

Inclusive information societies 2 (IIS2)

How knowledge, information and technology can connect agricultural and service-sector small producers to global supply chains

Submitted by LIRNEasia

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Executive Summary

LIRNEasia wishes to understand how the capabilities of information and communication technologies (ICTs) can be leveraged to create the conditions for hitherto excluded groups to participate in new economic opportunities in global supply chains in agriculture and services. Here we give primacy to participation as producers of value, rather than as mere consumers. Building on the insights that application of knowledge to productive processes and articulation with global supply chains are critical to increased productivity leading to economic growth, LIRNEasia seeks to make available agricultural research-based knowledge on better farming practices for high-value crops, including on disease avoidance and remediation. New techniques that disaggregate and make available small components of larger business-process outsourcing (BPO) tasks reduces transaction costs and helps manage quality concerns in ways that allow for greater participation by the less qualified and by those who are, for various reasons, excluded from the conventional forms of employment in the BPO sector.

In the case of agricultural supply chains, LIRNEasia has negotiated with the Sri Lanka Department of Agriculture to make open, and allow the digitization of, a valuable stock of paper-based information currently used as a resource when answering questions that come through on an agriculture hotline. Other sources of information LIRNEasia can access, such as fertilizer availability, weather data, irrigation water availability will also be digitized. The digitized information will then be delivered to farmers in the form of apps embedded in smartphones. A baseline and endline survey conducted over two crop cycles on a select sample of farmers will allow for an assessment of the impact of the open data delivered via the app. The proposed research fills a lacuna by examining the impact of high-quality knowledge delivered via smartphone to the farmer when she/he needs it. The work builds on prior work and has the cooperation, and indeed the manifest demand, of key actors including the Lanka Fruit and Vegetable Producers, Processors and Exporters Association and the Department of Agriculture on the supply side.

The ability to use ICTs to break up and reconstitute tasks that are being outsourced and also to communicate with and pay large numbers of small producers, thereby reducing transaction costs is the focus of the BPO component. Micro work has attracted some research attention, but we believe this is the first systematic study of success and failure factors with a focus on opportunities being created for women and youth.

In addition, a small component of the work will involve systematic improvement of the education components of measures that assess readiness to participate in the information society. The current indicators are quite rudimentary and give no weight to quality and to factors specific to the sector. This work conducted in relation to a small number of countries will, if successful, be extended to more countries and could contribute to the improvement of composite information society indices.

Estimated duration: 36 months

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General objective and specific objectives

The general objective is that of gaining an understanding of how the capabilities of information and communication technologies (ICTs) can be leveraged to create the conditions for hitherto excluded groups to participate in new economic opportunities in global supply chains in the agriculture and service sectors of the economy.

Specifically, the research seeks to

- Assess, the impact of making available agricultural research-based knowledge on better farming practice for high-value crops, including on disease avoidance and remediation, as well as weather and other data deemed to be useful, using ICTs.
- Identify the success and failure factors of initiatives to allow for greater participation in business process outsourcing supply chains by the less qualified and by those who are, for various reasons, excluded from the conventional forms of employment in the BPO sector. Here, the ICTs enable the disaggregation of tasks, the management of quality and the containment of transaction costs to create the necessary conditions for greater participation.
- Improve the skills-related ICT indicators that measure readiness to participate in the information economy, so that quality of skills can be portrayed, contributing to better policies and improved understanding of performance.

Background and rationale

ICTs change the boundaries of enterprises. According to scholars such as Coase (1937) and Williamson (1975), certain activities are done within enterprises (firms) and not outside because the transaction costs are lower and they determine organizational forms. ICTs change transaction costs, and thereby the boundaries of enterprises. A good example is business process outsourcing (BPO) a phenomenon that is common throughout the world but was not known prior to the 1980s. The BPO phenomenon was made possible by lowered transaction costs of having people on other continents and time zones do one's back-office work (Warf, 1999).

