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SYNERGIES AND TRADE OFFS WITH INTENSIFICATION OF RICE AND LIVESTOCK PRODUCTION IN CAMBODIA

Introduction

Agriculture is a high priority for the government's national development agenda (MAFF 2015). The main agricultural activities are rice, subsidiary and industrial crops, poultry and livestock. Rice is the principal crop, and there are four main rice ecosystems in Cambodia: rain-fed upland, rain-fed lowland, dry season irrigated, and floating and recession rice (Ros, Chhim and Nang 2011). The near-natural and formerly predictable nature of the extensive wet season flooding of the floodplains in the Mekong River Basin in Cambodia has supported flood recession agriculture. This involves small-scale farmers producing annual crops like rice as well as harvesting fish and other wild foodstuffs.

The natural flood flows are changing, particularly due to the existing and planned construction of hydropower dams in the basin. The Cambodian government plans to extensively expand regulated, infrastructure-based irrigated agriculture to enable production of two to three rice crops a year and increase milled rice export. From 2009 to 2013, the Ministry of Water Resources and Meteorology (MOWRAM) expanded irrigation coverage to provide water for an additional 387,907 ha of agricultural



Sacks of rice readied for export to Vietnam.
Takeo, Feb 2017

land. By 2013, the total irrigated area had increased to 1,485,670 ha (NSDP 2014-18).

We hypothesise that this change may result in increased production of rice but decreased production of other foodstuffs important in the diet of Cambodians. Hence it may favour commercial

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farmers at the expense of the livelihoods and nutritional security of subsistence farmers. Further, expansion of irrigated agriculture will require much greater use of resources such as energy and water that have not been modelled and may amount to negative impacts on other values. It will definitely increase the use of fertilisers and pesticides as the rice varieties capable of faster and bigger yields also require more of these inputs.

Therefore, the research question for this study is: what are the benefits, costs and risks of changing food production from flood recession to regulated, irrigated agriculture in Cambodia, considering food production, land, water, energy and household nutrition security?

Methodology

The research used a combined quantitative and case study approach. Scenario analysis synthesised and interpreted secondary data from many sources to estimate and compare food and nutritional supplies, yields, input (water, energy, fertiliser, labour, pesticide) requirements, and the benefits, costs and risks of one double rice and two integrated rice-fish farming systems. The quantitative results were supplemented with research evidence and observations from extension projects and case studies in Cambodia of when farmers can access good support, training and best practices or new technologies, namely system of rice intensification (Tech 2014; Anthofer 2004) and community fish refuges (Brooks and Sieu. 2016; Thouk 2009). Data on model vegetable farmers was not available, so the study used data on the highest vegetable yields attained in 2015 (MAFF 2016) based on the

assumption that farmers were able to achieve high yields as a result of training and special support. The quantitative approach comprised several steps, as follows:

Food and nutritional supply calculation. The following formula was adapted from FAO (2001) based on available data to determine supplies of rice, bovine meat, ricefield fish, other aquatic animals (OAA) and vegetables. Food supply was divided by harvest/pasture area to determine food supply per hectare.

$$\text{food supply} = \text{production} + \text{import} - \text{export} \pm \text{stock} - \text{feed} - \text{seed} - \text{food manufacture} - \text{waste} - \text{other use}$$

Supplies of paddy, vegetables and bovine meat were calculated using FAOSTAT data (2016). Ricefield fish and OAA supplies were calculated based on data from six studies in Cambodia (Gregory, Guttman and Kekputhearith 1996; Nesbitt 1997; Guttman 1999); Troeung et al. 2003; Hortle, Troeung and Lieng 2008; Thouk 2009).

The study relied mainly on FAO's (1953, 1981) food composition tables to estimate nutritional supplies of protein, calories and lysine per hectare of rice, bovine meat, ricefield fish, OAA and vegetables (Table 1).

Potential production area projection. Using Arc-GIS and crop area maps (IRRA 2010; ODC 2015, 2016), the current irrigated single-crop rice area was chosen as the potential area for irrigated double rice cropping (see Figure 1).

Table 1: Average protein, calorie and lysine content per 100 g by food type

Food stuff	Protein (g/100g)	Calories (cals/100g)	Lysine (mg/100g)
Ricefield fish (all fish, unspecified)	18.80 ^a	132 ^b	1713 ^a
Other aquatic animals	16.00 ^c	103 ^b	1262 ^c
Bovine meat (excl. kidney fat [1.8%])	17.70 ^a	256 ^b	1573 ^a
Rice (husked or brown)	7.50 ^a	357 ^b	299 ^a
Vegetables	2.03 ^d	27 ^b	100 ^d

Sources: ^a FAO 1981; ^b FAO 1953; ^c Nurhasan et al. 2010; ^d Pittock, Dumaresq and Orr 2015

Production/yield estimation. MAFF annual reports provided data for both-season paddy yield (1980-2011), dry-season paddy yield (1980-2015), wet-season paddy yield (1980-2015), ricefield fish production (2008-2015), wet-season rice harvest area (2008-2015), vegetable yield (1996-2015), and milled rice supply (2008-09). This data was used to calculate protein, calorie and lysine production.

Input estimation. Data was compiled from several sources to estimate water consumption (Abrams 2015), energy consumption for rice (Islam et al. 2011), vegetable production (Canakci et al. 2005), fertiliser use (Theng et al. 2014), pesticide and labour costs (World Bank 2015).

Scenario modelling. Three scenarios were designed to compare current food supplies, projected protein, calorie and lysine production, water use, fertiliser use, energy consumption, labour and pesticide costs in the potential production area under three farming systems:

- Scenario 1: double rice cropping (wet- and dry-season rice)
- Scenario 2: wet-season rice / ricefield fish / OAA / bovines

- Scenario 3: wet-season rice / ricefield fish / OAA / vegetables

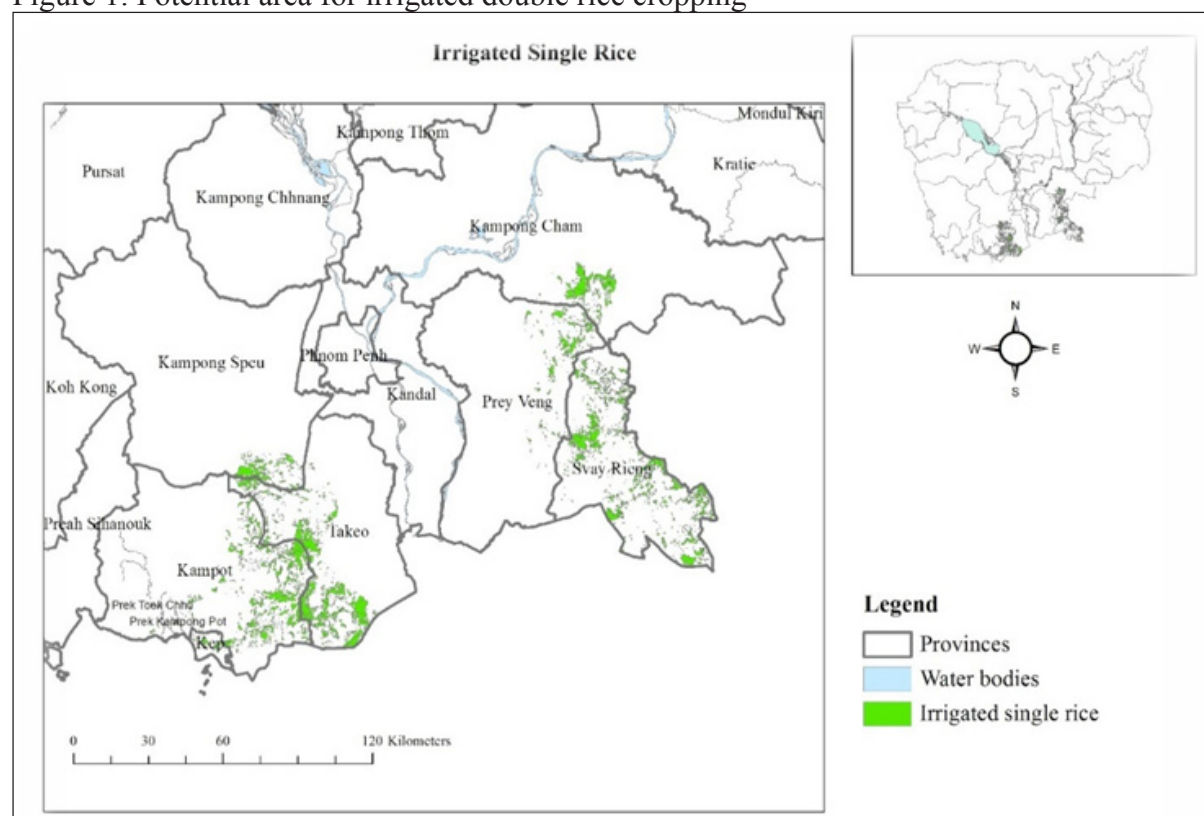
Scenario 1 was chosen to reflect conventional agricultural intensification. The other two were selected to reflect integrated farming systems that might be more sustainable for farmers: after harvest, the rice fields are either used to graze cattle or grow vegetables. All three scenarios were run a second time to compare the same criteria with and without the adoption of best practices and new techniques.

Key results

Table 2 presents the current food supply per hectare estimates for each scenario. As expected, scenario 2 produces less than the other scenarios. Although ricefield fish, OAA and meat provide more nutrition than rice, production combined with wet season rice is relatively low. Scenario 1 produces the most calories of all three because rice provides a lot of calories. However, scenario 3 is best in terms of protein and lysine, and produces almost double the lysine of scenario 2.

The current rice areas with potential for irrigated double rice cropping amount to 125,724 ha (Figure 1). Table 3 presents the projected trends for food

Figure 1: Potential area for irrigated double rice cropping



Source: IRRA 2010

Table 2: Total annual supply per hectare of protein, calories and lysine by food type

Food type	Scenario 1			Scenario 2			Scenario 3		
	Protein (t)	Calories (kcal)	Lysine (t)	Protein (t)	Calories (kcal)	Lysine (t)	Protein (t)	Calories ('000 kcal)	Lysine (t)
Rice	0.12	5880	0.005	0.060	2940	0.0020	0.060	2940	0.0020
Bovine meat	-	-	-	0.009	0.136	0.0010	-	-	-
Fish	-	-	-	0.020	0.150	0.0020	0.020	0.15	0.0020
OAA	-	-	-	0.004	0.030	0.0003	0.004	0.03	0.0003
Vegetables	-	-	-	-	-	-	0.100	1.35	0.0050
Total	0.12	5880	0.005	0.093	3256	0.0053	0.184	4470	0.0093

Table 3: Scenario modelling results for the potential area (125, 724 ha)

	Scenario 1	Scenario 2	Scenario 3
Projected annual food production, water, energy and fertiliser use, pesticide and labour costs			
Protein (t)	29475	15363	29898
Lysine (t)	900	729	1398
Calories (kcal million)	1403	559	751
Water use (mcm)	3017	1508	2451
Energy use (MJ million)	6726	3363	11059
Fertiliser use (t)	39176	13484	43938
Pesticide cost (USD)	2.01 m	503000	10.81 m
Labour cost (USD 4.56/day)	43.59 m	15.91 m	113.28 m
Projected annual food production, with training, technology/best practice adoption			
	+SRI	+CFR	+CFR + high veg yield
Protein (t)	90521	170976	192842
Lysine (t)	2764	14908	15939
Calories (kcal million)	4309	1652	1942

Note: SRI = system of rice intensification; CFR = community fish refuges.

production in terms of protein, calories and lysine in the entire potential area.¹

Discussion

Benefits, costs and risks

Scenario 1: The benefits of double rice cropping are income from rice export, the highest food supply and production of calories, and the second highest food supply and production of protein and lysine. However, water costs are the highest and energy, fertiliser, and labour costs the second highest among the three scenarios.

