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Potentials and Constraints of Cambodian Rice Export[†]

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Abstract

Rice is one of the most important crops in Cambodia and its export becomes a significant source of employment and foreign exchange accumulation. In this study, the potentials and constraints of rice export are explored. Producers' and export prices significantly influenced the volume of export. Given the export price, when the producers' price is cheaper, export will increase. Export will also increase if export price increases while the producers' price remains unchanged. In addition to the prices, factors that also affect the export of rice include the cost of transportation, access to finance, informal payment, access to the international market, quality of paddy, and business trust (trust among traders, trust between the rice trader and miller, and trust among the rice trader, miller and farmer).

Key words: Rice Export; Export Supply; Cambodia

JEL Classifications: Q17; Q21

1. Introduction

Rice is one of the most important crops in Cambodia. The Royal Government of Cambodia regards rice as “white gold”, which signifies how important the crop is to the country. Rice is the main sources of food and income for most of the rural households, and through export, it is a source of foreign exchange. The World Bank Report in 2013 asserted that the increase in price of rice in 2008 and 2009 helped reduce poverty in rural Cambodia significantly (World Bank, 2013). In 2010, having seen that rice has a potential to be exported, the government formulated the policy to promote the export of rice by committing to export one million metric tons of rice by 2015. However, by the end of 2015, the target of the volume of export has not been met, indicating that more effort needs to be done including mobilizing stakeholders and resources. Many stakeholders are engaged in exporting rice including farmers at the lowest value chain to middlemen and trading companies at the end of the value chain. In general, Cambodia has a comparative advantage in rice production, which has grown substantially since the middle of the 90s. The promotion of export is essential as the increased production has to be absorbed. Otherwise, the price of rice will be dampened and farmers' livelihood

[†] This paper is the revised version of my master's thesis titled “The Determinants of the Export Supply of Cambodian Rice”. I would like to convey my gratitude to Prof. Naoko Shinkai for her advice on its earlier version.

will be negatively affected. The potential for rice export is large; however, there are many internal and external constraints that need to be addressed to smoothen the export of rice and to increase export. This study examines both the potentials and constraints of the Cambodian rice export using both the quantitative and qualitative methods. Following this introduction, the next section will illustrate the historical trends of rice production and export. The quantitative analysis on the factors that affect rice export is in section three followed by the result from the interview of rice exporting firms. Finally, the study will propose policies to reduce the constraints of and increase rice export.

2. Rice production and export in Cambodia

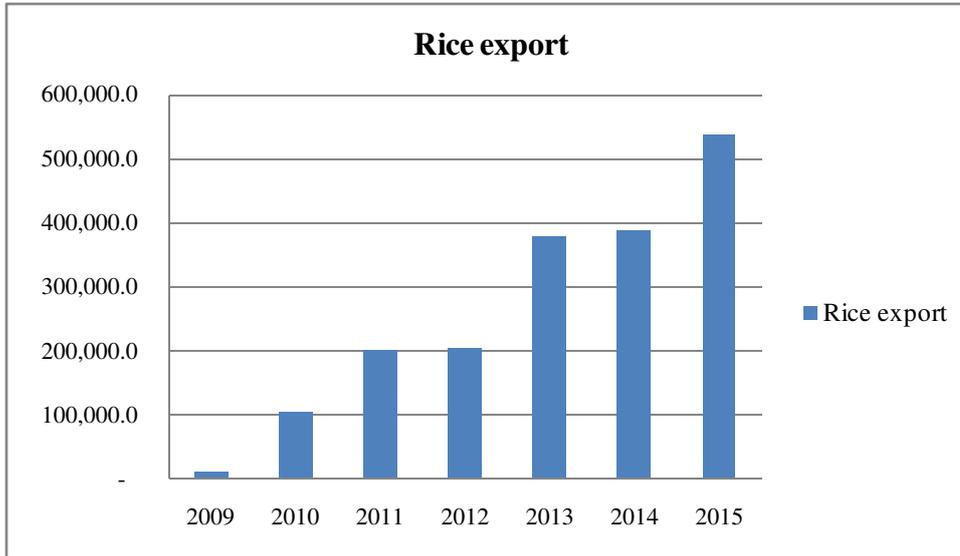
Rice was one of the most important crops in Cambodia since the country gained independence from France in November 9, 1953. From then on, Cambodia had been one of the main rice exporters until the war broke out in 1970s. During the war period from early 1970s to the middle of 1990s, rice production in Cambodia had not been sufficient to meet the need of domestic population (Nesbitt,1997). In that period, Cambodia was dependent on food import and donation from international organizations and allied countries. The data for rice production that was available from 1980 to 2013 shows that the production has increased more than five folds in 35 years. The production in 1980 was only 1.7 million metric tons and has increased to 9.4 million metric tons in 2013 (see Annex 1).The increased production of rice has been attributed to the increase in both the harvested areas and yield. The harvested areas in 1980 were only 1.4 million hectares and have increased to 2.9 hectares in 2013 (Annex 2). It is worth noting that during the war period, many hectares of paddy field had not been cultivated due to the insecurity and the presence of mines. Mine clearances have contributed to the expansion of the arable areas, to significant extent. Although rice yield is low, it has grown substantially from a mere 1.2 metric tons per hectare in 1980 to 3.2 metric tons per hectare in 2013, which is almost triple.

