



Impact of Agricultural Land and the Output of Agricultural Products Moderated with Internet Users toward the Total export of Agricultural Product in Three Islamic South East Asian Countries

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ABSTRACT

Agriculture was the key to preserving the main supply of food. Internet users could moderate the output of agricultural product. This study aims to explore and indepth analysis on the agricultural land and its products moderated with internet users could affect the total exports of agricultural materials in. This study used secondary data collected from sesric.org and fao.org from three OIC countries, Indonesia, Malaysia, and Brunei. This study used the number of internet users as a moderating variable on the effect of agricultural production which was divided into several types toward exports. The endogenous variable was total export, a moderating variable was the total of internet users, while the agricultural products were exogenous variables. The data were analyzed using moderated regression analysis to observe if the moderating variable affected exogenous variables. The result found that before the variables such as width of agricultural land, total output of cow's meat, chicken's meat, and freshwater fish were being moderated by number of internet users, all of them had no significant effect to total export.

ABSTRAK

Pertanian adalah kunci untuk melestarikan pasokan utama makanan dan pengguna internet dapat memoderasi output produk pertanian. Penelitian ini bertujuan untuk menggali dan menganalisis secara mendalam tentang lahan pertanian dan produk-produknya yang dimoderasi dengan pengguna internet dapat mempengaruhi total ekspor bahan pertanian masuk. Penelitian ini menggunakan data sekunder yang dikumpulkan dari sesric.org dan fao.org dari tiga negara OKI, Indonesia, Malaysia, dan Brunai. Penelitian ini menggunakan jumlah pengguna internet sebagai variabel pemoderasi terhadap pengaruh produksi pertanian yang terbagi menjadi beberapa jenis terhadap ekspor. Variabel endogen adalah total ekspor, variabel moderasi adalah jumlah pengguna internet, sedangkan produk pertanian merupakan variabel eksogen. Analisis data menggunakan analisis regresi moderasi untuk melihat apakah variabel moderasi mempengaruhi variabel eksogen. Hasil penelitian menunjukkan bahwa sebelum variabel-variabel seperti luas lahan pertanian, total output daging sapi, daging ayam, dan ikan air tawar dimoderasi oleh jumlah pengguna internet, semuanya tidak berpengaruh signifikan terhadap total ekspor.



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INTRODUCTION

Agriculture was important to be managed carefully to make sure that the supply of raw material for food in society was sufficient. Food security become an important issue because insufficient food supply could impede economic growth and many health problems in society would arise. Food security is a multidimensional and very complex issue, covering social, economic, political, and environmental aspects (Surahman, Soni, & Shivakoti, 2019). The political aspect is often the dominant factor in the decision-making process to determine food policy. Realizing sustainable food security is an issue and priority agenda in various meetings held by various countries and international institutions (Silva, de Moraes, & Molin, 2011).

Food security could be achieved through inside and outside pathways a country. Through inside, a country could use technological advances in helping farms to grow more plants in a shorter period with more resilience against disease. For livestock, the government could use genetic engineering and artificial insemination to produce better variants that could grow faster. The example of broiler chicken which could grow fast in a short amount of time to meet the national meet demand, especially for the fast-food industry was the example of technological advances in agriculture. Technological advances could also tackle the problem of reducing land for agriculture by creating artificial farms inside building, such as a greenhouse, hydroponic, and garden inside building (Toutounji et al., 2019).

Farm livestock and freshwater fishery were the example of agricultural sectors as source of supply of raw material of food in market. Farm livestock also called as meat plantation, because they provide meat to be supplied into market. Study by stated that The more population in a country, the higher demand for protein, which could be attained by consuming meat and fish as a source of protein. But a huge number of livestock along with the fish from pond need feeder to maintain their live. Feeder for livestock such as cow and chicken was supplied from farm. Similar to livestock, fish also need feeder which was also supplied from farm field. In other words, the demand of feeder have to be balanced with the number of livestock and fish (McKendree, et al., 2020)

Besides using technological advances, the government in a country should implement a policy which fully supports the sustainability of agriculture to continue to grow, by using land reform regulation, an incentive for the farmer, placing more venture of village cooperation to distribute or buy the product from farmers with understandable price, and obliterate hoarder (Rizou, et al., 2020). If the supply for national demand did not reach the quota, the government could use import policy, but only for food supply needed for main necessity which was a lack in market. Import also has to consider the effect toward the farmer which have the same varieties of product, so that they would not suffer great loss (Huo, 2014).