Spence (2011) pointed to the integration of knowledge into production processes and the connection of small producers to global supply chains as critical to them coming out of poverty and their countries closing the growth gap. The conditions under which micro and small enterprises are articulated to global supply chains and how their needs are met by governments and utility service suppliers has been a topic of continued interest to LIRNEasia, from the agri-market research conducted in 2006-07¹ to the 2010-12 research that directly addressed how small producers were connected to six supply chains in

¹ <http://lirneasia.net/projects/2006-07/icts-transaction-costs-traceability/> & De Silva, H. Ratnadiwakara, D. (2008) Using ICT to reduce transaction costs in agriculture through better communication: A case-study from Sri Lanka, available at <http://lirneasia.net/wp-content/uploads/2008/11/transactioncosts.pdf>

three countries² and most recently when we looked at the supply of government and utility services to urban microenterprises.³

In Phase 2 of its Inclusive Information Societies research, LIRNEasia wishes to drill deep into the differences that knowledge, information and technology can make to the inclusion of small enterprises in global supply chains and thereby improve their economic well being. In most of the countries LIRNEasia is active in, it is the agricultural and service sectors that employ the largest proportion of the population. Understanding how specific ICT applications change the conditions under which hitherto excluded people can connect to global supply chains, thereby improving their lives, is an important missing piece in the information society discourse which, too often, focuses on the consumption aspects of the information society. Here, we will be looking at people using the potential of ICTs to “put money in their pockets” in the context of productive activities in agriculture or services.

In the case of the agriculture component, we have built on the research conducted in 2010-12 and the relationships built through that work with suppliers⁴ to identify the nature of the most efficacious knowledge interventions. We were surprised that a recent systematic survey that was completed by LIRNEasia (Stork, Kapugama & Samarajiva, 2014) showed there was no evidence of the efficacy of agricultural information services, in this case Reuters Market Lite in India. Seeing this gap and motivated by genuine interest from wholesale purchasers of fruits and vegetables for export for better ways to deliver knowledge on good agricultural practices (not the easier-to-handle market information) and government agencies with the required knowledge, we decided to digitize the knowledge base and deliver it to growers in the form of apps in smartphones. Weather data (collected by the government) and other information such as that related to seed and fertilizer (available through private sector) and information about the release of water to irrigated areas will also be digitized and made available via the apps. The impact would be studied over two crop cycles.. This is also a significant achievement in terms of a bottom-up, pragmatic open data initiative, wherein one of the most valuable troves of government information will be opened up in digitized form.

The ability to use ICTs to break up and reconstitute tasks that are being outsourced and also to communicate with and pay large numbers of small producers, thereby reducing transaction costs is the focus of the BPO component. Here, the actual practice of impact sourcing and the reconfiguration of tasks will be studied in India and Sri Lanka.

In addition, a small component of the work will involve systematic improvement of the education components of measures that assess readiness to participate in the information society. The current indicators are quite rudimentary and give no weight to quality and to factors specific to the sector.

² All reports available at <http://lirneasia.net/projects/2010-12-research-program/knowledge-based-economies/>

³ All reports available at <http://lirneasia.net/projects/2012-2014-research-program/improving-service-delivery-for-e-inclusion/>

⁴ <http://lirneasia.net/2011/10/value-chain-research-results-shared-with-vegetable-fruit-producers-processor-exporters-association/>

Proposed work stream 1: Inclusion in agriculture supply chains

As of 2012, 43 percent of the population in lower middle-income countries were employed by the agriculture sector.⁵ However, the sector's contribution to GDP⁶ still remains low; 16.9 percent in lower middle-income countries and 27.5 percent in low-income countries. The agriculture sectors in low and middle-income countries are dominated by smallholders.

A variety of explanations have been advanced for the lower productivity and efficiency of the agriculture sector. Among these are low-quality inputs such as planting material, fertilizer and pesticides (Mwangi, 1996); lack of knowledge of proper farming practices (Ruttan, 2002) and inefficient markets (Lokanathan and de Silva 2010). The use of inferior-quality inputs such as seeds and fertilizer results in low yields and hence lower productivity. The use of inferior-quality inputs may be due to the unavailability of quality seed material or the farmers' lack of knowledge. The lack of knowledge of farming practices may be due to inefficiencies in transferring knowledge to the farmers. Further, information and knowledge seeking is costly (De Silva and Ratnadiwakara, 2008). The above not only affects the productivity of the sector, but also the quality of the agriculture produce.

Previous research has shown that small-holder farmers who are integrated into global value chains have higher earning potential than those that are not (Minten et al, 2009 and World Bank, 2008). Ability to reach global markets depend in part on a) awareness and ability to discover such markets and b) ability to meet various phytosanitary and other quality and certification requirements imposed by international buyers such as various ISO process certifications and traceability (ability to trace back the final product to a specific farm plot and list all ingredients used in growing). Both require information and knowledge. Ability of farmers to acquire knowledge and information are, therefore, important means of enhancing the livelihoods of farmers and increasing the (currently low) productivity of the sector.