Cambodia achieved self-sufficiency in rice production in 1995/1996. After that, Cambodian rice has gradually penetrated the international market. It is difficult to have an accurate data on rice export from Cambodia as most of the transaction is conducted unofficially. During harvesting season, traders from neighboring countries such as from Thailand and Vietnam visit the farming areas and directly buy unmilled rice (paddy) from farmers. This practice is normally not recorded and causes significant loss to the Cambodian economy as value added from rice milling and processing is not operated inside the country. The reasons from this unofficial export include the shortage of working capital to buy paddy and the relative high processing cost. Many Cambodian traders do not have sufficient working capital to buy up all paddy during harvesting season. And they usually offer farmers lower prices than the Thai and Vietnamese businessmen as the processing cost in Cambodia is high; thus, if they offer the same price, they will not be price competitive in the international markets.

Although large portion of the Cambodian rice is exported unofficially, there is also milled rice that is exported through official channel and the volume of export has been gradually increasing. According to Figure 1, the volume of export was only 12,613 metric tons in 2009 and increased about

40 times to 538, 396 metric tons in 2015. This increase shows that significant amount of rice has been exported; however, the target of one million metric tons of rice export has not been realized. In the next section, the potentials and constraints of rice exporting will be examined.

Figure 1: Rice export from 2009 to 2015 (metric tons)



Source: Working Group on Paddy-Rice, 2013-2016

3. Determinants of rice export

Different factors affect rice export. According to Bilal & Rizvi (2013), who studied the determinants of rice export in Pakistan, factors that affect rice export include production, domestic consumption, total world rice export, rice yield, domestic and export prices. Production, yield and international demand was found to be positively correlated with export, while export and domestic prices are negatively correlated with the export. Domestic consumption was insignificant. Another study in Pakistan using firm level data found that exporters' educational level, sale price and marketing cost have influenced the export of rice (Javed & Ghafoor, 2013). Based on the previous literature and the availability of the data, the export supply function to be estimated to examine the factors affecting the export of Cambodian rice is expressed as the following:

$$X_{it}^S = \beta_0 + \beta_1 RPX_{it} + \beta_2 RPP_{it} + \beta_3 RNF_{it} + \beta_4 Dd_{it} + \beta_5 Y_{it}^* + \mu_{it}, \quad (1)$$

$$i = 1, 2, \dots, N, t = 1, 2, \dots, T$$

Where X^S is the annual rice export in metric tons, RPX is the ratio of the export price to the producer price. This variable captures the profit maximizing behavior of the export. It is expected to be positively correlated with the amount of export, which indicates that, on the one hand, if the export price is increased given the invariant producer price, exporters will increase export. On the other hand, given the export price, if the producer price decreases, exporters will also increase export. RPP is the ratio of the producer price to the domestic price, which is proxied by the consumer price index (CPI). This variable reflects the profitability of producer. If RPP is higher, the producers gain more profit