The very high water requirement in this scenario poses the greatest risk, especially given the adverse impacts of hydropower dams and climate change on the quantity and quality of water resources. Ensuring a stable water supply and mitigating water supply risk in irrigated agriculture is costly as it requires irrigation infrastructure and institutional mechanisms.

Operating an irrigation system/water pumps also consumes a substantial amount of energy, although total energy requirement is lower than in scenario 3. Alternative energy sources would need to be considered.

¹ In projection, we only estimate food production because we cannot project export and import needed for food supply calculation.

High fertiliser use associated with conventional intensive cropping can alter soil chemistry, damage soil structure and disrupt soil ecology. However, increased use of inorganic fertilisers in scenario 1 carries less risk than in scenario 3. Similarly, higher pesticide use stands to contaminate the environment (water, soil, air), degrade soil, harm non-target vegetation and organisms, and adversely affect human, animal and ecosystem health. Emissions of the greenhouse gases methane (CH₄) and nitrous oxide (N₂O), potent greenhouse gases in terms of their global warming potential (GWP), would increase under double paddy cropping. GWP would be higher than in scenario 3 with the application of fertiliser, or the same as in scenario 3 without the application of fertiliser.

If farmers were to adopt system of rice intensification (SRI) methods, double rice cropping could produce more food in terms of protein, calories and lysine, but using 50 percent less water. Also, energy costs would be lower, inorganic fertiliser use minimised, soil quality enriched and soil water conserved.

Scenario 2. Based on current per hectare food supply estimations, scenario 2 provides more lysine than scenario 1 but less than scenario 3. Projected lysine production in scenario 2 is slightly less than in scenarios 1 and 3, and projected protein and calorie production is much lower. Costs are the lowest among the three scenarios. The types of risks are the same but the degree of risk is lower than in the other two scenarios because scenario 2 has the lowest water and energy requirements and the lowest fertiliser and pesticide usage. If farmers were to adopt community fish refuges (CFR), the projected production of protein, calories and lysine in the potential area would increase.

Scenario 3. Integrated wet-season rice/fish/OAA/vegetables provides the highest food supply and projected protein and lysine productions, and the second highest food supply and projected calories production. The four sources of protein can contribute to reducing stunting and underweight in Cambodia. The gross margin of vegetables in scenario 3 is higher than that for wet-season rice and dry-season rice, and vegetable production in this scenario can help meet domestic demand. However, scenario 3 has the highest energy, fertiliser, pesticide and labour costs, and the second highest water cost.

Water use and energy consumption are also high, so scenario 3 has similar risks as scenario 1. But the level of risk is lower because scenario 3 requires less water. Even so, scenario 3 is the biggest energy user. The implications of high-energy agriculture in the potential area are an important consideration.

Fertiliser and pesticide use in scenario 3 carry the same risks as in scenarios 1 and 2, but the level of risk is higher because vegetable crops require higher rates of fertiliser and pesticide application. Similarly, increased CH₄ and N₂O emissions from wet-season paddy and vegetables pose the same risk as from the farming systems in scenarios 1 and 2, but the level of risk is higher. However, if no inorganic fertilisers were applied, there would be no difference in risk between the scenarios. Finally, if farmers were to adopt CFR and produce high vegetable yields, scenario 3 would produce more food in terms of protein, calories and lysine.

Comparison of technology and best practice adoption in the three scenarios

In this section we compare the results for scenario 1+SRI, scenario 2+CFR, and scenario 3+CFR+high

Table 4: Ranking of scenarios with and without training, best practice and technology adoption

Scenarios	Protein production		Calorie production		Lysine production	
	No adaptation	Training and technology adaptation	No adaptation	Training and technology adaptation	No adaptation	Training and technology adaptation
Scenario 1	2	3	1	1	2	3
Scenario 2	3	2	3	3	3	2
Scenario 3	1	1	2	2	1	1

vegetable yield. Projected annual production of protein and lysine in the potential area is highest in scenario 3: protein production is about 102,321 tonnes higher than in scenario 1 and about 21,866 tonnes higher than in scenario 2; lysine production is about 13,175 tonnes higher than in scenario 1 and about 1,030 tonnes higher than in scenario 2. Scenario 3 produces about 289 million kcals/year more than scenario 2 but about 2,367 million kcals/year less than scenario 1.

This study cannot compare water and energy requirements between the three scenarios with and without training and new technology adoption because such data is not available. However, the study does show that SRI adoption in scenario 1 can help reduce water use by up to 50 percent, and that SRI adoption in scenarios 2 and 3 can help conserve water and energy because this method reduces flooding in the wet season and saves water in the dry season.

Conclusion

Comparison between the three scenarios with and without support, training and best practice/technology adoption shows that: (1) projected protein production would be highest in scenario 3 both with and without training/technology adoption, while scenario 1 would drop to third and scenario 2 rise to second ranking; (2) the ranking for projected calorie production would remain unchanged, with scenario 1 ranked first followed by scenario 3; and (3) projected lysine production would be highest in scenario 3 with and without training/technology adoption, while scenario 2 would rise to second and scenario 1 drop to third ranking. Overall, scenario 3 has the highest potential for improving food production in terms of protein, calories and lysine in the potential area.

Different future agricultural development scenarios/policies have different implications. If the primary objectives are generating export income from rice and increasing calorific supply, these are maximised by scenario 1 – double rice cropping. If the primary objectives are to maximise profits for farmers and improve the supply of more nutritious foods (to reduce child stunting, for instance) then scenario 3 (rice - fish - vegetables) is best. In the future, with upstream dam development and climate change, water supply is likely to become less reliable. In this situation, scenario 1, which requires

the most water, is most risky, whereas scenario 3 is moderately risky. The major drawback of scenario 3 is that it requires much more energy than the other two scenarios.

This research has outlined the costs and benefits of three different options for agricultural development in Cambodia. CDRI stands ready to support Cambodian agencies who wish to better understand these options to enhance governmental policies and on-ground programs.

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Progress and Challenges of Deconcentration in Cambodia: The Case of Urban Solid Waste Management

Introduction

Decentralisation reform in Cambodia has entered a new phase despite a history with mixed results. A revived emphasis on deep reform by the National Committee for Democratic Development (NCDD) following the 2013 general elections is pushing decentralisation forward. By 2015 districts and municipalities had embarked upon administrative renewal, marked by the transfer of various functions from line ministries to district and municipal administrations. As stated by the government, the goal of functional transfer is to move service delivery closer to the people in order to promote local initiatives and shorten the accountability route (Sar 2015). Against this backdrop, the new phase of decentralisation reform represents an effort to realise the promises of decentralised service delivery.

What distinguishes this latest wave of decentralisation reform is a remarkable public display of political commitment. The deputy chief of the NCDD secretariat, for example, made functional transfer¹ the core of decentralisation reform, proclaiming that “reform is about the transfer of functions and resources. If there is no transfer there is no reform” (NCDD 2015). On the other hand, the deputy prime minister and chairman of NCDD attributed the slowness of the earlier phase of reform to the hesitance and resistance of line ministries and urged them to take the reform seriously (Sar 2015). By accelerating functional transfer, the national government appears to have put aside concerns about the mismatch between local government capacity and greater responsibilities and become more willing to recognise the institutional imperatives of decentralisation reform such as decision-

making power and resources. Given the revitalised commitment, it is fair to say that decentralisation reform no longer translates into only political decentralisation (devolution) that characterised earlier commune-level decentralisation but also translates into administrative decentralisation (deconcentration).

Background: The waste problem and the need for functional transfer

With rapid population growth and urbanisation comes an increased municipal waste problem and associated public health issues. This problem is particularly acute in Phnom Penh – Cambodia’s capital and largest city – where more than 1,000 tonnes of solid waste are generated daily (Blue Media Cambodia 2015). In light of these challenges and post-election decentralisation reform targets, the Ministry of Environment (MOE) jointly with the Ministry of Interior (MOI) and Ministry of Economy and Finance (MEF) issued in 2015 the inter-ministerial prakas on the Usage of Environmental Sanitation Service Fund (“the fund”).² The initial budget of USD5 million was allocated between 26 municipalities across the country, with distribution of funds determined based on population size. Budget allocation set the stage for the transfer of the solid waste management function to subnational administrations. The subsequent Sub-decree on Urban Solid Waste Management operationalised the fund by assigning functional responsibilities to different tiers of subnational administration, namely the capital, municipal and district administrations. This study is limited to solid waste management at the municipal level because the fund is currently only allocated to municipal administrations.

Research questions

The transfer of functions that began in 2015 signifies the arrival of the anticipated deconcentration. Based on a document analysis and in-depth interviews, the purpose of this study is to promote an understanding of the status

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1 Alternative terms commonly found in the literature include functional delegation and functional reassignment.

2 Unofficial translation.

of deconcentration. It therefore addresses the following research questions: *What rights and responsibilities for solid waste management have been deconcentrated to municipal administrations? And what challenges have they faced in exercising those rights and responsibilities?*

Key concepts

Deconcentration is one of the models for transferring functions to local governments, the other being devolution (or decentralisation as more commonly used in Cambodia). When a function is deconcentrated, the central ministry retains policy and fiscal discretions while subnational administrations are responsible for implementing the function and control the personnel transferred from the ministry. A function is a set of activities such as solid waste management, health centre management or rural water supply maintenance that contributes to the functioning of the larger governance system (Pak 2011). The transfer of functions to subnational administrations in the current reform entails either *assignment* or *delegation*. Assignment refers to “the transfer of ownership of the function [and] all necessary responsibilities, power and discretion for managing and implementing the function.” Delegation denotes “the transfer of function [and] responsibilities, power and discretion for managing and implementing the function in the name of the delegators based on criteria of such delegation. The delegating authority retains ownership on the delegated function” (RGC 2012, 3). In other words, assignment is a strong form of deconcentration whereas delegation is a weak one. The former gives subnational administrations more power to exercise their responsibilities as delineated in a legal framework.