A non-representative survey done by LIRNEasia in India, Bangladesh, Sri Lanka and Thailand in 2010 showed that farmers considered themselves to be the most useful source of knowledge. However, they do seek knowledge from other sources (Lokanathan & Kapugama, 2012). Some of the sources indicated included other farmers and friends and family. Extension workers did not feature as a popular choice for obtaining knowledge, even though Sri Lanka has a comprehensive and well-established extension

⁵ World Bank Data, <http://data.worldbank.org/indicator/SL.AGR.EMPL.ZS/countries/XM?display=graph> Accessed on 5 Oct 2014. Employees are people who work for a public or private employer and receive remuneration in wages, salary, commission, tips, piece rates, or pay in kind. Agriculture corresponds to division 1 (ISIC revision 2) or tabulation categories A and B (ISIC revision 3) and includes hunting, forestry, and fishing.

⁶ World Bank Data, <http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS/countries/1W-XM-XN?display=graph> Accessed on 5 Oct 2014. Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator.

system. Research showed that this was partly due to extension workers being unavailable when growers needed them.

Farmers have a host of information requirements. Among these are information about disease and pest control, the use of fertilizer, new seed varieties and weather (Babu, Glendenning, Okyere & Govindarajan 2012; Walisadeera, Wikramanayake, & Ginige, 2013). The information requirements are dependent on the stage which they are at in reference to the crop cycle (Lokanathan et al, 2012). As such, the timeliness of information is of paramount importance. A large amount of this information is available within the government but often is not accessible by the farmers unless through an intermediary in the form of an extension worker. The data is often not in computer readable formats.

ICTs bridge spatial and temporal gaps. Based on this quality, numerous ICT based services pertaining to the agriculture sector have been introduced all over the world. The modes of delivery are numerous. Some offer services through websites; others via call centers, both through operators and Interactive Voice Recordings (IVRs); some through SMS and mobile applications (Qiang, Kuek, Dymond, & Esselaar, 2011). The applications predominantly focus on two areas; market and crop-advisory information. The services can be broadly categorized into pull or push services. The websites and call centers are pull services (initiated by user action) while the SMS based services and mobile applications can fall into both push and pull services. The impacts of these services have been assessed in a variety of literatures (Stork, Kapugama & Samarajiva, 2014; Brugger, 2011; Arfan et al, 2014).

However, in comparison to the number of market information services that have been deployed, the number of impact assessments on them have been limited. The assessments have not shown overwhelming evidence that the services help improve livelihoods (Stork, Kapugama & Samarajiva, 2014). This may be due to the lack of relevance of the information, the inability of the farmers to utilise the information given (IEG, 2011, Cerdán-Infantes, P., Maffioli, A., & Ubfal, D., 2008) or the lack of incentives to utilise the information.

As mentioned above, a number of the agriculture information/agricultural management information systems (AgMIS) services focus on price information or crop advisory services. This often does not integrate other data such as disease outbreaks, weather, availability of fertilizer and the availability of water for irrigated lands. This type of information is often given through other media or through representatives of farmer associations on a push basis. The lack of integration is often due to the data being “owned” by multiple departments across Government. Opening the data relevant to the agriculture sector would be beneficial in this situation.

Understanding the impact of increased knowledge within agriculture supply chains

Farmers require multiple types of information and knowledge. These include but not limited to information on diseases, fertilizer, seeds and weather.

Knowledge and information are currently provided through multiple means. These include call centers, mobile-based applications, media, seminars, workshops, field visits by extension workers, messages through farmer associations and notices.

In Sri Lanka, a large amount of the information relevant to the farmers are held with the different departments and ministries, including but not limited the agriculture ministry and the meteorological department. As such the information is often disseminated through diffused means. Furthermore a substantial portion of this information and knowledge is not in computer readable formats. For an example, the Department of Agriculture of the Government of Sri Lanka operates a call center referred to as 1920 (a telephone short code). The service has been in operation since 2006 and has a system in place, which allows the operators to digitally capture caller name, phone number, crops, reason for calling and the solutions provided by the operator. The operators use research material (in paper-based form) provided by the government agriculture research institutes to provide solutions to the callers.