and have the incentive to produce more, which increase the capacity for export. It also is expected to be positively correlated with the amount of export. RNF and Y^* are the annual rainfall and average paddy yield respectively. Yield is expected to have a positive relationship with the amount of export while rainfall may have both the negative and positive relationship as too much rainfall may not be good for rice production. These two variables show the domestic production capacity for the production of rice in Cambodia still depend to a large extent on the climate. Finally, Dd is the domestic consumption, which is expected to have negative relationship with the amount of export as when the domestic consumption increases, the amount of rice available for export will shrink.

Data sources

Data from various sources are employed. The time-span of the data is from 2001 to 2009. The unpublished data for rice export and export price were obtained from the Ministry of Commerce (MoC)'s general department of Camcontrol. Camcontrol's data also shows the exporting countries for different years. CPI data were obtained from the International Monetary Fund (IMF). Data for rice consumption were obtained from the US Department of Agriculture (USDA) and the producer prices were obtained from the UN's Food and Agriculture Organization (FAO). The data for rainfall and yield were obtained from the National Institute of Statistics (NIS)'s statistical yearbook.

Descriptive statistics

According to the data from Camcontrol, during the period from 2001 to 2009, Cambodia exported on average 1,372.8 metric tons of rice. Domestic consumption is on average 3.3 million metric tons; the mean rainfall is 1,625 millimeters and rice yield is on average 2.3 metric tons per hectares. The average export price is 218 US\$ which is almost double that of the producer prices (110 US\$).

Table 1: Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
Export	overall	1,372.8	2,073.3	0.0	9,008.5	N = 45
	between		1,103.5	35.9	2,864.9	n = 5
	within		1,817.2	-842.1	8,496.7	T = 9
Domestic consumption	overall	3,293,078.0	610,258.9	2,455,000.0	4,130,700.0	N = 45
	between		0.0	3,293,078.0	3,293,078.0	n = 5
	within		610,258.9	2,455,000.0	4,130,700.0	T = 9
Rainfall	overall	1,625.0	168.9	1,405.6	1,920.4	N = 45
	between		0.0	1,625.0	1,625.0	n = 5
	within		168.9	1,405.6	1,920.4	T = 9
Yield	overall	2.28	0.4	1.8	2.8	N = 45
	between		0.0	2.3	2.3	n = 5
	within		0.4	1.8	2.8	T = 9
Producer prices	overall	110.1	42.3	71.6	204.4	N = 45
	between		0.0	110.1	110.1	n = 5
	within		42.3	71.6	204.4	T = 9
Export prices	overall	218.0	137.6	0	551.5	N = 45
	between		54.7	136.6	284.1	n = 5
	within		128.4	-26.02	525.5	T = 9

Source: Author's compilation

Results of the regression analysis

Table 2 and 3 show the result of the Fixed and Random effect model, and the Hausman test, which indicate that the Fixed effect model is more preferred ($\text{Prob} > \chi^2 = 0.0266$). The ratio of export price to producer price, *RPX*, was found to be the only significant variable. In Table 4, several models were tested to check the robustness of the relationship between the volume of export and price ration, *RPX*.

Table 2: Determinants of rice export

Dependent variable: <i>lnEXP</i>		Fixed effect	Random effect
	<i>lnRPX</i>	3.714*** (0.622)	3.826*** (0.621)
	<i>lnRPP</i>	2.443 (2.471)	2.496 (2.492)
	<i>lnRNF</i>	-1.918 (3.202)	-1.801 (3.228)
	<i>lnDd</i>	4.807 (6.526)	4.750 (6.582)
	<i>lnY*</i>	-3.275 (6.425)	-3.191 (6.479)
	<i>Constant</i>	-53.438 (-0.590)	-53.611 (91.031)
R-squared	within	0.545	0.545
	between	0.605	0.605
	overall	0.487	0.486
	Sigma_u	1.639	1.403
	Sigma_e	1.692	1.692
	rho	0.484	0.407
	No of Obs.	45	45

Note: Number in the parenthesis is the standard error.