Findings

The legal framework: Responsibilities, rights and resources

The advance in functional transfer has brought about some major changes. Under the 2015 Sub-decree on Urban Solid Waste Management, municipal administrations are assigned five broad responsibilities for solid waste management: 1) prepare annual management, action and budget plans, 2) plan and implement tasks for solid waste management, 3) establish and manage waste collection, transport and dumpsites, 4) advise the people on sanitation practices and waste service usage, and 5) educate consumers about eco-friendly practices (the 3Rs – reduce, recycle, reuse) and promote the use of recyclables and the purchase of products made with recycled materials.

These responsibilities are accompanied by rights and resources. To support function execution,

The goal of functional transfer is to move service delivery closer to the people in order to promote local initiatives and shorten the accountability route.

municipal administrations are allowed to: 1) issue warrants or other legal instruments, 2) operate directly or contract out cleaning and/or collection and/or transport and/or dumpsite services to the private sector, 3) cooperate with neighbouring subnational administrations to jointly

deliver services, 4) delegate a part or the entire function to sangkat councils or assign rights to communities to implement one specific or some subfunctions, 5) determine fees for cleaning-collection-transport and dumpsite services, 6) use municipal funds or funds from other sources to supplement the fund for solid waste management, and 7) approve organisational or individual requests for solid waste for private use (RGC 2015).

With respect to resources, in 2015 the studied municipalities received funds of USD45,000 to 90,000 depending on their population size. This represents major progress relative to the meagre provincial budget for solid waste management in the pre-transfer time (Pak and Craig 2008). In addition, municipal administrations will be able to generate own-source revenue through waste collection fees. Based on a fee ceiling designed

by central ministries, municipal administrations can determine fee structures for their localities depending on business type, location, income level and waste volume. Before arriving at this decision, municipal administrations must consult service users and other stakeholders. Also, they are responsible for designing the mechanisms for the collection, management and settlement of waste service fees. Although funds are made available to municipal administrations, reassignment of personnel is not yet part of the functional transfer.

Municipal administrations have used the funds for various activities to beautify the city including picking up litter, sweeping main roads, trimming trees and shrubs, installing garbage bins and putting up education banners. One municipality creatively used a portion of the fund to renovate the road leading to the dumpsite. Except this municipality, which uses a mixed model of public-private implementation of the function, other municipalities chose to contract private service providers selected through their procurement committees to carry out the described activities. In these cases, municipal administrations primarily focus on monitoring the performance of private contractors. In one municipality, sangkat councils are asked to assist with the monitoring and the information is reported to the municipal administration by phone.

Central-local relations: Support and control

Under the new structure, the Provincial Department of Environment's new roles in solid waste management are to: 1) promote environmental awareness, 2) participate in the development of a solid waste management plan, 3) provide technical advice on solid waste management projects or proposals, 4) monitor, review and evaluate the progress of solid waste management, and 5) prepare semester and annual reports on the status and progress of solid waste management (RGC 2015). Given these responsibilities, municipal administrations will be

able to engage more meaningfully with provincial departments than in the past when interaction between the two parties was limited to involvement in occasional environment-related public events.

As it now stands, relations between municipal administrations and provincial departments of environment remain flat across the studied municipalities. In one municipality, for example, a provincial department informant expressed his dissatisfaction with the municipal administration, complaining that they have become more autonomous and discretionary: "they don't listen to the department or province". He was also sceptical of the prospects of recruiting a new service provider because he thought that the existing service provider had been very helpful by responding to the department's requests and he doubted that a new one could follow suit. He even suggested that provincial

departments should have been recipients of the fund instead of municipal administrations. Until recently, the Provincial Department of Environment oversaw the private service provider, which was recruited by the department's former chief.

In another municipality, the provincial department has taken a more hands-off approach to the transfer. Complaints, by contrast, came from the municipal administration. Suggesting an indifferent relationship, a municipal informant complained that the provincial department had not contributed much towards waste management, neither before nor after the functional transfer. "I used to ask them whether the fund could be used for awareness-raising activities and to buy garbage bins because it is not clear from the prakas; and they said they didn't know either."

Yet in another municipality, the municipal administration encountered a more assertive provincial department. A municipal informant said that his proposal to use the fund to raise environmental awareness was rejected by the provincial department who argued that the fund is

Municipal administrations have used the funds for various activities to beautify the city including picking up litter, sweeping main roads, trimming trees and shrubs, installing garbage bins and putting up education banners.

for service delivery or intervention purposes only, although the informant personally thought that it was allowed by the sub-decree. He admitted that it is more important to follow what individuals say than to follow what is written on paper because they have discretion to approve fund requests, hinting at the influence of the provincial departments of environment and economy and finance on the fund transfer process. Municipal administrations are legally required to submit a request for funds along with an action plan for solid waste management to the MEF via their respective Provincial Department of Environment.

With regard to the Ministry of Environment, its main role is to perform regular inspections of function execution. In case of a breach of the guidelines on solid waste management, the ministry can propose that the MEF postpone the transfer of funds to the municipal administration in question. It can also propose that the MOI warn the municipal administration concerned

about its underperformance, inefficiency or noncompliance (MOE, MOI and MEF 2015).

Issue of local capacity

As pointed out earlier, the reassignment of personnel is not part of the transfer. This

situation has disproportionally affected municipal administrations. As private contractors take up the bulk of the work in solid waste management, municipal administrations are primarily responsible for monitoring. Two municipalities have each formed a taskforce, led by a deputy municipal governor assisted by officials from the administration's procurement unit and city development unit. Another municipality has adopted a more participatory approach, forming a working group led by a deputy municipal governor and membered by officials from the provincial department and municipal office of environment. Due to its higher level of development, another municipality was able to create a specialised unit that works on waste management and city beautification long before the functional transfer. This municipality is consequently best

equipped for the function. A municipal informant was intending to propose a plan to the MOI for the establishment of a similar unit to relieve the workload of his officials. Similarly, another municipal informant expressed concern about the busy workload of his officials and thought that new personnel should come with every new function. In response to the workload concern, provincial MOE informants indicated that the lack of personnel at the local level is a general phenomenon that has no easy solution, pointing to similar problems in their departments.

Despite human resource constraints, all municipal informants appeared to welcome the new function and reject a long-held belief that local administrations lack capacity. A municipal informant asked:

If you don't transfer the function to me, how can you know whether I can do it or not? Don't always think that the lower level can't

do it. If they really can't do what is assigned, you build their capacity. There's nothing wrong with that.

The functional transfer has clearly helped empower municipal administrations to provide solid waste services by giving them greater responsibilities and the necessary rights and fiscal resources although reassignment of personnel is not part of the transfer.

Another municipal informant admitted that the functional transfer allows municipal administrations to fulfil

their responsibilities rather than blame others for any problems, and motivates them to work harder to avoid being "looked down upon".

Discussion and conclusion

Based on a case study of urban solid waste management, this paper is an early attempt to assess the progress and challenges of deconcentration to date. The functional transfer has clearly helped empower municipal administrations to provide solid waste services by giving them greater responsibilities and the necessary rights and fiscal resources although reassignment of personnel is not part of the transfer. The functional transfer effectively shifts the mandate for solid waste management from the provincial level down to the municipal level accompanied by a ministry-granted fund

that is increased annually, something provincial authorities did not have prior to the transfer. The fund is sizeable but more is needed if the service is to be developed further. Municipal administrations' power to raise local revenue through waste collection fees and charges in the foreseeable future could strengthen their fiscal base.

The case study suggests that municipal administrations have not experienced major obstacles in implementing the function so far although some challenges exist. In terms of central-local relations, interactions between municipal administrations and provincial departments of environment have been flat across the studied municipalities. But more interaction can be expected once ministerial inspection of the function implementation has begun. Nevertheless, the case study did uncover an instance of veto exercised by a provincial department over a municipal proposal because they disagreed on the activities the fund can be spent on. But the veto was based on the department's interpretation of the regulation rather than an act of extra-legal interference or abuse of power. This incident has important implications for the relationship between regulation and local power. While it is plausible that less and broad regulations give more opportunities to local governments to take initiatives, it could in the meantime breed ambiguities that are open to interpretations that suit particular interests to the exclusion of others. In a context where institutions to resolve discretionary discrepancies are non-existent or weak, the prevailing power structure favours interpretation of the superordinate at the expense of the subordinates. In terms of capacity, municipal administrations feel determined and ready to prove themselves despite some concerns about increased workload. This optimism essentially downplays the "lack of capacity" belief as exemplified by the view that there is nothing wrong with building capacity when there is a lack of it, implying the need to normalise rather than problematise the situation.

In general, the case study suggests that greater rights, responsibilities and fiscal resources can be expected to strengthen the role of municipal administrations in local development and promote their relevance in local accountability. The prospects, however, will be negated if centralising

tendencies do not simultaneously subside. Even so, this is an early conclusion and richer insights leading to divergent conclusions may emerge as the reform interacts with political reality over time. It is also necessary to study other more politically contentious sectors such as education and health to arrive at a more comprehensive understanding of the dynamics of deconcentration.

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Tracking in Education: A Four Country Comparative Study

Introduction

Tracking, also known as streaming, is the practice of placing students into different courses, study programs or schools, based on their abilities, achievements and interests. This practice allows teachers to prepare instruction that meets students' needs (Chmielewski, Dumont and Trautwein 2013, 926), with limited concern over leaving slow learners behind or not stretching fast learners enough.

Tracking has been practiced, although in different forms, in both developed and developing countries. For instance, Germany and Hungary track student progress from as early as age 10, while the United Kingdom, Japan and the United States tend to keep their lower secondary schools comprehensive before streaming students at the upper secondary level. This paper reviews, from a comparative perspective, the tracking practices in four Asian countries: Singapore, South Korea, Vietnam and Cambodia. The aim is to learn from a diversity of experiences to improve Cambodia's streaming practice.

Methodology

This paper is based mainly on documents, including existing literature and educational policies of each case study country. The literature review was supplemented with information gathered from the researcher's informal conversations with a chemistry teacher at an upper-secondary school in Cambodia, and with her colleagues in Vietnam and South Korea.

Singapore and South Korea have been successful in building their modern education systems, so their experiences in applying tracking practice are significant for Cambodia. Though still at an early stage of development, Vietnam surpassed world expectations, achieving a remarkable mean score of 511 on its first participation in 2012 in the Programme for International Student Assessment (PISA) compared to the average score of 494 for OECD countries (OECD 2014a).

Overview of tracking practices in each country *Singapore*

Singapore has practised tracking since 1979, with students from primary school upwards placed into different courses of study through exams, tests and school reports (Kam and Gopinathan 1999, 103). The idea behind introducing tracking at grades 5 and 6 was to enable school children to reach their potential by understanding differences in academic attainment and growth (OECD 2011).