The proposed project component hopes to use the captured caller data to identify multiple supply chains (of fruit and/or vegetables) and digitize the research material pertaining to them.

The information and knowledge that are digitized are often not publicly available and have to be secured through considerable monetary means (e.g. weather data in Sri Lanka) or by way of special permission. The proposed project component hopes to identify various types of data that are available in the public sector, both digitized and not, and relevant to the agriculture sector. The project hopes to bring together the sources of the identified data to build consensus on making the data publicly available. This will be done through one-on-one engagements and workshops. The available data will be brought together and made accessible through a single mobile app.

The app will be provided to a group of farmers to assess the impact of making data publicly available.

The process of opening up the information relevant to agriculture will be documented and this will act as a blueprint for making other government data publicly available. This has been an issue LIRNEasia has engaged with for some time and represents a bottom-up approach to open data.⁷ The digitized data will also be made available to others who wish to use it to create other mobile-based apps. A hackathon (outside the scope of this project) may be organized to facilitate this process, preferably by others.

The backend data of the mobile app, such as number of downloads, content downloaded, geographical locations of downloads etc. will also be analysed.

⁷ E.g., <http://lirneasia.net/2012/07/make-govt-data-available-to-app-developers-lirneasia-at-future-gov-saarc-summit/>

The project will approach the local telecom providers to provide publicity for the mobile application and to discuss uptake of the application upon the cessation of funding.

Phase 1 (18 months)

- Identify the available data that are relevant to agriculture sector and map the data to the relevant institutions.
- Identify through existing data multiple crops (vegetables) that suffer from quality issues through the use of existing data.
- Digitize information/data and knowledge (residing both within government institutions, private sector institutions; both published and unpublished; research material as well as 'know how' that is passed on verbally) pertaining to the above-identified crops. The knowledge relating to good growing practices as well as data/information on weather, fertilizer, water availability are included in this process.
- Document the process of obtaining the data, with a particular focus on the process of obtaining the government data.
- Create mobile based app that makes accessing the knowledge and information mentioned above easy; pilot test the app and make improvements
- Conduct baseline survey of farmers to obtain information about their sources of income, information, knowledge, etc. The variables will include land area used for crop, start date for growing, harvesting, end of harvesting, current sources for obtaining information and knowledge, quantities of crops harvested and sold etc.

Phase 2 (6 months)

- Conduct end-line data collection
- Analyze the data

Phase 3 (6 months)

- Disseminate findings to policy makers and industry stakeholders.
- Develop guidelines (based on LIRNEasia's experience) that will enable others to extract and make available to the public data that is inside government.

The base-line and end-line surveys will be conducted to assess the impacts of the above interventions. Among the data collected will be: farmer details, buyer details, crop, price received, quantity sold, difference between what was bought by the collector and what the collector wanted to procure (lost opportunity), etc. Each of the above will be collected for two crop cycles (2 months each), per transaction, per farmer. In addition, the following indicators will also be assessed: changes in growing practices changes in rejected or wasted produce, changes to quantity of produce sold to international value chains vs. the local market, changes in income, etc.

The research team will take steps to maintain the quality of the data collected. In addition to collecting data from farmers, the team will also collect data from the collectors (first handlers) and the exporters for triangulation purposes. The daily market prices of the selected crops will also be recorded. In order to ensure the integrity of the data collection process, a number of field-level officers will be deployed and supervised. This will result in additional administrative costs. As such the number of farmers is kept at 50. This will ensure the internal validity of the study and also allow attrition to be managed.

The research seeks to answer the following research questions:

Phase 1:

- What are the crops that require a higher amount of crop-advisory information?
- How can tacit knowledge be captured and digitized?
- What is the effectiveness of digitizing crop-advisory information?
- What is the process of making data publicly available?

Optional

- What are the problems in the agriculture sector that can be mitigated by making existing data public and computer-readable?
- What data, apart from the digitised research material, are required to be made publicly available to improve the current status of the agriculture sector?

Phase 2:

- Can the quality of agricultural produce be improved by provision of knowledge; incentives and knowledge?

Phase 3:

- Can we develop broad principles on how to make government data available to the public, based on the experience of the agriculture sector?

Expected Outcomes

- Better understanding of the costs associated with digitizing agriculture information
- A blue print of the processes required to make government data accessible
- Assessment of the impact of knowledge, information and incentives on the quality of agricultural produce

Gender considerations.