Technological advances not only created the invention of technological devices, but also a huge number of internet users. Internet users in Indonesia according to the report by internetworldstats data, had reached 212.35 million in 2021. Indonesia was in the third place with the highest number of internet users in Asia region. Malaysia had 29,03 millions internet users in 2021, while Brunei had 417,5 thousands in 2021. Indonesia had the highest number because it also had the total of population exceeded 270 millions in 2021. Study by Soedjana & Priyanti stated that a huge amount of internet users in the country could boost the penetration of information to be faster than before. Thus, it could help society who focused in agricultural sectors to communicate with each other to maintain the supply-chain of products. Moreover, the huge number of internet users could also enhanced the promotion of agricultural product, so that the farmers and industries could get more revenue from selling (Soedjana & Priyanti, 2017).

According to the previous study by Wani & Dhami, Southeast Asia was known as *the granary of Asia*. That was because most of the countries in South East Asia consisted of agricultural land which has contributed as the biggest exporter of grains. There were six countries known as the rice granaries of Southeast Asia. This term arose because of the high level of rice production (Wani & Dhami, 2016). Those countries were Thailand, Laos, Vietnam, the Philippines, Myanmar, and Indonesia. But, only Indonesia was included as OIC member (Angkurasanee, et al., 2019).

OIC or organization of Islamic cooperation was the group of Islamic countries to cooperate in socio-economic factors. The differences between OIC and ASEAN was the OIC emphasized the importance of sharia rule to be encoded in every trade and agreement between each OIC member, so that could create

mutual prosperity. OIC members should also follow any rule of Islamic economy principle in conducting the business and social activity which involved bilateral or multilateral agreement (Kayaoglu, 2015).

Islamic economy system has organized such situation since the age of caliph and Rasulullah. Because the Islamic economy used Al-Qur'an and hadith as the legal foundation of the system's implementation, economic activity must be beneficial for all or *maslahah*. In economic practice, Islam prohibited *gharar*/impose danger to other, *maysir*/gambling/speculation, and *riba*/involved in interest rate. By doing so, economic activity could achieve good distribution of wealth along with sustainable economic growth (Muslim & Widayatsari, 2019). In the case of agriculture as a vital sector in ensuring human life through food, the Islamic economy emphasized that the practice of the agricultural sector would follow the sharia law. Moreover, the government as policymakers must prioritize public interest by making sure that the supply block chain of the agricultural product would be safe until reached the market (Choudhury & Malik, 2016).

Islamic economy system was only implemented in the Muslim country or a country with Muslims as the majority. Organization of Islamic Cooperation (OIC) is an international organization consisting of 57 member countries spread all over the world. OIC is the second biggest organization in the world after United Nations. OIC has been formed for several propose, which are to increase Islamic solidarity among member countries, to support international peace and security, to protect Islamic holy places, to assist in the struggle for the establishment of an independent and sovereign Palestinian state. Among 57 members of countries, only 3 were from southeast Asia/ASEAN (ASEAN, 2016).

This study was diferent from previous study because this study used number of internet users to moderate the effect of total agricultural product toward total export. Based on that background, this study has a purpose to observe if the number of agricultural products of three OIC members in South East Asia affected to total export of agriculture. The implication of this study is to be hoped used as references for local government or international Islamic organization which was interested in researching agriculture in Islamic countries.

RESEARCH METHOD

This study uses a purposive sampling technique by specializing the sample in only OIC member countries. The data is taken specifically for agricultural products during 2015-2020 from sesric.org. The data were only taken from 2015-2020, and could not be continued to next year, such as in 2021 was because there was a limitation of data sharing, since COVID-19 impeded the data collection led by OIC experts into public. Indonesia, Malaysia, and Brunei were chosen because the Southeast Asian country is known as the largest producer of agricultural products in Asia. The three countries are also safe from conflict compared to other OIC member countries in the Middle East. The three countries also have agricultural areas that are predominantly green, not deserts. The data is downloaded in the form of a CSV file (Prabowo, Rahman, & Rahman, 2012).