*** denotes significant at 1% level

Source: Author's calculation

Table 3: The result of the Hausman test

Dependent variable	(b)	(B)	(b-B)
<i>lnEXP</i>	Fixed	Random	Difference
<i>lnRPX</i>	3.714	3.826	-0.112
<i>lnRPP</i>	2.443	2.496	-0.053
<i>lnRNF</i>	-1.918	-1.801	-0.117
<i>lnDd</i>	4.807	4.750	0.057
<i>lnY*</i>	-3.275	-3.191	-0.084

Source: Author's calculation

Table 4 shows that the correlation between the volume of export and *RPX* is robust. This positive relationship indicates that, as the natural logarithm form was estimated, if *RPX* increase one percent, export will increase by around 3.7 percent. *RPX* can increase by either increasing the export price given the same level of producers' price or reduce the producers' price given the same level of export prices. Therefore, the price variables, both producers' price (domestic) and export price (as given) influence the volume of export. Since Cambodia is a small exporting country, so the country

cannot influence export price. Therefore, in order to be price competitive, the only option available is to reduce the producers' price as well as other related cost in domestic market.

Table 4: Determinants of rice export

		Dependent variable <i>lnEXP</i>				
	<i>lnRPX</i>	3.714*** (0.622)	3.737*** (0.614)	3.716*** (0.609)	3.759*** (0.576)	3.374*** (0.600)
	<i>lnRPP</i>	2.443 (2.471)	2.683 (2.401)	3.987** (1.508)	3.975** (1.488)	
	<i>lnRNF</i>	-1.918 (3.202)	-1.933 (3.169)	-0.619 (2.538)		
	<i>lnDd</i>	4.807 (6.526)	1.734 (2.471)			
	<i>lnY*</i>	-3.275 (6.425)				
	<i>Constant</i>	-53.438 (-0.590)	-10.009 (29.494)	5.808 (18.879)	1.204 (0.805)	2.940 (0.510)
R-squared	within	0.545	0.542	0.536	0.535	0.448
	between	0.605	0.605	0.605	0.605	0.605
	overall	0.487	0.486	0.482	0.483	0.419
	<i>Sigma_u</i>	1.639	1.636	1.638	1.634	1.674
	<i>Sigma_e</i>	1.692	1.675	1.663	1.642	1.767
	rho	0.484	0.488	0.493	0.497	0.473
	No of Obs.	45	45	45	45	45

Source: Author's calculation

4. Constraints of rice export

4.1 The characteristics of the exporting firms and the exporting destinations

Rice exporting firms were asked to voice their opinions and experiences about constraints they have faced in rice exporting business. The companies interviewed are among the top exporters in Cambodia; however, they have different characteristics and target different destinations/ markets. Some companies have targeted upmarket customers in Western Europe, North America and wealthy countries in East and Southeast Asia such as Malaysia, Hong Kong and Singapore; while, others have targeted the markets in Eastern Europe or specialized in organic rice. Most firms started from being traditional rice millers which supplied for the domestic market. This type of firms own a rice mill and/or processing factory. Others are rice trading companies which buy milled rice from rice miller to further process for exporting. They do not own rice mill. One company owns a processing factory but does not own a rice mill. The last category is the NGO exporters which are mainly specialized in supplying organic rice. Generally, rice exporters in Cambodia are members of an association or organization working in the rice industry in order to gain various benefits including building a supply

network, having more bargaining power in exporting policies and the like. The Cambodian government through the fund from Australian Agency for International Development (AusAID) and International Financial Corporation (IFC), has regularly organized twice per year the Government Private Sector Forum (GPSF) which is presided over by the prime minister, with the aims to improve business environment, build trust and encourage investment. Some rice millers' associations have been invited to actively participate in this forum.

