*A close up of a logo

Description automatically generated*

ADB I.T Social Innovation Hub Report

Alleviating poverty in Cambodia through technology

*R15B-2：Jayden Zhang, Aaron Amaral, Jack Liao, Aaron Auld, Faye He*

**CONTENTS**

**Page**

**I. OVERVIEW 2**

**II. COLLABORATORS 2**

**III. FUNDING 3**

**IV. SKILLS REQUIRED 4**

**V. KEY TECHNOLOGIES**

A.Precision Irrigation System **5**

B.Water Efficient Soil Mixture - Bountigel G **6**

C.Zoom/GM Crops **7**

**VI. TIMELINE 8**

**VII. RISKS 9**

**VIII. COSTS 10**

**IX. BENEFITS 11**

**X. RETURN OF INVESTMENT 11**

**XI. CONCLUSION 11**

**XII. REFERENCES 12**

**XIII. CONTRIBUTIONS 14**

**I. OVERVIEW**

The proposed Social Innovation Hub aims to assist in poverty alleviation within regions that the Asian Development Bank (ADB) operates. The facility will provide I.T services and explore technologies with the capabilities to contribute towards relieving poverty.

The Social Innovation Hub contributes towards identifying technologies to aid the accomplishment of the Sustainable Development Goals outlined by the United Nations specifically focusing on goals 1(No Poverty), 2(Zero Hunger), 4(Quality Education) and 6(Clean Water and Sanitation) (United Nations, 2020)

Cambodia was chosen specifically due to the significant opportunities available to enhance their economy and alleviate poverty throughout the country (World Vision, 2020). Agriculture is one of the largest sectors of the Cambodian economy and employs the majority of the workforce. Hence applying technologies through the Social Innovation Hub to agricultural practices will create new jobs as well, improving the quality of life and raising the minimum wage.

**II. COLLABORATORS**

1**. Precision Irrigation System - Netafim**

Netafim is an israeli manufacturer of irrigation equipment and leader in sustainable agricultural technologies that include monitoring systems, control systems and crop management.

**2. Water Efficient Soil Mixture - mOasis**

mOasis is a company that specialise in innovation crop science and manufacture products that improve water efficiency of soil.

**3. Online Education – Zoom**

**III. FUNDING**

Funding for development of the Social Innovation Hub will require significant capital from the ADB due to the high start-up costs of such a project. Of the $3 million provided by the ADB 40% will be used for construction and maintenance of the facility, 20% will go towards initial wages and the remaining 40% will go towards market research and obtaining the technologies to be implemented in Cambodia.

Capitalizing on grants from organisations seeking to partner with projects believed to be aiding a mutual cause. The Australian Embassy for Cambodia has the Direct Aid Program (DAP) providing small grants (up to $15,000) to projects with objectives that align with their criteria such as developing science, technology, engineering and mathematics capacity (Cambodia Embassy, 2020).

Additionally, partnering with venture capitalists is highly advised due to the high growth potential of the Social Innovation Hub. It would be recommended to acquire partnerships with relevant companies in order to have access to their resources and technologies. It would be expected to raise an initial $5 million from these partnerships which would then go towards development and implementation of the technologies sourced for the hub in a pilot program. Upon successfulness of these programs we will then decide whether to implement them full scale and if so aim to raise an additional $10 million.

**IV. SKILLS REQUIRED**

To run the Social Innovation Hub, we need people with a wide range of skills. Talents with the following skills are who we are looking for.

**1. Interpersonal and communication skills** make decisions more rational and effective. The supervisor should pass the information clearly to the staff, and the staff should accurately understand the decisions and improve work efficiency. Also, colleagues should unite closely to reduce or resolve team conflicts.

**2. Leadership** can be one of the most important skills. If it feels that there are no employees in the company that can have strong leadership skills, it is recommended to hire professionals. Usually, such a person or a team can avoid a larger number of mistakes such as unnecessary capital expenditures and personnel expenditures.