Tracking practice has now been refined to subject-based banding. This allows children to realise their potential based on their strengths and interests, providing greater flexibility by offering them the choice of a combination of standard and foundation subjects (MOE of Singapore 2016a). For example, students who excel in languages (English and Chinese, Malay or Tamil) but struggle in mathematics and science may choose two language subjects at standard level and take mathematics and science at foundation level. The school recommends a subject combination based on the results of exams in grade 4, and parents can fill out an option form to indicate their preferred choice. In grade 5 students take a subject combination chosen by their parents. At the end of the year, the school assesses students' ability to cope with their chosen subjects. Then, in grade 6, students take the subject combination recommended by the school, and sit for the national Primary School Leaving Examination (PSLE) (MOE of Singapore 2016a).

At secondary school, depending on PSLE results, students are grouped into one of three courses: express, normal (academic) or normal (technical). The difference between express and normal (academic) is that the express course provides mother tongue instruction at a higher level. Students on the normal (technical) course take computer applications as a compulsory subject, as well as English language, a mother tongue language and mathematics (MOE of Singapore 2016b). Singapore's secondary education system provides flexibility, allowing students to move from one course to another depending on their performance and assessment from the school principal and teachers.

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South Korea

The South Korean education curriculum remains comprehensive (common courses) until grade 10 (Nuffic 2013). The aim is to ensure that students acquire the basic knowledge and skills they need for everyday life. From grade 11, there are two types of high schools: general high school for those who wish to go on to higher education, and vocational high school¹ for those who intend to join the workforce on leaving school (Kim, J-H. Lee and Y. Lee 2003, 5). The division (tracking) at general high school is based on field of study, not ability, into science and humanities, to prepare students wanting to study science, engineering or social sciences at university. Students from different tracks study at the same school, and every student takes the same predetermined classes without changing classroom (Kim, J-H. Lee and Y. Lee 2003, 5). Korea also has special high schools to provide programs for gifted students in natural sciences and mathematics; for example, students can graduate from a two-year program at Seoul Science High School and continue to top-ranked universities or academic institutions (Choi and D-S. Hon 2009, 45).²

The curriculum allows students to choose from elective courses at grade 11. Those who opt for humanities and social sciences choose from subjects such as Korean language, moral education and social studies; and science students select such subjects as mathematics, science and technology. In addition, all students must complete a core set of compulsory subjects (MOEST Korea 2008). Thus South Korean tracking practice allows a degree of heterogeneity in the classroom and knowledge transfer or sharing between students. However, the exchange of ideas, or knowledge spillover, might occur only in compulsory classes such as foreign language, and might be limited to advanced subjects in each track; for instance, students following the social science track would have limited opportunity to take advanced science courses.

Vietnam

Vietnam keeps its education curriculum comprehensive until grade 9 (UNESCO 2007).

Tracking was first applied from grade 10 to grade 12 in 2006/07. Aiming to provide a wider choice, the curriculum was divided into three tracks: natural sciences, technology, and social sciences and foreign languages. The school principal or school council can decide how many tracks or which track the school should offer after getting approval from the Provincial Department of Education and Training (Fredriksen and Peng 2008). Requirements for the three tracks are knowledge or skill standards in all curriculum subjects. For example, to take natural sciences, students must have achieved advanced level physics, chemistry, biology and mathematics in the entrance exam. Still, students in each track have to take the same compulsory subjects (e.g. art, civic education, foreign language, geography, history, literature, mathematics, sciences, technology, sport and military education), with six hours a week devoted to their elective subjects (WES 2012).

Cambodia

Tracking in Cambodian schools starts at grade 11. Two different tracks are offered: science and social studies. The tracking system was introduced to give students the opportunity to develop their interests and shape their program of study by choosing up to four elective courses across the two tracks (MOEYS 2004). The science stream covers chemistry, physics, biology, earth and environmental studies; and social studies covers morality and civics, history, economics and geography. All students have to take four compulsory courses: Khmer literature, foreign language (English or French), basic (four hours a week) or advanced mathematics (eight hours a week), and physical and health education and sport.

Similarly to South Korea and Vietnam, Cambodia allows tracking within school, meaning that students take different classes according to their ability and subject choice. Whereas Singapore and Vietnam stream students based on ability, exam results and subject scores, Cambodia, like South Korea, mainly streams students based on their interests.

Discussion and implications

Singapore is a world leader in education and tops most major global education rankings. In the PISA 2012 assessment of problem solving, Singaporean

¹ For the purpose of this paper, vocational high schools are not included in the discussion.

² Special high schools, both private and public, have autonomy in selecting students, designing curricula and setting admission criteria.

students performed particularly well on knowledge-acquisition tasks and interactive items (OECD 2014b). The country's sustained success has been attributed to several factors, including close alignment between policy and practice, recruitment of high quality teachers and school principals, and a focus on teacher training and development for continuous quality improvement. In addition, basic mathematics and science courses starting at elementary level equip children with a solid foundation for success at school (OECD 2011).

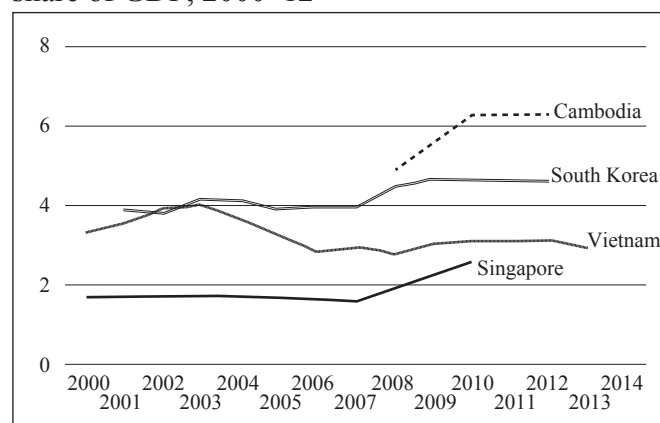
Notably, educational tracking in Singapore, which allows students to choose from different pathways or streams, has reduced student dropout rates, improved education quality and developed the skill sets required in a capital- and skill-intensive economy (OECD 2016). Even though tracking allows schools to develop curricula to meet students' needs and interests, there was initial criticism that it could have "adverse effects on student motivation and self-concept that would flow from the streaming-labelling process" (Kam and Gopinathan 1999, 113). Overall, in taking lessons from Singapore's education system, one must be mindful of its advantages as a very small city state with a relatively large government, strong social networks and a pervasive sense of community.

Increased government investment in education and effective use of foreign aid, first focusing on universal primary education and then secondary education to meet labour market demands, allowed South Korea to progressively improve the quality of teachers, instruction and school facilities. In 1954, 4.2 percent of total government budget went to education, rising to 15.2 percent in 1960. A special fund was created and additional tax revenues allocated to support curriculum development in the 1980s and 1990s. In addition, between 1960 and 1990, the government allocated 12.5 percent of development aid to education (Kim et al. 2015) (Figure 1). Financial investment aside, the perception of education as a tool for upward social mobility is a big factor behind South Korea's educational success (Sorensen 1994, 28).

The national education curriculum in South Korea was designed to impart comprehensive knowledge until grade 10, with tracking applied from grade 11. From an equality perspective, tracking seems to give students the freedom to choose their own courses in

either social sciences or natural sciences. However, placing students into different tracks based on their interests rather than abilities might not provide the homogeneity that would allow teachers to design better instruction; for instance, students who are not good at science could opt for the science track.

Figure 1: Government spending on education as share of GDP, 2000–12



Note: Cambodia data is only available for 2000 to 2010.

Sources: TheGlobalEconomy.com;

UNESCO www.theglobaleconomy.com/compare-countries/

Although not well documented, Vietnam's tracking practice is systematic. Students are placed into different tracks based on exam results or subject knowledge, and schools have autonomy to design the tracking to meet students' needs. Analysis of Vietnam's performance in education quality highlights two key success factors. First, Vietnam has been committed, for several decades, to investing in education in order to tackle illiteracy, increase enrolment rates and set minimum standards for education across the country; and second, Vietnamese teachers are qualified and student attendance is high (Bodewig 2013).

Similarly to South Korea, Cambodia's tracking practice gives students freedom to shape their study program and develop their interests through elective courses. This has reduced the burden of having to take too many subjects, some of which they might not be particularly interested in, in the final year of high school. Students can focus more on their specialisation subjects. On the downside, Cambodia still lacks a mechanism for implementing its tracking system. Securing sufficient resources and matching teachers to subjects remain critical issues at secondary school, especially for vocational subjects which in 1999

had the lowest matching rate of 5-20 percent.³ By contrast, core subjects such as mathematics, Khmer language and sciences had matching rates of 85-95 percent (UNESCO-IBE 2011).

Cross-country evidence highlights that tracking policy should place as much importance on building students' interest and confidence in a subject area as on frequent assessment of student progress and subject knowledge. To determine how frequent assessments should be and who should be involved in separating students into different tracks, it is important to consider the nature of the tracking policy and whether it is to start at primary school, lower secondary school or upper secondary school. For instance, because Singapore applies tracking from primary school (grade 5), it is important to involve parents in decisions about which subjects best fit their child's aptitude and talent, in addition to the school's assessment. On the other hand, if tracking starts at secondary school, it might not be necessary to involve parents in the same way; however, students' ability needs to be assessed and students need guidance on choice of subject area.

In Cambodia it is important not to undermine student motivation in choosing a track. For example, students may opt for the science track partly because they believe they would achieve high scores in the national exam. It stands to reason that in order to make informed and responsible choices for themselves and build on their strengths, students need sufficient information and knowledgeable guidance. In turn, teachers need to accurately interpret each student's knowledge and ability in order to assess their aptitude and potential and guide them on the right choice of subjects.

An assessment of each track is needed to measure the effectiveness of tracking practice in Cambodia and to find ways to improve the overall quality of education. In addition, critical reviews of best practices from other countries' experiences of tracking and curriculum development are needed for benchmarking the quality of education and adapting those foreign practices to ensure that they fit the Cambodian context and culture. Cambodia's education system might also need to consider promoting gifted schools that will allow talented students with an aptitude for science to reach their maximum potential.

Further research is needed to critically examine the practice of tracking at upper secondary schools in Cambodia to form a sound education policy and improve the quality of education. For example, randomised control trial studies can be a useful way to evaluate the effectiveness of tracking. It is important that further studies look at school autonomy, the role of the school principal and teachers, and how these factors affect on the quality of education under a tracked system.

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³ 100 percent matching means that a mathematics teacher, for example, teaches only maths.

Economy Watch—External Environment

This section presents economic indicators of major world economies and economies in South-East Asia during the first quarter of 2017.

In this quarter, Indonesia's real GDP rose by 5.0 percent from a year earlier, 0.1 percentage point more than in the previous quarter, while government expenditure and exports increased. GDP in Malaysia increased by 5.6 percent from the same quarter in the previous year, the highest growth since 2015, driven by strong domestic demand that set off the contraction of the external sector. Singapore's growth was 2.7 percent year on year, 0.2 percentage points lower than in the previous quarter, while manufacturing and services slowed from the acceleration in the previous quarter. Thailand's economy expanded by 3.3 percent over the year, 0.3 percentage points higher than in the preceding quarter, as household spending was robust due to high consumer demand and income increases in rural areas. Vietnam's growth was 5.1 percent year on year, 1.6 percentage points lower than in the previous quarter.