4.2 The Constraints

The constraints of rice export have been studied and classified by Ear (2009) into three categories which are (1) the external or purely technical, (2) directly governance related and (3) indirectly governance related. From the interview, there were many constraints rice exporting companies have faced which can also be classified as in Ear (2009) into external constraints referring to the factors such as the international demand of Cambodian rice, the importing and other exporting countries' policies and so on, which affect the export supply, and the internal ones which are the domestic factors.

The main external constraint which all companies mentioned during the interview was that they lack the access to the international market. As the rice exporting has just emerged, for Cambodian exporters, the access to the international market was very limited compared to Thai and Vietnamese exporters; thus Cambodian rice was exported to very few export destination (Sok et al., 2001). Many studies reported that although there was latent demand of Cambodian rice in the international markets, many large and medium-sized millers did not have confidence to export because they could not assure the stable supply and meet the appropriate standard quality required in the international markets (Ear, 2009; Meas, 2009; Ishikawa, 2009). However, unlike what have mentioned in the studies, all the exporting companies interviewed cited their success in exporting to the markets which demand highest standard such as the US and EU markets. And they were confident that they could secure the stable supply as many of them were members of the rice millers association which they can seek help regarding the supply of paddy/rice. The problems they complained were that international customers have not known much about their products because they were new suppliers. One company representative said although it was in the middle of the year, his export was still far behind the annual exporting plan due to few orders. In short, the problems facing the exporting firms are that they are not known to the international buyer widely enough.

Regarding the international market, two exporters complained that there have not enough action taken (by all stakeholders including the government) to expose the Cambodian rice to the world market. Financial and diplomatic means to promote the products such as conducting a business conference where Cambodian exporters and buyers can meet and discuss about trade, inviting buyers to visit their rice mill or factory, visiting importers and so on cannot be mobilized. Consequently, customers have not known thus reluctant to buy Cambodian rice though the quality is claimed to be comparable to the Thai and Vietnamese rice.

In order to capture the market, in other words, to compete with the other exporting countries, all the Cambodian exporters interviewed have been trying all the possible means including designing the company's webpage, building network with other countries' exporters and the like. However, that was deemed not sufficient. Most of the exporters would like to get acquainted to the importers or to have a chance to introduce their products to the importers and even to have the capability to exert the influence on the negotiation for trade preference such as the "everything but arms" schemes granted by the European Union, which took full effect in September 2009, permitting Cambodia to export with zero import tariff (Ear, 2009), but they found these very challenging if not impossible.

For the internal constraints, there are several. The first and foremost constraint which all of the exporters raised during the interview was the credit shortage and the difficulties in getting access to finance. In rice trading, money is needed for various purposes from buying paddy to upgrading the factory. All of the exporters interviewed claim to have needed credit regardless of whether they own rice mills and/or rice processing factory, or just a trading company. The requirement of fund includes funding to buy paddy from farmers and to equip their rice mills and processing factories with state-of-the-art technology so that they could compete with exporters in other exporting countries and meet the buyers' quality requirement. For the companies which buy paddy directly from farmers, at harvest time, they need a large amount of liquid working capital in the form of cash, but because they sell rice to consumers on credit they faced difficulties in absorbing large quantity of paddy. Also due to the credit constraint, the majority of Cambodian millers used the obsolete technology of milling. Most of the machines used were mainly the second-hand from Vietnam and China (Ishikawa, 2009). One of the exporters explained that before their rice mill and processing factory upgraded, they got the rice price lowered than the agreed price after the product reached the importing country's port. Credit shortage is not only blamed for the constraint of the export but also for the unofficial export of Cambodian paddy to neighboring countries, which was estimated to cost Cambodia millions of US dollar per year.

The need for credit in the Cambodian rice industry is pronounced. Considering only the cost to buy up the paddy production surplus of 3.4 million metric tons with the average cost of around 200US\$ per metric tons, the industry needs 680 million US\$ which is roughly 6.5% of the 2009 GDP. Adding this cost with other costs such as the cost to upgrade the mill or processing industry, the need for credit in the rice industry will be more pronounced.