Agriculture has a high degree of female participation. This is often in the form of farm workers. Female family members are often involved in farm related activities as well. Where possible, the study will incorporate into the study female farmers. The research team responsible for this component is mostly female. The Managing Director of the leading exporter, who was also the former head of the Lanka fruit

and vegetable producers, processors and exporters association (LFVPPEA), who asked for this research and is the critical interface with the exporters is also a woman.

Risk assessment and mitigation

The proposed project has a number of risks associated with it. These are common to projects assessing impacts in agriculture (Millennium Challenge Corporation, 2012). The table below highlights the identified issues and steps that can be taken to mitigate the risks.

Stage of project/ task	Possible risk	Level of risk	Methods of mitigation
Phase 1			
Document the process of obtaining government data	Risk of restrictions in obtaining government data	Medium/Low	LIRNEasia has built the necessary relationships with a number of departments relevant to the agriculture sector.
Conduct baseline survey of farmers to obtain information about their current sources of income, information, knowledge etc. The variables will include land area used for crop, start date for growing, harvesting, end of harvesting	Risk of errors in data collection; buyer details, crop, price received, quantity sold, difference of what was bought by the collector and what the collector wanted to procure (lost opportunity)	Low	In addition to collecting data from farmers, the team will also collect data from collectors (first handlers) and exporters for triangulation purposes. A number of field-level officers will be deployed and supervised to ensure the integrity of the data collection process
Phase 2			
Conduct mid-line and end-line data collection	Risk of errors in data collection; buyer details,	Low	In addition to collecting data from farmers, the

	crop, price received, quantity sold, difference of what was bought by the collector and what the collector wanted to procure (lost opportunity)		team will also collect data from collectors (first handlers) and exporters for triangulation purposes. Field officers will be deployed and supervised to ensure integrity of data collection
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The proposed project has the support of the Fruit and Vegetable Exporters, Processors and Producers Association of Sri Lanka (FVEPPA) and John Keells Holdings, a premier supermarket chain in Sri Lanka.

Ethical Considerations

The digitized data and the developed app will be available for public consumption under the agriculture component as such no party will be excluded from consuming the product.

The proposed research includes surveys, interviews and observation of micro-work stakeholders during working hours. There are ethical considerations when conducting such studies. As in the past, LIRNEasia will follow IDRCs guidelines on these matters. Routine actions such as obtaining the subject consent (to being surveyed, and separately, to being photographed or videotaped, where applicable), and informing the subject to opt-out of the research at any point will be done. No personally identifiable information about the subjects will be maintained in research databases, including those of field research firms/enumerators that may be contracted.

Dissemination strategy

The entities who can act on the findings are the government (the Department of Agriculture, especially its extension unit) and the private sector. . The research has been designed in consultation with them and may even be described as “pulled,” especially by leading members of the FVPPEA. Therefore, the conditions are ideal for focused dissemination to them, through presentations. In 2011, when LIRNEasia was an unknown quantity in the agriculture space, we still managed to present our research to an audience assembled by FVPPA that paid to attend.⁸ We also used op eds and media coverage in 2011, which can be repeated depending on the nature of the findings.

⁸ <http://lirneasia.net/2011/10/value-chain-research-results-shared-with-vegetable-fruit-producers-processor-exporters-association/>

In 2012, LIRNEasia used opportunities such as a regional Future Gov Summit to get the agriculture findings to influential government officials.⁹ Such opportunities cannot be identified beforehand, but will be exploited when they appear.

LIRNEasia's ongoing relationship with FAO Bangkok that hit a high point with the event for regional senior officials that was organized in April 2012¹⁰ continues. It will be a natural conduit for dissemination. In addition, we believe that the quasi-experimental design is likely to be welcomed by journals. It is expected that several articles will be submitted to scholarly journals.

The research findings will be disseminated to a wide audience of Sri Lankan policy makers and industry stakeholders. The project will be working closely with private sector stakeholders.

Theory of Change is in Annex 2.