This study used secondary data. According to Espinosa et al, secondary data is a collection of primary data stored in the agency's repository, both in print and digitally, and used for research purposes (Espinosa et al., 2021). Besides secondary, other sample characteristics of the data were panel data, each exogenous variable comes from Organization of Islamic Cooperation (OIC), namely sesric.org, and each sub-type of exogenous variable comes from Food and Agriculture Organization (FAO), namely fao.org.

The exogenous variables of this study were the Agricultural area (thousand Ha), total output of cow's meat, total output of chicken's meat, and total output of freshwater fish caught. The moderator variable was the number of Internet users. The endogenous variable was the total value of raw food exports in USD (Asnawi, Sukoco, & Fanani, 2018). This study analyzed the data using moderated regression analysis (MRA) (Aguinis, 2004). The model of analysis is as follows:

$$Y = a + b1.X1 + b2(X1*Z) + b3(X2*Z) + b4(X3*Z) + b5(X4*Z) + e$$

Y: exogenous variable

X1: endogenous 1

X2: endogenous II

X3: endogenous III

A: constant value

B: coefficient regression

Z: number of internet users (moderating variable)

E: error coefficient

Table 1. List of variables and indicators

Variable	Definition	Indicator	Reference
Agricultural area (exogenous)	Indicator of width of the area for agricultural practices	Land width (thousands Ha)	(Struik & Kuyper, 2017)/law of diminishing theory
Suppy of seafood (exogenous)	Total catches of marine and freshwater products for a year	Total caught (Tonnes)	(Keen, 2013)/Keynesian
Meat production (exogenous)	Amount of meat produced from carcass in a year	Total carcass (Tonnes)	(Keen, 2013)/keynesian
Internet user (mediator)	Number of internet users for a year	Internet users per 100 people	(Muslichah, Abdullah, & Razak, 2019)/Solow Swan Growth Model
Export of agriculture (endogenous)	Toal of agricultural output exported each year	Total value of raw food exports in USD	(Huo, 2014) /Keynesian

Relationship Between Variables

Area of Agriculture affects total exports of agricultural product

According to a study by (Leksono, et al., 2021), the area of agricultural land affects the total export of agricultural products. Since the industrial revolution, developing countries that have emphasized agriculture as a source of living began to move into industrialization areas. There were more and more land for agriculture was being sold because the farmer could not make a proper living by working on rice plantations. One of the examples was Indonesia as one of the biggest exporters of rice in the world have to rely on import besides the supply from an agricultural area to meet the national demand. Land-use change was the reason for reducing the supply of food resources. Based on that statement, therefore, the hypothesis could be stated as such:

H1: The area of agriculture has a significant effect on the total exports of three OIC member countries

Cow's meat output Impact to Total Exports of Agricultural Product

According to the study by Abdullah et al, meat from cow was really popular as source of protein. Moreover, Islamic countries also prohibited the usage of ll compotent from pig and boar, especially consuming its meat. cow meat become the main player of international trade of halal meat supply in Islamic countrie,s because of high demand as well as the tastiness of its meat which was different from poultry as a source of meat. moreover, cow's meat had less staurated fat than goat or sheep, made it easier to digest by body and less chlesterol that could be clog the blood transmission in artery (Abdullah, Borilova & Animals, 2019).

H2: Total output of cow's meat had a significant effect on total exports of three OIC member countries

Chicken's Meat Output Impact to Total Exports of Agricultural Product

According to a study by (Angkurasanee et al., 2019) stated that the number of cattle slaughtered which also adds to the total production of meat has a positive effect on the total export of agricultural products. This study also stated that China has developed sophisticated technology for the management of livestock, such as raising chicken. The poultry system of the indoor area could make the required habitat for a chicken to grow. Moreover, the selection of breeding of chicken, such as broiler which could reach adult in 4-5 weeks with weight 5 pounds was suitable for meat purpose. For egg-laying, many poultry plantations have raised white leghorn. As a result, China could export more than 1.67 million tons in 2018. Therefore, the hypothesis could be stated as such:

H3: Total output of chicken's meat had a significant effect on total exports of three OIC member countries

Freshwater Fish Output Impact to total Exports of Agricultural Product

According to a study by Umroh et al, aquaculture for freshwater species affect the total export of agricultural products. Indonesia, Malaysia, and Brunei which were located in Malayan peninsular has a great

potential in producing a great number of fish because of their humid temperature and rich land with natural resources for feeding the fish. Moreover, the advancement of technology of aquaculture of freshwater could also add more supply of fish and other seafood products to meet the national quota of demand (Umroh, et al., 2020). Therefore, the hypothesis could be stated as such:

H4: Total of freshwater fish output had a significant effect on total exports of three OIC member countries

Internet Users Moderated Area of Agriculture Impact to Total Exports of Agricultural Product

According to a study by Espinosa et al stated that technological advances especially the internet increase the degradation of agricultural land which moderates the total export of agricultural products. It was stated that the advancement of digital technology could persuade the millennial generation to contribute to agricultural sectors by becoming digital farmers (Espinosa et al., 2021). As the number of people keeps increasing, it needs the initiative of the young generation to continue the previous generation in working on the farm. Social media could be used in persuading the youth to continue their parents in working at the farm so that the land usage would not be changed into industry or housing. Therefore, the hypothesis could be stated as such:

H5: Internet users could moderate the influence of agricultural area on total exports of three OIC member countries

Internet Users Moderated Cow's Meat Output Impact to Total Exports of Agricultural Product

Study by Wang showed that the appearance of social media also disseminate any useful information in maintaining the growth and quality of life of cow, so that the cow would be healthy and weighed more. Moreover, the existence of social media allowed the farmer to promote their meat supply from cow, so that it could be sold faster. The more the cow's meat supplied from farmer or meat plantation to the market, the bigger the revenue that they could get. As a result, farmer and meat plantation could produce more and could meet the demand for international trade too (Wang, 2019). Therefore, the hypothesis could be stated as such:

H6: Internet users could moderate the influence of cow's meat output to total exports of three OIC member countries

Internet Users Moderated Chicken's Meat Output Impact to Total Exports of Agricultural Product

Chicken's meat had become the daily consumption for society. The rise of social media also promoted many types of fast food chain restaurant in Islamic countries that used chicken's meat as ingredient. More meat of chicken would be demanded as a result of the endorsement by social media influencers, along with the opening branches of some reputable fast food such as KFC and McDonald with the halal standard. Therefore, the hypothesis could be stated as such:

H7: Internet users could moderate the influence of chicken's meat output to total exports of three OIC member countries

Internet Users Moderated Freshwater Fish Output Impact to Exports of Agricultural Product

According to a study by (Ramanathan et al., 2019), The internet of things can affect fishery supply results to be more sustainable so that it can moderate fishery products to total exports of agricultural products. Therefore, the hypothesis could be stated as such:

H8: Internet users could moderate the influence of freshwater fish output to total exports of three OIC member countries

RESULT AND DISCUSSION

Descriptive Statistic

Result in table 2 showed that there was no outlier of the data, means that the data could be processed into classical assumption test. The test result showed that all of the variables were normal because the mean score of the variables either were not below the minimum score nor above the maximum score.

Table 2. Result of descriptive statistic

	N	Minimum	Maximum	Mean	Std. Deviation
X1_agriland	15	13	62300	23155	27873
X2_CowMeat	15	418	35410	12201	12985
X3_ChickenMeat	15	23228	3495091	1503641	1262613

X4_freshwaterfish	15	591	932600	285915	392068
Z_Internet_Users	15	71	95	86	10
Y_TotalExport	15	1698750	10156884489	4215815182	3706093307
Valid N (listwise)	15				

On the other hand, table 3 showed that Agricultural land width was significant to total export. Meanwhile cow's meat and chicken's meat output was significant to total export. Similar think was happened to freshwater fish caught output, which was also not significant to total export. All of them had significant score > 0,05. It means that H1, H2, H3, and H4 were all rejected.