All exporters interviewed complained they have difficulties in getting loan from the commercial bank and other financial sources due to the collateral requirement. However, the obstacle to access to finance is not a problem only to the rice industry but to other small and medium enterprise as well, and the constraints are not limited to collateral requirement. Other constraints to financing include the weak legal infrastructure and judicial system which provide insufficient insurance to the lender, the poor financial record on the borrower side, the inability of the bank staff to access and manage financial risk, the lack of the fund needed to make medium and long term loan, and there are few borrower who can afford the high cost of borrowing which lead to the high interest rate (MPDF,

2003). Besides lacking access to formal financial institution, credit constraint in the form of start up and working capital are also attributable to the nature of the domestic investor. In Cambodia, *Oknhas*, the rich businessman, are unlikely to invest in the sectors which they generally do not have and they are hesitant to bring from outside the country. Because rice export involve some technical know-how for Sanitary and Phytosanitary (SPS) and other compliance to international standard, rice industry has only some *Oknhas* (Ear, 2009). This means that those who are most capable to mobilize fund are not interested in rice export as the return is relative low.

Besides credit shortage, all of the companies interviewed muttered that the administrative and export procedure are cumbersome. In order to export rice from Cambodia, many paper works namely the certificate of origin, phyto-sanitary certificate, certificate of fumigation, certificate of quantity, bill of landing, signed packed list and test report, need to be fulfilled. Those documents involve several different departments and ministries such as the MoC's General Department of Camcontrol, MAFF's Department of Sanitary and Phyto-sanitary and MEF's General Department of Custom and Exercise whose works are generally overlapped thus resulting in less inter-ministerial cooperation and conflict of interest (Ear, 2009). The requirement of many certificates combines with the involvement of many different ministries makes the process and time consuming and costly. Therefore, it is impossible for anybody to export either paddy/rice, by legal or illegal means, without paying the unofficial fee (Sok et al., 2001). Two exporters said they could not export rice to the countries in ASEAN, many of which are big rice importers, because the products need fewer days to reach the port of exporting destination than to get the paper work ready in Cambodia. All exporters claimed to have paid unofficial fee to get their exporting document done. They affirmed that the service provided by those officials in charge depends on the amount of unofficial payment. If the amount is large enough, the express service will be provided. The unofficial cost is reported to be around 9US\$¹ per metric ton, which is over the profit² one exporter claim he gained from selling one metric tons of rice.

Third, transportation cost also has been reported to be more expensive than the borne by the Thai and Vietnamese exporters. The reasons for the higher cost of transportation in Cambodia are that the transportation infrastructure is relative poor while the fuel cost is relative high. Poor transportation infrastructure leads to high transportation costs. The high fuel price, due to high tariff on fuel import, has accelerated the already high transportation costs (Sok et al., 2001). The Sihanouk Ville Autonomous port which is the biggest seaport in Cambodia could not accommodate big vessel as the water level is too shallow as well as the crane and the containers cannot bear heavy load. Besides, the containers are too old and too few to transport the export in case of too many orders at the same time.

Fourth, rice trading business is generally the business for the locals. From sowing to exporting, all of the stakeholders are Cambodian. However, because rice trading is an emerging

¹ This figure was reported in the MoC's report titled integration and competitiveness study in 2001; the report cited the figure from the report on Cambodian rice miller conference.

² During the interview in August, 2010, one exporter claimed he makes profit of only 5\$ per metric ton from rice exporting. His company buys the milled rice from rice millers for exporting.

industry and many rice millers have not been familiar with formal practice such as enforcing a contract and the like, some exporters found it difficult to trust their partners. For instance, one of the exporters interviewed mentioned he bought rice from a rice miller and concluded a contract specifying clearly the payment date with the husband, but a few days later, the wife of his business partner disregarded the contract and demanded he pay as soon as possible because she needed the money immediately. He found this practice inconvenient; thus, he had to select only a numbers of rice millers to be his suppliers.

Fifth, the fact that rice industry is an emerging sector also contributes another constraint to the exporters. Because they have to fulfill many paper works which involves many government departments and ministries, many exporters mentioned that they have not had sufficient capacity to conduct the work by themselves. Therefore, they have to outsource the work to the so-called logistic company. This practice added the cost to their final production.

