phone)	42 (23%)	22 (22%)	64 (23%)	
Personal contact	**75 (41%)**	32 (32%)	**107 (37%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

44. Preferred channel for debit card

Preferred channel to apply for debit card	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**75 (41%)**	**47 (47%)**	**122 (43%)**	0.032
Mobile apps (mobile phone)	46 (25%)	18 (18%)	64 (23%)	
Personal contact	62 (34%)	36 (36%)	98 (34%)	
Total	183 (100%)	101 (100%)	284 (100%)	

45. Preferred channel for transaction/checking account

Preferred channel for transaction/checking account	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**74 (40%)**	**93 (93%)**	**167 (59%)**	0.000
Mobile apps (mobile phone)	**74 (40%)**	4 (4%)	78 (27%)	
Personal contact	35 (20%)	4 (4%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

46. Preferred channel for savings/deposits account

Preferred channel for savings/deposit account	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	66 (36%)	**77 (77%)**	**143 (50%)**	0.000
Mobile apps (mobile phone)	**68 (37%)**	8 (8%)	76 (27%)	
Personal contact	49 (27%)	16 (16%)	65 (23%)	
Total	183 (100%)	101 (100%)	284 (100%)	

47. Preferred channel for personal loans

Preferred channel to apply for personal loans	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	30 (16%)	27 (27%)	57 (20%)	0.010
Mobile apps (mobile phone)	24 (13%)	4 (4%)	28 (10%)	
Personal contact	**129 (71%)**	**70 (70%)**	**199 (70%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

48. Preferred channel for wealth management account

Preferred channel for wealth management account	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	45 (25%)	19 (19%)	64 (23%)	0.000
Mobile apps (mobile phone)	36 (20%)	0 (0%)	36 (13%)	
Personal contact	**102 (55%)**	**82 (82%)**	**184 (64%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

49. Preferred channel for house loans

Preferred channel to apply for house loan	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	33 (18%)	23 (23%)	56 (20%)	0.000
Mobile apps (mobile phone)	27 (15%)	0 (0%)	27 (10%)	
Personal contact	**123 (67%)**	**78 (77%)**	**201 (70%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

50. Preferred channel for mortgage/mortgage refinance

Preferred channel for mortgage/mortgage refinance service	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	33 (18%)	19 (19%)	52 (18%)	0.000
Mobile apps (mobile phone)	27 (15%)	0 (0%)	27 (10%)	
Personal contact	**123 (67%)**	**82 (81%)**	**205 (72%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

51. Channel: transfers within the same bank

Channel used to handle transfers from one account to another account in the same bank	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	72 (39%)	**93 (92%)**	**165 (58%)**	0.000
Mobile apps (mobile phone)	**81 (45%)**	8 (8%)	89 (31%)	
Personal contact	30 (16%)	0 (0%)	30 (11%)	
Total	183 (100%)	101 (100%)	284 (100%)	

52. Channel: transfers with other banks

Channel used to transfer money to another account in a different bank	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	69 (38%)	**75 (74%)**	**144 (51%)**	0.000
Mobile apps (mobile phone)	**75 (41%)**	26 (26%)	101 (35%)	
Personal contact	39 (21%)	0 (0%)	39 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

53. Channel: pay monthly bills

Channel used to pay bills	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	75 (41%)	**78 (77%)**	**153 (54%)**	0.000
Mobile apps (mobile phone)	**78 (43%)**	19 (19%)	97 (34%)	
Personal contact	30 (16%)	4 (4%)	34 (12%)	
Total	183 (100%)	101 (100%)	284 (100%)	

54. Channel: balance inquiry

Channel used for balance inquiries	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	70 (38%)	**64 (63%)**	**134 (48%)**	0.000
Mobile apps (mobile phone)	**86 (47%)**	23 (23%)	109 (38%)	
Personal contact	27 (15%)	14 (14%)	41 (14%)	
Total	183 (100%)	101 (100%)	284 (100%)	

55. Channel: update account

Channel used to update account details	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**75 (41%)**	**71 (70%)**	**146 (52%)**	0.000
Mobile apps (mobile phone)	**73 (40%)**	4 (4%)	77 (27%)	
Personal contact	35 (19%)	26 (26%)	61 (21%)	
Total	183 (100%)	101 (100%)	284 (100%)	

56. Channel: bank service inquiry

Channel used to inquire about a bank service	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	**69 (37%)**	**31 (31%)**	100 (35%)	0.000
Mobile apps (mobile phone)	54 (30%)	8 (8%)	62 (22%)	
Personal contact	**60 (33%)**	**62 (61%)**	**122 (43%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

57. Channel: file complaints

Channel used to handle or file a complaint	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	54 (30%)	8 (8%)	**62 (22%)**	0.000
Mobile apps (mobile phone)	30 (16%)	4 (4%)	34 (12%)	
Personal contact	**99 (54%)**	**89 (88%)**	188 (66%)	
Total	183 (100%)	101 (100%)	284 (100%)	

58. Channel: loan or credit application

Channel used to apply for a loan/credit	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	24 (13%)	8 (8%)	32 (11%)	0.000
Mobile apps (mobile phone)	24 (13%)	0 (0%)	24 (9%)	
Personal contact	**135 (74%)**	**89 (88%)**	**224 (80%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

59. Channel: transaction disputes

Channel used to handle transaction disputes	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	48 (26%)	4 (4%)	52 (18%)	0.000
Mobile apps (mobile phone)	42 (23%)	0 (0%)	42 (15%)	
Personal contact	**93 (51%)**	**97 (96%)**	**190 (67%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

60. Channel: lost or stolen cards

Channel used to report lost/stolen debit/credit card	Nationality		Total	p-value
	Indonesia	Hungary		
Online banking (PC, tablet, laptop)	39 (21%)	31 (31%)	**70 (25%)**	0.054
Mobile apps (mobile phone)	42 (23%)	16 (16%)	58 (20%)	
Personal contact	**102 (56%)**	**54 (53%)**	**156 (55%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

61. Important features in digital finance

Important features in the use of online banking and mobile apps*	Nationality		Total	p-value
	Indonesia	Hungary		
Stronger online data security	**144 (79%)**	**81 (80%)**	**225 (79%)**	0.000
More real-time problem resolution	78 (43%)	20 (20%)	98 (35%)	
Making the login/authentication process easier	57 (31%)	**61 (60%)**	118 (42%)	
Ability to do more of regular banking transactions online or on the mobile apps	**90 (49%)**	40 (40%)	130 (46%)	
Costs/fees of making the transaction	**135 (74%)**	**85 (84%)**	**220 (77%)**	
Total	183 (100%)	101 (100%)	284 (100%)	

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DECLARATION OF ACADEMIC HONESTY

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