**3. Skills of risk assessment and problem-solving** are required. As the project progresses, there will be various risks. The skill of risk assessment helps to identify the risk, and the skill of problem-solving helps to make an effective solution. Take budget risk as an example, assessing budget risk is to predict capital expenditures and risk standards when facing risks. The risk assessment skill helps to realize that there may be a shortage of capital chain in the early stage of preparation so that the team can collect as much cash flow and capital reserve as possible.

**V. TECHNOLOGIES**

**A. Precision Irrigation System**

The largest sector of Growth Domestic Product (GDP) in Cambodia is the agricultural sector contributing on average 22%. As such an improvement in farming practices will enable more efficient production and improve the quality of living ultimately reducing poverty.

One such technology that would provide drastic improvements is the commercialization of precision irrigation systems. Precision irrigation is the process of feeding water and nutrients directly to the plants instead of the soil. This process grows higher yields of healthier crops in addition to lowering costs and reducing water wastage during the crop production process (Seametrics, 2020). In comparison to traditional farming techniques utilized in rural areas, precision irrigation collects information, uses algorithms and modelling to enhance the benefits generated from the system (Mckee, M., & Torres-Rua, A, 2020).

As time continues more and more stress will be placed on the earth’s resources, especially on the need to manage water for current and future generations. Moreover, as demand for food grows and water resources diminish, precision technology will help farmers save water whilst simultaneously increasing productivity (Temple, L. 2020). Precision irrigation is also more effective than overhead spray irrigation, since overhead systems are subject to water evaporation and surface run-off.

Precision irrigation measures evapotranspiration and detects crop stress, utilising this information enables for more accurate measurements and precise scheduling decisions on water distribution. Thus, adopting precision irrigation will enable for greater crop harvests driving the Cambodian agricultural sector to more efficient production ultimately increasing the GDP and alleviating poverty.

**B. Water Efficient Soil Mixture - Bountigel G**

Due to lack of access to irrigation, an estimate of 76 % of farmers in Cambodia still rely on the weather for irrigation (United States Department of Agriculture, 2010). The farmers are constantly in the risk of losing all their crops if the weather is not in their favour. As such, we are introducing BountiGel G, a granular product that improves soil moisture holding capacity. It can store 250 times its weight in water. The farmers first distribute the product evenly in the field before seeding. The BountiGel G will then absorb and hold the water at seed line or root zones after irrigation. It slowly releases water to ensure a uniform growth rate of the crops and thus improving overall yields and quality. By prolonging the irrigation cycles, it puts farmers in a safer place when there is a sudden shortage of water or lack of water in general.

We will first launch a pilot program and test the effectiveness of BountiGel G on Cambodia lands. We will apply BountiGel G on 5 acres of field that have a decent irrigation system to see how the growth rate and yields improve. We will experiment on another 5 acres of field that only have occasional irrigation and see if the survival rate of crops will improve. The duration of this program will be 6 months.



# (mOasis, 2017)

**C. Zoom/GM Crops**

A key problem that has been observed in developing countries like Cambodia is minimal access to quality education relating to farming practices. The western world has developed agricultural practices that are extremely more efficient and are yet to be introduced to developing nations. Hence, by using emerging technology in the communications/education field such as Zoom and also introducing biotechnologies particularly GM crops, we aim to improve the efficiency of farming practices and the quality of produce.

The World Farmers Organisation is a key institution that could be looked into for a partnership relating to agricultural education. Their primary objective is to bring together the world’s farmers to develop policies to support farmers in developing countries. Given the strong membership from across the world, particularly in developed countries, they could educate Cambodian farmers on the best practices and can help supply the necessary chemicals and products to make these learnings a reality.

To aid communication, remote learning tech such as Zoom could be implemented. Given the current coronavirus pandemic, it has become apparent that distanced learning is a suitable and cost effective alternative to providing physical teachers. That said however, we are not naive to not acknowledge that real teachers will also be needed, however the use of remote learning such as Zoom will allow for less physical teachers to be required and allow international farmers to share their expertise. Ultimately, this should allow for farmers in Cambodia to learn and adapt to new technologies used in modern farming.