All the constraints mentioned about are attributable to the governance, and the capability of the firms themselves. However, farmers' traditional cultivating practices also attribute the constraints to rice exporting. Farmers in Cambodia owned a small plot of land and cultivate paddy at the subsistent level (Yu & Fan, 2011) which mean they produce for their own consumption and sell their small surplus for cash. They cultivate too many varieties of paddy making selecting and sorting tedious works for traders who usually buy many different varieties from many farmers and also the quality is not good enough for export. Moreover, it is also difficult to standardize the varieties demanded in the international markets as several varieties of paddy are sometimes mixed in one plot of cultivating land. These have been resulted from the fact that farmers are not well informed of the agricultural technology as well as the information about markets due to the very few number of agricultural extension workers available to assist famers (Lim, 2006). Thus, the challenge is how to get large quantities of rice at the consistent quality (Ear, 2009).

5. Conclusion and Policy Implications

The quantitative analysis shows that price is an important factors in promoting the export supply of Cambodian rice, and the only price that Cambodia can manage and adjust is the domestic price (producers' price) since export price is given in the case of small exporting country. Reducing producers' price involves many stakeholders from rice farmers to policy makers. Farmers need cheap and high-tech inputs, and stable supply of water and so on to produce cheaper output. All the relative cheap output supply may be possible by the coordination between the government and private sectors and other stakeholders. In addition, the interview with rice exporting firms is also relevant. In order to increase export, exporting infrastructure, access to finance, reduction of under table payment and marketing promotion and so no needed to be provided. These factors are connected with the price competitiveness. If corruption is reduced and other infrastructure, hard and soft, are provided and are be competitive vis a vis other rice exporting countries, it is possible to increase the export of rice, whose benefit will trickle down to the rural areas. Furthermore, trust is also important in rice

exporting business. Stakeholders need to trust one another in order to conduct business smoothly. From the interview, there are many problems of trust among stakeholders. Trust needs to be built among rice exporters, between exporters and millers, and among exporters, millers and farmers. One way to build trust is through the implementation of contract. If contract is assured, stakeholders will be able to do business securely with each other. In this regards, institutional support from the government is indispensable as in the Cambodian culture, business has been conducted based on verbal agreement rather than written contract. Verbal agreement is easily breached, and it is difficult for an individual to implement contract without the support from the state.