Table 3. Result of T- test

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
constant	76,819	40,785		1,884	0,089
X1_agri land	4,940	6,561	5,733	0,753	0,480
X2_Cow Meat	-1,207	7,737	-0,790	-0,156	0,881
X3_Chicken Meat	7,933	8,251	1,934	0,961	0,373
X4_freshwater fish	14,547	17,207	11,845	0,845	0,430
X1_Z	0,009	0,003	0,929	3,058	0,012
X2_Z	-0,014	0,006	-0,887	-2,347	0,041
X3_Z	0,007	0,015	0,186	0,482	0,640
X4_Z	-0,005	0,005	-0,413	-0,972	0,354

Table 3 also describer that variable *agricultural land* as variabel which was moderated by total of internet users had significant impact to the total export of agricultural product. It was shown with the P-value < 0.05, which was significant, which means that H5 was accepted. This was in line with the the study by Raimi et al which stated that Brunei, Malaysia, and Indonesia was a rich country with abundant natural resources. With a huge supply of non-renewable natural resources in Brunei like oil, it could be relatively easy to funding a country with small population like Brunei.

For Malaysia, the abundant of renewable resurces such as agricultural products could enhance the Malaysia GDP. Indonesia that had both abundant agricultural land area nor abundant natural resources and rich soil could fed up the huge number of its population. (Raimi, Olowo, & Shokunbi, 2021). Moreover, the advancement of technology in Brunei utilized for monitoring of agricultural land could supervise the condition of land to better, so that the measurement could be implemented faster and more effciently (Wani & Dhami, 2016). A small change in the number of production could directly affected the total number of commodities that would be exported overseas (Hamzah, 2017).

Between those 3 countries, Indonesia had a big number population, consisting of mainly young ages. According to the study by Moeis et al, a huge number of young ages led to the demand for digital devices and internet providers. Based on the national census of the population led by the Center of Statistic Institution of Indonesia, in 2020, Indonesia had 75.49 of Z generation. It was equivalent to 27.94 percent of the total population in Indonesia (Moeis, et, al., 2020).

Further, table 4 showed that coefficient of determination (R2) was 0.568 (56.8%). It can be inferred that the total export as variable could be explained by exogenous variables in this study was 56,8%, while the remaining 43,2% was explained by outer variables which was not included in this study. This was according to the study by Mazhangara et al where R2 which was more than 50% was considered as moderate and could be indicated that the coefficient was quiet good in explaining the variables (Mazhangara, et, al., 2019).

Table 4. Result of coefficient determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	,754 ^a	0,568	0,395	0,94576

a. Predictors: (Constant), X4_Z, X1_Z, X2_Z, X3_Z

DISCUSSION

Indonesia also had 69.38 million millennial generations as the second most dominant population. It was equivalent to 25.87 percent of the total population in Indonesia. In fact, based on the National Labor Force Survey conducted by the Bureau of Statistics Agency (BPS, 2020), 20.62% of Indonesian youth worked in the agricultural sector in August 2020, up from 18.43% in the previous period. The increase in the number of young people in the agricultural sector during this pandemic can be a momentum to expand it. As many as 85.62% of them are internet users and have the opportunity to become early adopters of digital technology in the agricultural sector (Moeis et al., 2020).

Study by Baba et al also stated that Indonesia has a demographic bonus in the early 21st century. Moreover, the Indonesian population in old age also being decreased each year. Thus, the productive age population has increased. Indonesia itself was an agricultural country with very vast agricultural land. The humid temperature and soil with rich minerals for planting crops made Indonesia recognized as an emerald country of the equator. It won't be surprised if many young generations involved in agricultural sectors use technological advancement to increase production and create an easier supply chain (Baba, et al., 2019).

Table 3 also showed that an exogenous variable, which was total production of cow meat has p-value <0.05 after being moderated with a variable total of internet users. It means that H6 was accepted and in line with the study by H. H. Wang et al which explained that the socila media could become the line for internet users to share the tips in maintaining cow's health. Thus, social media also digital transaction used by internet users boosted the supply chain process of cow's meat, not only because the supply was bigger, but also the transaction was also faster using mobile banking and e-banking (Wang et al., 2018).

Table 3 also showed that some exogenous variables which was *chicken meat* had P-value>0.05 after being given with a moderating variable. Based on the result, H7 was rejected which means total output of chicken had no significant effect to total export.