China's economy expanded by 6.9 percent from a year earlier, boosted by government expenditure on infrastructure and a robust housing market. The economy of China's Hong Kong SAR grew 4.3 percent year on year, the highest growth since 2012. South Korea's annual growth was 2.8 percent, 0.5 percentage points higher than a quarter earlier, impelled by the external sector and fixed investment. GDP in Taiwan expanded by 2.6 percent over the year, 0.3 percentage points lower than in the previous quarter.

The eurozone's real growth was 1.7 percent for the year, the same as in the previous quarter. Japan's economy expanded by 1.6 percent, the same as in the previous quarter, as private consumption and the external sector accelerated due to the yen's depreciation and strong global demand. Growth in the United States was 2.1 percent year on year. Compared to the previous quarter, it increased by 0.2 percentage points, while consumer spending and nonresidential fixed investment expanded more than expected.

World inflation and exchange rates

All the selected trading partners experienced inflation: Cambodia 4.2 percent, Indonesia 3.6 percent, Malaysia 4.3 percent, Singapore 0.7 percent, Thailand 1.1 percent, Vietnam 5.0 percent. Inflation in China was 1.4 percent, in Hong Kong 1.0 percent, in South Korea 2.0 percent and in Taiwan 0.8 percent. Inflation in the eurozone was 1.8 percent, in Japan 0.2 percent and in the United States 2.5 percent.

In this quarter, the USD-KHR exchange rate was KHR4015.8/USD. The Thai baht appreciated by 0.8 percent from the preceding quarter to THB35.1/USD, and the Vietnamese dong appreciated by 0.3 percent to VND 22429.1/USD. The Chinese yuan depreciated by 0.8 percent to CYN6.9/USD, and the Japanese yen depreciated by 3.8 percent from the previous quarter to JPY113.7/USD.

Commodity prices in world markets

Prices of most major commodities in world markets rose in this quarter. The price of maize increased by 5.5 percent to USD160.6/tonne, palm oil by 2.7 percent to USD773.0/tonne, rubber by 25.1 percent to USD2147.7/tonne, rice by 42.8 percent to USD537.0/tonne, and soybeans by 1.8 percent to USD419.1/tonne. The price of crude oil increased by 9.3 percent to USD52.0/barrel, gasoline by 6.6 percent to US cents 41.0/litre and diesel by 3.0 percent to US cents 41.4/litre.

Table 1: Real GDP growth of selected trading partners, 2009–17 (percentage increase over previous year)

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
Selected ASEAN countries												
Cambodia	0.1	6.0	7.1	7.3	7.4	7.1	-	-	-	-	-	-
Indonesia	4.2	6.2	6.5	6.3	5.8	5.2	4.8	4.9	5.2	5.0	4.9	5.0
Malaysia	-2.4	9.0	4.9	5.4	4.6	6.0	4.9	4.2	4.0	4.3	4.5	5.6
Singapore	-4.5	14.7	4.7	1.3	3.8	3.0	2.0	1.8	2.1	1.1	2.9	2.7
Thailand	3.3	7.9	0.0	6.7	2.8	1.6	2.8	3.2	3.5	3.2	3.0	3.3
Vietnam	5.4	6.4	6.2	5.2	5.4	5.9	6.6	5.5	3.5	6.4	6.7	5.1
Selected other Asian countries												
China	8.2	10.4	9.3	7.7	7.7	7.3	7.0	6.7	6.7	6.7	6.8	6.9
Hong Kong	-3.2	6.9	4.9	2.9	3.0	2.3	2.3	0.8	1.7	1.3	3.1	4.3
South Korea	-1.0	6.1	3.6	2.1	2.8	3.4	2.6	2.7	3.2	2.3	2.3	2.8
Taiwan	-3.6	11.1	4.2	1.2	2.2	3.5	0.6	-0.8	0.7	2.0	2.9	2.6
Selected industrial countries												
Euro-12	-3.8	1.6	1.6	-0.5	0.1	0.7	1.3	1.5	1.6	1.7	1.7	1.7
Japan	-5.4	4.1	-0.8	1.7	1.7	0.6	0.3	0.2	0.8	1.1	1.6	1.6
United States	-2.5	2.7	1.8	2.1	1.8	2.4	2.3	2.1	1.2	1.3	1.9	2.1

Sources: International Monetary Fund, Economist and countries' statistics offices

Table 2: Inflation rate of selected trading partners, 2009–17 (percentage price increase over previous year–period averages)

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
Selected ASEAN countries												
Cambodia	-0.5	4.1	5.5	3.0	3.0	3.9	1.2	2.4	3.1	3.0	3.6	4.2
Indonesia	4.7	5.1	5.4	4.3	7.0	6.4	6.4	4.3	3.5	3.0	3.3	3.6
Malaysia	0.4	1.7	3.2	1.7	2.1	3.2	2.1	3.4	1.9	1.4	1.7	4.3
Singapore	0.5	2.9	5.2	4.6	2.3	1.0	-0.5	-0.8	-0.9	-1.5	0.0	0.7
Thailand	-0.9	3.1	3.8	3.0	2.2	1.9	-0.9	-0.5	0.3	0.3	0.7	1.1
Vietnam	7.3	9.0	18.6	9.3	6.6	4.8	0.6	1.3	2.2	2.8	4.4	5.0
Selected other Asian countries												
China	-0.8	3.2	5.4	2.7	2.6	2.0	1.4	2.1	2.1	1.7	2.2	1.4
Hong Kong	-0.3	2.4	5.3	4.1	4.0	4.4	3.1	2.9	2.6	3.1	1.2	1.0
South Korea	2.8	3.0	4.4	2.1	1.1	1.3	0.7	0.2	0.9	0.8	1.3	2.0
Taiwan	-1.1	1.0	1.4	1.9	0.8	1.5	0.6	1.7	1.3	0.7	1.8	0.8
Selected industrial countries												
Euro-12	0.4	1.6	2.7	2.5	1.4	0.4	0.0	0.1	0.2	0.3	0.7	1.8
Japan	-1.3	-0.7	0.1	-0.03	0.4	2.8	0.9	0.2	-0.4	-0.5	0.3	0.2
United States	-0.4	1.7	3.2	2.1	1.5	1.6	0.0	1.1	0.7	1.1	1.9	2.5

Sources: International Monetary Fund, Economist and National Institute of Statistics

Table 3: Exchange rates against US dollar of selected trading partners, 2009–17 (period averages)

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
Selected ASEAN countries												
Cambodia (riel)	4140.48	4187.1	4063.6	4037.8	4027.2	4037.6	4060.4	4022.4	4056.3	4094.1	4041.9	4015.8
Indonesia (rupiah)	10413.83	9089.9	8748.0	9363.0	10419.2	11,850.2	13394.8	13627.3	13324.1	13136.6	13265.3	13344.7
Malaysia (ringgit)	3.52	3.2	3.1	3.1	3.1	3.3	3.9	4.2	4.0	4.0	4.3	4.4
Singapore (S\$)	1.45	1.4	1.3	1.2	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4
Thailand (baht)	34.34	31.7	30.5	31.1	30.7	32.5	34.2	35.6	35.3	34.8	35.4	35.1
Vietnam (dong)	17725.24	19200.8	20574.3	20856.9	20990.3	21138.2	21917.7	22929.4	22314.5	22292.2	22493.7	22429.1
Selected other Asian countries												
China (yuan)	6.83	6.8	6.5	6.3	6.1	6.2	6.3	6.5	6.5	6.7	6.8	6.9
Hong Kong (HK\$)	7.75	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
South Korea (won)	1277.76	1156.3	1108.6	1126.6	1095.0	1053.6	1131.9	1200.8	1163.4	1120.9	1159.0	1152.4
Taiwan (NT\$)	33.04	31.5	29.4	29.6	29.7	30.3	31.8	33.1	32.4	31.7	31.8	31.1
Selected industrial countries												
Euro-12 (euro)	0.72	0.8	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
Japan (yen)	93.6	87.8	79.9	79.8	97.6	105.9	121.0	115.3	107.9	102.4	109.5	113.7

Sources: International Monetary Fund, Economist and National Bank of Cambodia

Table 4: Selected commodity prices on world market, 2009–17 (period averages)

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
Maize (US No. 2)–USA (USD/tonne)	165.5	185.9	291.7	298.4	259.4	192.9	169.8	160.0	171.1	153.5	152.2	160.6
Palm oil–Northwest Europe (USD/tonne)	682.8	900.8	1125.4	999.3	856.9	821.4	622.7	586.9	647.8	714.7	753.0	773.0
Rubber SMR 5 (USD/tonne)	1884.8	3405.7	4630.6	3200.7	2575.3	1755.6	1392.7	1190.0	1408.1	1349.4	1716.9	2147.7
Rice (Thai 100% B) –Bangkok (USD/tonne)	524.5	506.6	558.5	594.8	533.8	434.9	395.5	385.3	465.0	430.3	376.0	537.0
Soybeans (US No.1)–USA (USD/tonne)	436.9	449.8	540.7	591.4	538.4	491.8	390.4	328.0	418.7	416.7	411.7	419.1
Crude oil–OPEC spot (USD/barrel)	57.7	76.8	106.2	109.5	105.9	96.2	49.6	31.2	44.7	43.3	47.9	52.0
Gasoline–US Gulf Coast (cents/litre)	40.8	53.3	71.9	74.6	71.2	65.6	41.0	27.9	37.5	36.8	38.5	41.0
Diesel (low sulphur No.2)–US Gulf Coast (cents/litre)	43.0	56.1	75.7	80.7	78.4	71.5	41.7	27.2	35.6	36.3	40.2	41.4

Sources: Food and Agriculture Organisation and US Energy Information Administration

Economy Watch—Domestic Performance

Main economic activities

In the first quarter of 2017, total fixed asset investment approvals contracted by 74.1 percent to USD131.4 m, from USD507.4 m in the previous quarter. Year on year, they decreased by 85.8 percent. Agricultural investment dropped by 90.3 percent to USD8.0 m from the previous quarter. Total industrial investment approvals were USD115.6 m, 64.0 percent lower than in the previous quarter. Investments in garments were USD54.0 m, 184.2 percent higher than in the previous quarter. Investment approvals in services were USD7.8 m, 92.5 percent lower than the previous quarter. Hotel and tourism investment was USD3.6 m, a 93.6 percent decrease from the previous quarter.

Total international tourist arrivals stood at 1,502,896 persons, a 0.03 percent decrease compared to the previous quarter and an 11.9 percent increase year on year. Compared to the same quarter last year, arrivals by air increased by 17.4 percent to 921,410 persons, while arrivals by land and water increased by 4.3 percent to 581,486 persons.