**VI. TIMELINE**

|  |  |  |  |
| --- | --- | --- | --- |
| **Stages** | **Milestones** | **Estimated Required Time** | **Outcome** |
| 1.Setup of I.T  Social Innovation Hub | a. Contact WFO to collaborate with Agricultural experts | 3 months | To build the foundation of our hub and to ensure a smooth start with our operation in Cambodia. |
| b. Find office space and set up in Singapore |
| c. Contact with FAO to seek support from the local FAO team |
| 2. Funding | Initial starting fund of $5 million | 3 months | Initial funding will go towards the setup of the hub and the pilot programs |
| Seek further investment to support full-fledged program across Cambodia | 6 months | Further investment needed to increase of scale of operation |
| 3. Implementation | 1. Set up bi-weekly online talks through Zoom between the agriculture experts and the farmers. | 6 months | Allow for farmers in Cambodia to learn and adapt to new technologies used in agriculture to improve production |
| 2. (a) Pilot Testing Program and performance analysis | 6 months (1-2 production cycle depending on the rice varieties) | To ensure our solution is effective in solving the problem in hand before pushing it out to the farmers to avoid unnecessary cost and financial burden on the farmers |
| 1 month |
| 4. (c) Gradually increase scale of promotion across Cambodia | 1 -2 years | Ensure as much farmers as possible are benefited |

**VII. RISKS**

For simplicity sake, we will categorise risks in terms of internal and external risks.

Internal risks that we may face include:

* Operational challenges caused by personnel
* Technological challenges associated with distance learning software (i.e. connection issues), irrigation control issues, and defective soil mixtures
* Physical risks such as the loss of technologies during transportation

External risks on the other hand constitute problems such as:

* Economic downturns - global and/or domestic
* Natural disasters - particularly flooding, typhoons and droughts in Cambodia
* Changes in the political environment that may inhibit the ability of our plan to proceed
* Lack of understanding from local communities regarding controversial technologies such as GM products

**VIII. COSTS**

Firstly,rent of the innovation hub would cost $55,000 per month (Office Finder Singapore. 2020) to accommodate employees for the project. Furthermore, the Administrative cost of $63,000 per year per person (Glassdoor.com.au. 2020) is required for the salaries of staff. Finally, Utility fees of $3000 per monthwould cover the monthly necessities.

A consulting fee of $12,000 is also needed to look for reliable potential investors. Part of the funding will be used on advertising to convince potential investors and would take$4,000 per month.

For the implementation of our solution, there is a setup fee with a total of $970,000 (telecomHall Forum. 2020) and also the salary of agriculture teachers and Zoom subscription as outlined below.

A screenshot of a cell phone

Description automatically generated

Table of total cost

**IX. BENEFITS**

Better farming strategies and technologies will increase yield of crops causing the GDP to rise, resulting in a wealthier lower class with an improved standard of living. The farmers will also be skilled in using these new technologies after training allowing for an expansion of the domestic food supply for emergency situations.

By lowering the long-term cost of production of agricultural products, it allows Cambodia’s exports to be more price-competitive in the global market and provide more job opportunities within the primary sector. Introducing innovative technologies will save time for the local government to develop those technologies by themselves.

**X. RETURN OF INVESTMENT**

Average direct cost was US$309.65 ± 4.59 per ha and gross margins of 513.29 ± 26.42 per ha can be obtained. (Pao Srean,2018)

Our solution will be expected to drive the cost of production up by 10%. The cost now includes maintenance fee and purchase of BountiGel G. However, part of the increase in cost is counteracted by lower demand for water.

The production is expected to increase by 40% due to better irrigation and thus better yield.

Since the purpose of our hub is to eliminate poverty, we would only take 15% of the total gross margin from the farmers as our profits. The revenue is then 218 USD per hectare each year.