The exogenous variable, total output of freshwater fish caught alos had P-value>0.05, which means that it had no significant effect to total export, and H8 was also rejected. According to the study by Karbalaei et al, Malaysian prioritized types of other seafood such as mollusks and crustaceans, because they had more capital value than freshwater fish. Malaysians consumed 58 kilograms of fish per capita, and alot of them came from seawater fish (Karbalaei et al., 2019). Malaysia was placed near Indonesia which was between the Indian Ocean and the South China Sea which provided natural sources of seawater fish and other types of sea creatures such as squid, octopus, types of clam, and sea-urchin (Hamid-Mosaku, 2017).

In-line with the study by Karbalaei et al, a study conducted by Sany et al also stated that the marine fishery sectors in Malaysia also provided income and employment opportunities, particularly for rural villages in Malaysia. Malaysia produced over 1.5 million fisheries products each year. Malaysia produced about 85 percent of the total fisheries' national product from the Marine (Sany, et al., 2019). Malaysia had two types of dominant marine fish caught for consumption, which were Pelagic and demersal fish. Pelagic fish make up the majority of the marine catches by Malaysians. Those type of pelagic fish consists of round scad, squid, tuna, Indian mackerel, and bream being among the most common. Coastal/inshore fisheries and deep-sea fisheries are the two main forms of marine capture fisheries, based on the information from the Department of Fisheries Management in Malaysia in 2010 (Rais, et al., 2019).

One of the offshore fish which was the concern for the aquaculture industry in Malaysia was Sea bass. Sea bass (*Lates calcarifer*) is one of the most important high-value fish species recognized in Malaysia's National Key Economic Area (NKEA). Sea bass production in the aquaculture sector is expected to rise in the amount harvested as well as become more productive, competitive, and knowledge demanding under this initiative. Following the success of private hatcheries producing vast amounts of artificial fish seed, sea bass output in Malaysia has increased tremendously over the last decade. Sea bass was reached 30.440 tons in 2014 (Hashim & Azra, 2020), which was recognized as reaching the peak of productivity in Malaysia.

Moreover, sea bass contributed to a national income of at least 39 Million Ringgit at that time (Rais et al., 2019). To make sure that this project of aquaculture of sea bass as marine fish could accomplish without fail, the government through the Department of Fisheries Malaysia (DOFM) has introduced several economic incentives to the industry. Those were given proper training to improve farmer skills, giving subsidies in the form of farm equipment and infrastructure facilities, and establishing a center as a facility in controlling the quality of fish seed (Karbalaei et al., 2019). It could be inferred that marine fisheries sectors was more popular than freshwater fish sector in Malaysia.

Meanwhile, according to the study by Duggan & Kochen, the development of the aquaculture sector or freshwater fish in Indonesia was currently considered far behind from the captured marine fisheries sector. This indication can be seen from the amount of production carried out throughout the year since the aquaculture sector was developed in Indonesia in 20th century (Duggan & Kochen, 2016). The lack of technological development and lack of incentive for aquaculture of freshwater fish sectors became the reason of the slow development. Moreover, the treatment of freshwater fish sector was more difficult than treatment of poultry as one of the biggest protein providers in Indonesia (Duggan & Kochen, 2016).

CONCLUSION

Based on the result above, it can be concluded that width of agricultural lands moderated by number of internet users affected the total export of agricultural product. Total output of cow's meat which was moderated with number of internet users affected the total export of agricultural product. Meanwhile, such thing would not happen to total output of chicken's meat and freshwater fish, even though after being moderated by number of internet users. Before the variables such as width of agricultural land, total output of cow's meat, chicken's meat, and freshwater fish were being moderated by number of internet users, all of them had no significant effect to total export. It could be concluded that number of internet users could strengthen the effect of two exogenous variables. The practical implication of this research was to be hoped to be a reference that chicken's and freshwater fish should be increased more in output, so that national supply could meet the demand of international trade.

This study also had limitations in using the secondary data for three countries which were limited to the range of time from 2015-2020. This was because the data were heavily reduced to make the normality test result become normally distributed. This study also had limitation in using only three Islamic countries from south east asian region, because they were the only Islamic countries in tropical areas.

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