In this quarter, total exports were USD2290.7 m, a decrease of 6.7 percent from the previous quarter. Year on year, they fell 4.1 percent. Garment exports expanded by 5.6 percent to USD1856.3 m from the previous quarter and rose 5.5 percent year on year. Garment exports to the US were USD452.3 m, to the EU USD583.0 m, to ASEAN countries USD24.2 m, to Japan USD196.2 m and to the rest of the world USD600.6m. Agricultural exports rose by 12.0 percent to USD201.0 m from the previous quarter, and by 46.2 percent from the same quarter last year. Exports of rubber amounted to USD66.1 m, wood USD11.7 m, fish USD0.2 m, rice USD83.1 m and other agricultural products USD39.9 m.

Total imports expanded by 3.0 percent from a quarter earlier, and 14.2 percent from the previous year, to USD3173.5 m. Imports of gasoline were valued at USD75.1 m, diesel fuel USD146.4 m, construction materials USD55.6 m and other

imports USD2896.4 m.

Public finance

Total government revenue in the quarter was KHR4261.9 bn, 25.2 percent more than a quarter earlier, and 20.6 percent higher than in the same quarter last year. Current revenue was KHR3261.9 bn, 3.0 percent less than in the last quarter. Tax revenue was KHR3905.8 bn, 43.5 percent more than in the previous quarter, while non-tax revenue was KHR356.2 bn, 44.3 percent less than the preceding quarter.

Total expenditure was KHR3090.9 bn, 31.5 percent less than a quarter earlier, but 30.6 more than the same quarter last year. Capital expenditure was KHR859.0 bn, 29.9 percent less than the previous quarter. Current expenditure was KHR2231.9 bn, 32.0 percent less than a quarter earlier.

Inflation and foreign exchange rates

The overall consumer price index in the first quarter of 2017 was 4.2 percent, 0.3 percentage points higher than in the previous quarter. The prices of food and non-alcoholic beverages increased by 6.0 percent but that of transport declined 4.1 percent year on year.

Compared to the previous quarter, the riel appreciated by 0.6 percent against the dollar, to KHR4015.8 and by 1.7 percent against the Vietnamese dong, to KHR17.8 per 100 dong. Against the Thai baht, the value of the riel remained the same as in the previous quarter.

The price of gold dropped 1.9 percent to USD145.5/chi. The price of diesel fuel increased 8.4 percent to KHR3391.6/litre, while the gasoline price rose by 7.6 percent from the previous quarter, to KHR3697.0/litre.

Poverty situation

This section describes the poverty situation based on the survey of 120 garment workers and 320 other vulnerable workers in May 2017. The average real daily earnings of cyclo drivers, garment workers, motorcycle taxi drivers, porters, rice-field workers, small vegetable sellers, waitresses/waiters and unskilled construction workers decreased year on year. Only the earnings of scavengers and skilled construction workers increased. Since they started

their occupation, 64 percent of the vulnerable workers reported that their families were better off, 30.0 percent said they remained the same, and 6.0 percent said they were worse.

Garment workers' daily wages shrank by 6.6 percent from a year earlier, to KHR12,910. Sixty-nine percent of them were married. Their average level of education was sixth grade. On average, they had worked in the factory for four years. They worked 54.4 hours per week and saved 50.2 percent of their wages. Ninety-three percent of them sent savings to their families which could partially support them. About 54.2 percent did not want to change their jobs, 24.1 percent did, and 21.7 percent were not sure. Forty-six percent were optimistic about the future of their factory, 15.0 percent said that it would not be so good, 9.2 percent said that it would be the same, and the rest did not know.

Rice-field workers' earnings decreased to KHR7049 per day, an 11.0 percent decrease year on year. Seventy percent of those interviewed were the main income earners for their families. Their income had decreased compared to the previous quarter, 55.0 percent said. Eighty-two and a half percent stated that their income during May could partially support their families, while 17.5 percent said that it could not. Forty-seven and a half percent were in debt, and the average interest rate on their borrowing was around 2.2 percent per month.

Earnings of small vegetable vendors declined to KHR13,980 per day, 26.3 percent lower year on year. Vegetable vendors came from Svay Rieng (25.0 percent), Kandal (20.0 percent), Prey Veng (20.0 percent), Kompong Speu (12.0 percent), Phnom Penh (7.5 percent), Takeo (7.5 percent), Kampot (5.0 percent) and Siem Reap (2.5 percent). Thirty-five percent of them had no agricultural land. Fifty-five percent had 0.5 to 1.0 hectares, and the rest had 1.2 to 2.0 hectares. Forty percent of the respondents were the main income earners in their families. Seventy-seven and a half percent indicated that their capital was not enough for their business.

Scavengers' earnings increased by 42.3 percent from a year earlier, to KHR12,428 per day. Compared to the previous three months, the number of scavengers rose, but the source of rubbish and its price dropped, the majority of them said.

Ninety-two and a half percent of the scavengers interviewed were the family breadwinners. On average, scavengers needed to work 10.8 hours per day. They spent mainly on food (69.6 percent of their total spending), rent (14.9 percent), health care (4.1 percent) and other expenses (11.4 percent).

Daily earnings of unskilled construction workers decreased by 26.9 percent from a year earlier to KHR14,796 per day. Compared to the previous three months, the number of unskilled construction workers increased, 60.0 percent of the respondents said. Ninety-seven and a half percent of them said construction activities also increased. Seventy percent of these workers migrated alone to Phnom Penh or Siem Reap for work; Thirty percent migrated with family. They worked 9.4 hours per day on average. They spent 77.8 percent of their total spending on food, 13.5 percent on rent and 8.7 percent on other things. Their income could only partially support their families.

Compared to the same month last year, porters' earnings dropped by 1.0 percent to KHR14,625 per day. Seventy-seven and a half percent of these workers migrated alone to Phnom Penh or Siem Reap for work; 22.5 percent migrated with family. Their income was spent on food (73.3 percent of the total spending), rent (16.0 percent), health care (0.8 percent) and other expenses (9.9 percent). Since they started as porters, their families were better off, 67.5 percent reported, while 30.0 percent said that their families' livelihoods remained the same, and 2.5 percent said their families were worse off.

The daily earnings of waiters/waitresses decreased by 0.6 percent compared to the same month last year, to KHR8141 per day. All waiters/waitresses interviewed were provided accommodation by their employers. They had been working in this occupation for 3.8 years and worked on average 12 hours per day. They spent 72.9 percent of their total spending on food, 8.0 percent on health care and 19.1 percent on other spending.

Economy Watch—Economic Indicators

Table 1: Private investment projects approved, 2009–17

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
		Fixed assets (USD m)										
Agriculture	615	530.7	725.0	531.6	930.5	56.5	3918.9	27.6	0.0	7.4	82.1	8.0
Industry	818.5	403.7	2860.1	829.3	3257.0	1002.5	3918.9	252.4	597.0	266.1	320.8	115.6
<i>. Garments</i>	90.1	122.8	393.9	497.0	324.1	393.5	3918.9	70.8	239.9	51.1	19.0	54.0
Services	4432	1337.3	3425.4	916.6	140.7	622.6	3918.9	643.6	234.1	681.9	104.6	7.8
<i>. Hotels and tourism</i>	3980.1	1105.1	2850.9	691.5	106.0	446.9	3918.9	611.1	19.8	679.8	56.3	3.6
Total	5865.5	2271.7	7010.4	2278.0	4328.0	1583.9	3918.9	923.7	831.2	955.5	507.4	131.4
	Percentage change from previous quarter											
Total	-	-	-	-	-	-	-	80.5	-10.0	15.0	-46.9	-74.1
	Percentage change from previous year											
Total	-44.5	-61.3	209.0	-67.5	90.1	63.4	147.4	-67.9	226.4	242.0	-0.8	-85.8

Including expansion project approvals. Source: Cambodian Investment Board

Table 2: Value of construction project approvals in Phnom Penh, 2009–15

	2009	2010	2011	2012	2013	2014				2015		
						Q1	Q2	Q3	Q4	Q1	Q2	Q3
	USD m											
Villas, houses and flats	213.9	220.1	405.1	547.3	658.9	133.6	84.0	33.1	20.4	122.3	-	637.6
Other	187.8	217.8	199.9	463.6	859.6	190.0	141.7	105.6	11.7	49.8	-	252.6
Total	441.2	489.8	605.0	1010.9	1518.5	323.6	225.7	138.7	32.1	172.0	-	897.4
	Percentage change from previous quarter											
Total	-	-	-	-	-	34.3	-30.2	-38.5	-77.8	437.3	-	-
	Percentage change from previous year											
Total	-60.5	11.0	23.5	67.1	28.1	8.0	-9.2	-64.2	-86.7	-46.8	-	-

Source: Department of Cadastre and Geography of Phnom Penh municipality

Table 3: Foreign visitor arrivals, 2009–2017

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
		Thousands										
By air	1111.7	1304.3	1480.4	1722.1	2017.7	2273.5	2476.0	785.0	593.5	602.2	797.4	921.4
By land or water	999.7	1094.6	1401.4	1862.2	2192.5	2229.3	2299.2	557.4	522.7	545.3	705.9	581.5
Total	2111.5	2398.9	2881.8	3584.3	4210.2	4502.8	4775.2	1342.5	1116.2	1147.5	1503.3	1502.9
	Percentage change from previous quarter											
Total	-	-	-	-	-	-	-	-0.6	-16.9	2.8	47.6	-0.03
	Percentage change from previous year											
Total	-	-	20.1	24.4	17.5	7.0	-	-2.4	12.3	9.8	5.2	11.9