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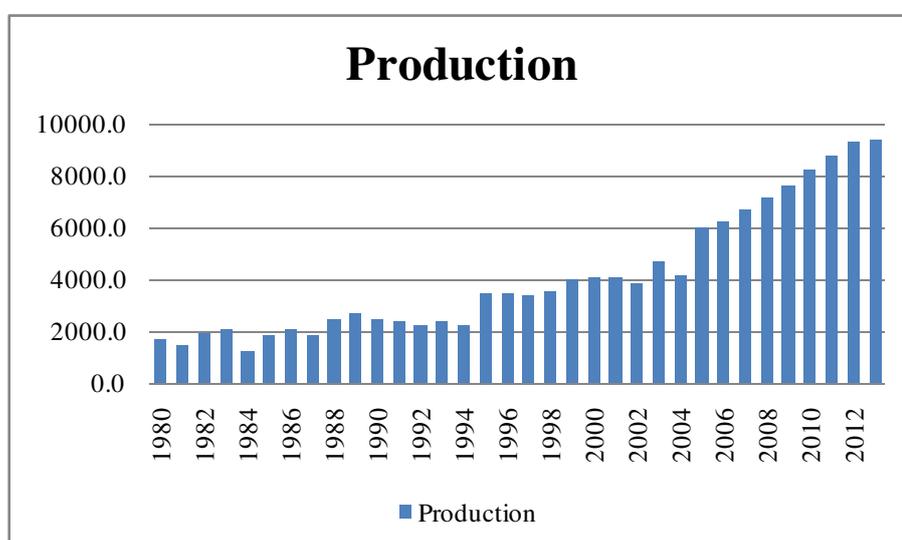
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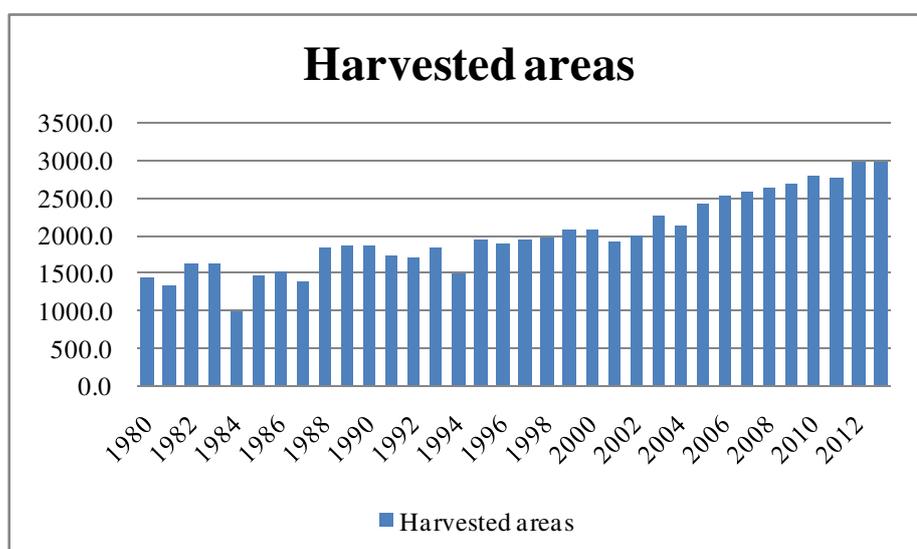
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Annex 1: Rice production from 1980 to 2013 (thousand metric tons)



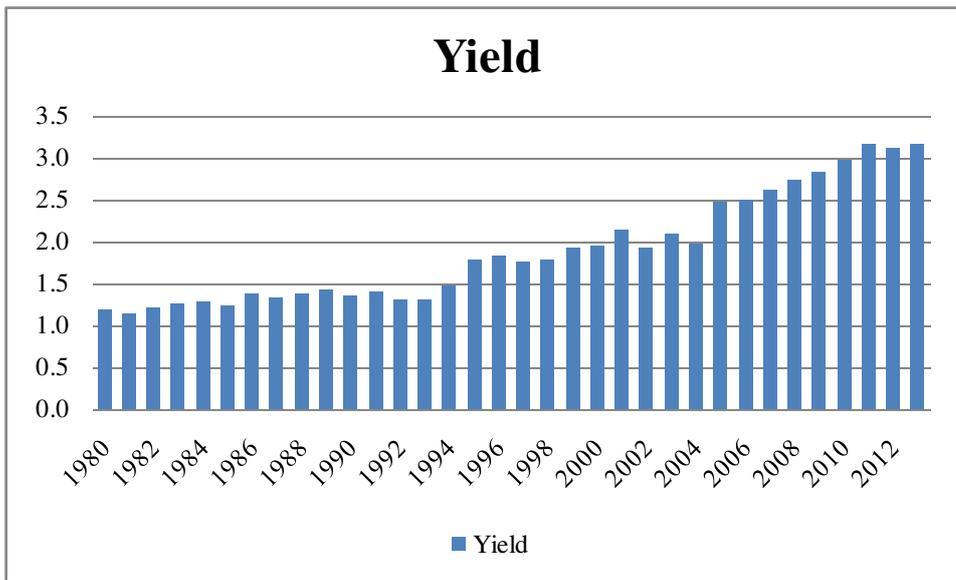
Source: NIS, 2011 and Agricultural Statistics, 2010-2013

Annex 2: Rice harvested areas from 1980 to 2013 (thousand hectares)



Source: NIS, 2011 and Agricultural Statistics, 2010-2013

Annex 3: Rice yield from 1980 to 2013 (metric tons/hectares)



Source: NIS, 2011 and Agricultural Statistics, 2010-2013