With the increase in scale of implementation, if we could get enough farmers with a total of 5000 hectares of fields to participate, the revenue could be as much as 1,090,000 USD per year.

**XI. CONCLUSION**

Improving the agricultural sector will allow for the creation of new jobs, increased overall produce and foster strength in the agricultural export market. Key emerging technologies that can be utilised well to achieve this are precision irrigation systems, BountiGel G and Zoom distanced communications. We do keep in mind the potential internal and external risks that could occur when conducting a project of this scale. The economic benefits of introducing these technologies however greatly outweigh the risk and cost factors, and hence our research suggests that this will be crucial for reducing poverty and improving the Cambodian economy.

# **XII. REFERENCES**

# United States Department of Agriculture. (2010) CAMBODIA: Future Growth Rate of Rice Production Uncertain**.** <https://ipad.fas.usda.gov/highlights/2010/01/cambodia/>

Development cooperation. Cambodia.embassy.gov.au. (2020). Retrieved 12 May 2020, from <https://cambodia.embassy.gov.au/penh/cooperation.html>.

Henley, W. (2020). The new water technologies that could save the planet. the Guardian. Retrieved 13 May 2020, from <https://www.theguardian.com/sustainable-business/new-water-technologies-save-planet>.

Mckee, M., & Torres-Rua, A. (2020). Technologies will tackle irrigation inefficiencies in agriculture's drier future. The Conversation. Retrieved 14 May 2020, from <https://theconversation.com/technologies-will-tackle-irrigation-inefficiencies-in-agricultures-drier-future-40601>.

Poverty - World Vision Australia. Worldvision.com.au. (2020). Retrieved 11 May 2020, from <https://www.worldvision.com.au/global-issues/work-we-do/poverty>.

Precision Irrigation Flow Meters Help Farmers Conserve Resources | Seametrics. Seametrics. (2020). Retrieved 13 May 2020, from <https://www.seametrics.com/blog/precision-irrigation/>.

Sustainable Development Goals .:. Sustainable Development Knowledge Platform. Sustainabledevelopment.un.org. (2020). Retrieved 10 May 2020, from <https://sustainabledevelopment.un.org/?menu=1300>.

Temple, L. (2020). Irrigation Innovation — Emerging Technologies can Improve Water Use Efficiency. U.S. Soy. Retrieved 13 May 2020, from <https://ussoy.org/irrigation-innovation-emerging-technologies-can-improve-water-use-efficiency/>.

Office Finder Singapore.( 2020). *Singapore Office Rental Rates Guide By District*. From <https://officefinder.com.sg/trend/singapore-office-rental-rates-guide-by-district/>

telecomHall Forum. (2020). *How Much Does A 4G LTE Base Station, Capex And Opex Cost.* From<https://www.telecomhall.net/t/how-much-does-a-4g-lte-base-station-capex-and-opex-cost/4330>[

Glassdoor.com.au. (2020). *Salary: Manager In Singapore, Singapore | Glassdoor*..From<https://www.glassdoor.com.au/Salaries/singapore-manager-salary-SRCH_IL.0,9_IM1123_KO10,17.htm?countryRedirect=true>

Investopedia. (2020). *How Companies Can Reduce Internal And External Business Risk*. From: <https://www.investopedia.com/ask/answers/050115/how-can-companies-reduce-internal-and-external-business-risk.asp>

Open Development Cambodia (ODC). (2020). *Disasters*.

From <https://opendevelopmentcambodia.net/topics/disasters/>

Pao SREAN, Buntha EANG, Ratha RIEN and Robert J. MARTIN. Paddy rice farming practices and profitability in northwest Cambodia (2018) From : https://www.researchgate.net/publication/325949464\_Paddy\_rice\_farming\_practices\_and\_profitability\_in\_northwest\_Cambodia

**XIII. CONTRIBUTIONS**

A screenshot of a cell phone

Description automatically generated