Source: Ministry of Tourism

Table 4: Exports and imports, 2009–2017*

	2011	2012	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
	USD m											
Total exports	3630.2	4929.5	4929.5	6106.4	6982.4	8106.0	9256.4	2388.3	2383.4	2817.7	2454.0	2290.7
Of which: Garments	3223.4	4259.6	4259.6	5015.4	5386.1	5960.5	6827.0	1759.4	1717.8	2072.5	1758.2	1856.3
. To US	1853.9	2055.3	2055.3	2143.3	2075.2	1963.6	2009.4	423.1	440.4	554.5	413.5	452.3
. To EU	809.5	1322.2	1322.2	1716.9	1969.6	2403.7	2903.9	789.6	776.6	733.4	629.2	583.0
. To ASEAN	9.9	17.6	17.6	39.4	60.2	83.3	103.4	25.6	25.7	21.4	25.7	24.2
. To Japan	86.5	147.0	147.0	188.6	278.7	383.1	524.2	176.0	122.5	216.0	140.9	196.2
. To rest of the world	463.6	717.5	717.5	927.2	1002.9	1126.8	1286.3	345.2	352.7	547.1	548.9	600.6
Agriculture	164.9	362.1	362.1	376.7	554.5	624.4	548.8	137.5	98.9	118.1	179.5	201.0
. Rubber	89.1	197.6	197.6	176.6	175.2	153.9	165.4	30.7	26.8	48.3	59.6	66.1
. Wood	34.1	48.8	48.8	36.8	73.6	132.0	46.3	4.9	12.4	11.6	18.3	11.7
. Fish	2.8	3.1	3.1	2.0	1.2	0.8	0.5	0.2	0.1	0.2	0.2	0.2
. Rice	34.7	106.6	106.6	146.4	262.3	248.5	315.3	91.4	56.1	53.4	99.9	83.1
. Other	4.1	6.0	6.0	14.9	42.4	89.1	21.3	10.3	3.6	4.6	1.6	39.9
Others	242.0	307.9	307.9	714.4	1088.2	1520.1	1880.2	491.3	566.6	627.1	516.2	233.4
Total imports	4332	5191	6375.9	8593.3	8639.4	10295.4	11494.5	2784.7	6136.6	3017.0	3080.8	3173.5
Of which: Gasoline	91.1	108.6	294.4	308.0	306.4	334.7	377.3	95.4	99.2	93.3	97.1	75.1
Diesel	180.7	203.8	447.0	559.5	569.1	602.3	607.8	163.1	194.6	173.7	178.0	146.4
Construction materials	49.7	57.6	48.1	66.1	80.8	117.6	164.4	50.8	62.1	83.1	57.4	55.6
Other	4010.0	4820.6	5586.4	7659.1	7682.6	9240.7	10345.1	2475.0	5780.8	2667.0	2748.4	2896.4
Trade balance	-1429.9	-1560.5	-1446.4	-1341.6	-1610.9	-2184.3	-2238.1	-390.7	-3753.3	-199.4	-626.8	882.8
Percentage change from previous quarter												
Total garment exports	-	-	-	-	-	-	-	4.7	-2.4	20.6	-15.2	5.6
Total exports	-	-	-	-	-	-	-	3.4	-0.2	18.2	-12.9	-6.7
Total imports	-	-	-	-	-	-	-	-5.8	120.8	-50.8	2.1	3.0
Percentage change from previous year												
Total garment exports	-14.1	25.7	32.1	17.7	7.4	10.7	14.5	13.6	7.2	3.9	4.6	5.5
Total exports	35.8	23.9	14.3	16.1	-	-	14.2	10.1	9.2	8.6	6.3	-4.1
Total imports	22.8	16.8	15.4	19.7	21.4	19.2	11.7	5.0	2.5	110.1	3.8	14.2

* Import data include tax-exempt imports.

Sources: Department of Trade Preference Systems, MOC and Customs and Excise Department, MEF (website)

Table 5: National budget operations on cash basis, 2009–17 (billion riels)

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
Total revenue	4885.2	5989.0	6251.4	7691.9	8255.2	10543.4	11879.9	3533.1	3849.7	3413.7	3405.0	4261.9
Current revenue	4855.9	5859.1	6179.3	7443.8	8233.2	10359.4	11759.0	3514.7	3836.3	3375.9	3361.7	3261.9
Tax revenue	4268.0	4693.0	5277.5	6334.8	7198.1	8995.2	10,502.4	3255.5	3368.1	2850.5	2722.4	3905.8
Domestic tax	3088.6	3533.6	4071.6	5002.8	5728.1	7226.5	8591.7	2715.3	2854.5	2378.5	2237.4	2450.0
Taxes on international trade	1064.7	1159.4	1205.9	1331.7	1470.0	1822.7	1910.7	540.1	513.6	472.0	485.0	455.8
Non-tax revenue	702.1	1166.1	901.8	1118.2	1035.2	1310.3	1256.6	259.3	468.2	525.4	639.4	356.2
Property income	64.6	291.1	63.8	143.0	84.0	88.5	77.3	8.1	26.1	43.2	38.5	17.4
Sale of goods and services	408.0	460.1	588.7	667.4	750.3	871.2	1047.1	198.5	315.3	294.9	439.5	272.1
Other non-tax revenue	228.2	408.9	249.3	298.8	200.8	350.5	132.2	52.7	126.8	187.3	161.3	66.6
Capital revenue	29.3	129.9	72.1	247.9	73.4	184.0	121.0	18.3	13.4	38.4	43.3	0.0
Total expenditure	7383.5	8784.6	9032.4	9660.9	12535.7	13306.5	13849.5	2364.3	3405.3	3460.8	4509.2	3090.9
Capital expenditure	2694.9	2853.2	3546.9	3628.3	5567.5	5590.7	5290.3	620.9	1091.1	811.3	1225.6	859.0
Current expenditure	4440.0	4773.1	5341.2	6188.4	6968.3	7715.8	8544.6	1743.4	2314.2	2649.1	3283.6	2231.9
Wages	2012.0	2048.8	2170.6	2486.6	2997.3	3755.5	4271.9	1133.1	1418.3	1403.6	1426.7	1567.6
Subsidies and social assistance	871.4	1099.4	1518.8	1586.8	1563.0	1627.0	1742.9	259.1	439.7	447.5	628.7	312.9
Other current expenditure	1556.6	1624.8	1651.8	2115.1	2408.0	2333.4	2529.8	351.2	456.2	798.1	1228.2	664.3
Overall balance	-2498.3	-2795.7	-1271.4	-1969.0	-4280.6	-2763.1	-1969.6	1168.8	444.4	-47.0	-1104.2	1171.1
Foreign financing	1746.1	1845.2	-2781.0	2457.8	4326.2	3972.1	3729.4	266.4	775.6	141.0	661.9	598.5
Domestic financing	474.9	938.6	2379.2	-332.9	824.4	-1428.7	-2034.9	-1631.4	-488.5	37.5	342.7	-352.8

Source: MEF website

Table 6: Consumer price index exchange rates and gold prices (period averages), 2009–17

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
Consumer price index (percentage change from previous year)												
Phnom Penh - All Items	-0.7	4.1	5.4	2.3	3.0	3.9	1.2	2.5	3.0	3.0	3.9	4.2
- Food & non-alcoholic bev.	-0.3	4.4	6.5	2.5	3.9	4.9	4.0	4.7	6.2	5.5	6.0	6.0
- Transportation	-10.7	7.0	6.9	3.3	-0.6	-1.0	-9.2	-6.5	-9.9	-7.9	-3.4	4.1
Exchange rates, gold and oil prices (Phnom Penh market rates)												
Riels per US dollar	4140.5	4187.1	4063.6	4039.2	4036.2	4060.4	4060.4	4022.4	4056.3	4094.1	4041.9	4015.8
Riels per Thai baht	121.1	133.1	133.2	130.0	124.9	119.4	119.4	113.4	115.7	118.1	114.9	114.9
Riels per 100 Vietnamese dong	23.4	21.7	19.7	19.4	19.1	18.7	18.7	18.1	18.3	18.5	18.1	17.8
Gold (US dollars per chi)	113.1	147.6	184.5	200.9	175.9	152.3	140.6	151.2	151.2	157.1	148.3	145.5
Diesel (riels/litre)	3170.9	3859.3	4761.2	4941.2	4852.1	4934.1	3771.3	2903.8	2932.8	3050.2	3129.3	3391.6
Gasoline (riels/litre)	3593.1	4368.1	5044.5	5312.7	5083.3	5155.7	3951.7	3310.6	3318.2	3281.4	3437.1	3697.0

Sources: NIS, NBC and CDRI

Table 7: Monetary survey, 2009–17 (end of period)

	2009	2010	2011	2012	2013	2014	2015	2016				2017
								Q1	Q2	Q3	Q4	Q1
Billion riels												
Net foreign assets	14655.0	16697.9	17893.9	18154.5	21260.1	26699.7	26665.5	29247.8	30138.5	32188.4	32814.5	36490.5
Net domestic assets	1573.0	2778.9	5760.8	10437.4	11508.3	15859.8	22157.6	21643.0	24399.1	24939.2	25802.3	24057.0
Net claims on government	-2252.0	-2126.6	-2123.1	-2486.4	-2794.9	-4359.1	-6428.8	-7621.2	-7977.4	-7916.6	-8148.5	-9818.9
Credit to private sector	10532.0	13331.2	17552.8	23536.6	27608.8	36244.6	46071	47627.0	52528.6	54551.1	56458.8	57385.9
Total liquidity	16228.0	19476.8	23654.7	28591.9	32768.4	42559.5	48823.1	50890.9	54537.6	57127.5	57616.8	60547.4
Money	3120.0	3220.9	3956.2	4045.7	4878.2	6308.4	6741.4	6717.8	6872.0	7460.9	7273.0	7524.7
Quasi-money	13108.0	16255.9	17893.9	18154.5	21260.1	26699.7	42081.7	44173.1	47665.6	49666.6	50343.8	53022.7
Percentage change from previous year												
Total liquidity	36.9	20.0	17.8	20.9	14.6	29.9	14.7	16.5	18.2	21.7	18.0	19.0
Money	30.1	3.2	16.9	2.3	20.6	29.3	6.9	1.4	9.2	18.7	7.9	12.0
Quasi-money	38.6	24.0	17.9	44.6	13.6	30.0	16.1	19.2	19.6	22.1	19.6	20.0

Source: National Bank of Cambodia

Table 8: Real average daily earnings of vulnerable workers (base November 2000)

	Daily earnings (riels)								Percentage change from previous year		
	2012	2013	2014	2015	2016			2017		2016	2017
					May	Aug	Nov	Feb	May		
Cyclo drivers	10303	10438	10774	12405	11898	11302	10985	11092	10916	-44	-6.6
Porters	12143	13247	13580	15631	11774	14094	13514	15171	14625	-4.7	1.9
Small vegetable sellers	10771	11366	14751	15867	18979	11903	17488	18411	13980	6.1	-9.5
Scavengers	8680	9819	9173	12344	8737	9953	11347	11478	12428	0.1	2.9
Waitresses/waiters*	6111	6697	7789	8436	8187	7895	8,015	7905	8141	3.6	0.6
Rice-field workers	6151	6599	7514	8745	7916	7722	8229	8332	7049	-7.5	-1.8
Garment workers	8932	10161	11178		13828	12900	13136	14889	12910	-10.9	0.01
Motorecycle taxi drivers	12930	13450	13386	14455	15425	13653	13434	14770	13888	-6.7	-4.9
Unskilled construction workers	11078	13184	13336	15349	20227	13894	19174	16664	14796	31.1	3.1
Skilled construction workers	13743	15442	17420	18624	21150	19184	20287	21716	21924	13.8	15.2

* Waitresses' earnings do not include meals and accommodation provided by shop owners. Surveys on the revenue of waitresses, ricefield workers, garment workers, motorecycle taxi drivers and construction workers began in February 2000. Source: CDRI
November 2015 data are not available.

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evidence-based research and policy can work together to solve shared problems and find solutions for sustainable development. This was an important opportunity for CDRI to share its experience in environmental policy research with various regional and international partners.

12 June 2017, Phnom Penh

Signing of a memorandum of understanding between CDRI and the University of Health Sciences (UHS). This agreement establishes a collaborative research relationship to carry out new research on medical professionalism.

15-16 June 2017, Shenzhen, China

UNESCO-ICHEI Regional Conference on Quality Assurance of Higher Education in Asia-Pacific. CDRI's executive director was appointed advisor to the International Centre for Higher Education Innovation (ICHEI) and participated in the first meeting of the International Advisory Committee and the Asia-Pacific Regional Conference on Quality Assurance in Higher Education. Held in Shenzhen, China, the event attracted more than 100 top education leaders from over 30 countries and was an important networking opportunity for CDRI.

20 June 2017, Phnom Penh

Strengthening cooperation in technology and innovation research. CDRI signed a contract with Swisscontact Cambodia to collaborate in the field of technology and innovation research. Joint activities will address key challenges in agriculture, water and other sectors through the promotion of research, technology and education using a market systems approach.

RESEARCH

Agriculture

The team is implementing six projects. Report writing for the project *Impact of Rice Export Promotion Policy and Food Security* is going smoothly. *Irrigated Agriculture in Cambodia*, a study backed by the Australian National University

(ANU), concluded with the completion of the technical report which is to be published on CDRI's website as a special report. Another output of the project is the article on the intensification of rice and livestock production in Cambodia published in this issue of the *Cambodia Development Review*. The team successfully completed endline data collection in five provinces (Kandal, Takeo, Kompot, Prey Veng and Svay Rieng) for the project *Testing Innovative Models of Extension in Cambodia's PADEE Programme*, funded by the International Food Policy Research Institute (IFPRI). This project has been extended to test a new extension model for the Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE). The final research outputs including a policy paper, policy brief and book chapter to disseminate the findings of *Rice Policy Analysis*, a study funded under the Lower Mekong Public Policy Initiative (LMPPI), were submitted to LMPPI. The team is preparing the concept note for a consultative workshop scheduled in August on *Agricultural Commodity Exports to the Mekong Region – Thailand, Vietnam and China*, a CDRI-Sida resource partnership 2016-21 project. Work on a *Final Evaluation Study* commissioned by the Arbitration Council Foundation (ACF) started in April. The inception report was well received by ACF, and the team is now conducting fieldwork in Phnom Penh.

Economics

The study *Interrelations between Partner Countries' Public Policies, Migration and Development: Case Studies and Policy Recommendations* was successfully completed. The team, in collaboration with the Ministry of Interior and the Organisation for Economic Co-operation and Development (OECD), organised the Launch of Report Workshop on 27 April in Phnom Penh, with strong participation from government agencies, NGOs, research and academic institutions. Also nearing completion is the project on *Exploring Non-Tariff Measures on Cambodia's Fish Exports*. The team submitted the final report and presented key findings at the ARTNeT Dialogue on *Analysing Non-Tariff Measures: Collating Evidence and Setting Research Agenda* on 26-27 April in Bangkok, Thailand.

Making good progress is the *Improving Job Prospects for the Young: Labour Markets, Skill Development and Private Sector Development in the Greater Mekong*, a three-year program under the Greater Mekong Subregion Research Network (GMS-Net), a regional research consortium supported by Canada's International Development Research Centre (IDRC). All country research teams submitted their final reports in May and presented their research findings at a regional technical workshop in July.

Also making good progress are three other projects. The first is *Vocational Training and Labour Market Transitions: A Randomised Experiment among Cambodian Young Adults*, which receives funding from GMS-Net. The team is now preparing the final report to be submitted in August. The second is the project on *Mapping Cambodia's Participation in Global Value Chains (GVCs)*, a research study under the Sida-funded five-year program on *Industrial Development, Human Capital and SME Development in Cambodia*. The team has finished the literature review and is now examining the GVC database before starting fieldwork. The third project, *Cambodia's Industrial Development Policy and One Belt, One Road – The Development of Sihanoukville Province as a Multipurpose Special Economic Zone and Utilisation of OBOR Initiative*, is funded by the Cambodia 21st Century Maritime Silk Road Research Center. The team has completed the literature review and plans to conduct fieldwork in August.

Education

In April, the team had a meeting at Seametre Centre in Takeo province to discuss strategic planning, expected responsibilities, and the research themes under three major policy-oriented research grants, from Australia's Department of Foreign Affairs and Trade, the Swiss Agency for Development and Cooperation (SDC) and the Swedish International Development Cooperation Agency.

The team organised an inception workshop in May to launch *Research, Policy Dialogue and Capacity*

Building Program on Technical and Vocational Education and Training – a three-year research project funded by SDC. The aim of the workshop was to inform CDRI's stakeholders of the proposed research programs and to seek their consultation, advice and collaboration regarding how to move the TVET program forward. In the same month, the unit organised a week-long Writing Retreat to provide team members a conducive and dedicated space for research paper writing and data analysis. Through a series of hands-on training workshops and seminars, CDRI senior economists and education researchers taught junior researchers how to analyse quantitative data using STATA. The aim was to build the team's capacity to interpret survey data on STEM (science technology, engineering and mathematics) collected from higher education institutions across five regions.

In June, the team visited the Regional Polytechnic Institute Techo Sen Kampot to learn about the contexts and challenges of TVET, and seek possible areas for collaboration with the institute. The team finished a UNESCO-commissioned work on the topic "Internalising the SDG 4 Education 2030 – An Analysis of Linkages With and Contribution of Different Sectors in Attaining the Education 2030 Targets in Cambodia". The work was the collaborative effort of six researchers across Education, Health, Economics and Agriculture units.

In sum, the Education Unit succeeded in bringing together relevant partners and consulting them on proposed research programs, sought further collaborations, finished a commissioned work, promoted interdisciplinary teamwork and improved capacity for data analysis.

Environment

The Environment Unit was involved in various research activities. The team worked with researchers from the Governance Unit to carry out the MK20 project, focusing on *Gender and Resettlement Process and Multistakeholder Platform* for the Lower Sesan 2 dam and completing

fieldwork for a study on *Water Governance in the 3S River Basins*. For the cross-unit study *Political Economic Analysis of Civil Society in Cambodia*, funded by USAID, the unit organised five focus group discussions, three with representatives of NGOs (one in Phnom Penh and two in Siem Reap) and two with representatives of community-based organisations (CBOs). In total, 87 NGO and CBO leaders across Cambodia were interviewed.

Within the unit, several key research activities were undertaken. The project *Empowering Women for Climate Resilience in Cambodia*, funded by the UN Democracy Fund, got underway. Involved in this project are four NGO partners, namely Akphiwat Strey (AS), Ponlok Khmer (PK), Women's Organization for Modern Economy and Nursing (WOMEN) and Cambodian Womens's Crisis Centre, working in four provinces: Battambang, Preah Vihear, Prey Veng and Kampot. In addition, the unit was commissioned by Save the Children Cambodia to conduct an analysis of the livelihoods of villagers and children living in floating villages on the Tonle Sap Lake in Pursat and Kampong Chhnang provinces.

The final report and a policy brief for *Gender in Environmental Impact Assessment in Cambodia*, a project funded by USAID under the Mekong Partnership for the Environment, were completed. A working paper titled *Common Pool Resources and Climate Change Adaptation* was published and a synthesis study on *Climate Change Adaptation, Livelihoods and Inclusive Growth* released.

Governance

The team working on the Mekong Water Governance project is close to completing two studies with the publication of two working papers, both of which explore critical issues involving the construction of Lower Sesan 2 dam. One examines local people's experiences and perceptions of multi-stakeholder engagement, and the other looks at the social and gender impacts of resettlement planning on affected communities. Fieldwork visits to Stung Treng province were organised and key institutional actors interviewed, including representatives from the provincial administration and departments

of Women's Affairs, Environment, Mines and Energy, and Water Resources and Meteorology. Preliminary analyses and findings were presented at the International Conference on Public Policy held at the Lee Kuan Yew School of Public Policy in Singapore on 27-30 June.

The unit also organised two training workshops, one on Ethnographic Methods and Practices in Southeast Asian Studies and the other on How to Write and Present an International Conference Paper. Both workshops were facilitated by Dr Duncan McCargo, Professor of Political Science at the University of Leeds. In addition, in late June, the unit hosted a research workshop with visiting scholars from Bradford University on the topic North-South Research Collaboration, with participation of government officials, academics and donor representatives.

Health

The signing ceremony for a memorandum of understanding (MOU) between CDRI and the University of Health Sciences (UHS) took place in June. The objectives of this MOU are to develop and implement a cooperative program of action research which will address two research questions: What qualities make a good doctor? How to help medical students become good doctors? The first concept note was immediately submitted to the Research Office of the Faculty of Medicine for review, and the Health team and their counterparts at UHS have already held a series of discussions about the background, objectives, targets, research design and methods, and analytical framework. A draft research proposal on medical professionalism in Cambodia was also updated and is awaiting feedback from the Research Office of UHS.

Continued from page 16 **Tracking in ...**

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CDRI Update

MAJOR EVENTS

19-21 April 2017, Tianjin, China

Moving TVET forward. CDRI's executive director and HE Sok Siphana, chairman of CDRI's board of directors, visited Tianjin Sino-German University of Applied Sciences, China, where Dr Sok Siphana has been appointed visiting professor. The university is building the international Lancang-Mekong Vocational Training Centre at the National Polytechnic Institute of Cambodia, which is scheduled to open in early 2018. The university expressed interest in continuing its support for TVET training in Cambodia and undertaking collaborative research with CDRI on TVET policy development. Exchange of scholars between the two institutions was encouraged.

27 April 2017, Phnom Penh

Making the most of migration. Senior managers and researchers attended the launch of the report on Interrelations between Public Policies, Migration and Development in Cambodia. The report is the output of a joint project between CDRI's Economics Unit and the OECD Development Centre, in collaboration with the Ministry of Interior and with support from the European Union. It addresses three factors of migration that affect the socioeconomic fabric of Cambodian society –

emigration, remittances and return. The aim of the project was to provide policymakers with evidence on the way migration influences the labour market, agriculture, education, investment and financial services and, conversely, how sectoral policies can influence patterns of migration.

2 May 2017, Phnom Penh

Research, policy dialogue and capacity building on TVET. CDRI's Education Unit organised an inception workshop in Phnom Penh to launch a new three-year TVET research program, which is funded by the Swiss Agency for Development and Cooperation (SDC). The workshop brought together various stakeholders from government, education institutions and the private sector. The aim was to seek their consultation, advice and collaboration on how to move the TVET program forward.

30 May 2017, Bangkok, Thailand

Stockholm Environment Institute (SEI) Science Forum 2017 – science and policy confront the challenge of sustainability. The executive director represented CDRI at the annual SEI Science Forum, which was co-hosted by Chulalongkorn University in Bangkok, Thailand. The forum looked at how

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