Proposed work stream 2: Inclusion in business process outsourcing

Over the past two decades, global corporations have leveraged improved technology and global connectivity to outsource not only the manufacturing of physical products, but also business processing activities to low-cost markets (Rockefeller Foundation, 2011). Business Process Outsourcing (BPO) refers to the outsourcing of business processes which are not mission critical to BPO service providers (Kennedy, Sheth, London, Jhaveri, & Kilbarda, 2013). The different players of the BPO ecosystem are, employees, client, BPO service provider and greater community (Lu, Nicholson, & Heeks, 2012). The benefits of outsourcing from the client perspective include lower costs, ability to leverage time difference, ability to focus on core competencies and increase productivity and efficiency. The benefits from the perspective of BPO employees are increased employment opportunities and increased knowledge and skills. BPO activity also benefits its location because it increases employment opportunities, which then increases consumer spending (Kennedy et al., 2013).

India, the Philippines and Sri Lanka are among significant beneficiaries of the 'BPO-boom' that has generated employment and increased foreign exchange earnings. For example, IT-BPM (or Information Technology/Business Process Management, emerging substitute term for 'BPO') accounted for over 8 percent of Indian GDP (NASSCOM, 2014). The BPO sector was over 5 percent of the Philippines GDP in 2014 (IBPAP, 2014). The ITeS (Information Technology Enabled Services, another term more or less referring to the same domain) was the 6th highest export revenue generator in Sri Lanka in 2012 (Sirimanne, 2012). Large outsourcing centers have sprung up in cities such as Bangalore, Hyderabad, Chennai, Mumbai, Colombo, Manila, employing workers who cater to the full spectrum of outsourced activities: from the high value-added, outsourced software development, to the lower-value added out-bound call centers, and everything in-between. Studies indicate that in the early days these industries increased the ratio of female employment (Shastry, 2008) and investment in human capital in girls (Jensen, 2010). But more recent studies have found no conclusive evidence that the BPO sector or interventions by government (e.g. in BPO-targeted skills development for the underprivileged in the

⁹ <http://lirneasia.net/2012/07/make-govt-data-available-to-app-developers-lirneasia-at-future-gov-saarc-summit/>

¹⁰ <http://lirneasia.net/2012/04/regional-fao-workshop-on-the-use-of-mobile-technologies-in-agriculture/>

Philippines) have increased inclusiveness. A criticism is that these mega-BPO centers have limited the economic dividends to those who already have certain marketable skills (such as software coding ability through a degree in computer science), increased congestion in cities and generally been less inclusive than possible. But facing the business realities of labor shortages and high operational costs in major cities, move to second tier cities has already started - Philippines has had success in moving BPO activity from metro-Manila to second- and third-tier cities such as Cebu (Carve, 2013). This certainly has potential to increase inclusiveness. But given this is happening at scale, there is no particular reason for LIRNEasia to spend public funds to study this phenomenon.

Another way inclusiveness can increase is to increase inclusiveness among the ancillary service providers in the BPO sector – i.e., the providers of transport, catering and the like. BPOs tend to rely on reputable and large service providers for these services due to reduction of risk (due to historical reputation of established firms) and transaction costs (the ease of managing one contract with one transport service provider, compared to the transaction costs of managing multiple smaller transport companies). But technology platforms such as airbnb.com are offering ways in which reputational rankings and digital platforms and payment mechanisms are reducing the transaction costs, helping solve the trust/risk issues and increasing the type of service providers. This type of solution could certainly be conceivable in the BPO sector (e.g. reputational rankings of taxi services, done by customers, and the higher ranked ones being chosen by individuals working in BPO companies). We think such a research would require action-reach (software development, deployment of the app and observing the effects). Given such methods are proposed in the agriculture research, we chose to not repeat it, albeit in a different sector.

The third way that inclusiveness is being increased is through Impact Sourcing, which focuses on outsourcing work to disadvantaged individuals or areas of low employment, in order to benefit them (Bulloch & Long, 2012; Kennedy et al., 2013). Sometimes called 'rural outsourcing', the phenomenon has gained footing in India in particular. There are in-depth case studies done on individual rural impact sourcing initiatives such as the study on RuralShores conducted with IDRC funding (Mukarji, 2012) or studies which focus on the evolution of BPOs in India (Knowledge@Warton, 2010) and even failure cases of rural impact sourcing (for example the case of Cache Solutions in Jagalur, India, as documented by Bhardwaj, 2012).

What is proposed, therefore, is to study in detail the potential for increasing the inclusiveness of the BPO sector through one particular phenomena that is in the early stages of development in both India and Sri Lanka: micro-work. In micro-work, complex tasks are being broken down into small, more commoditized tasks, and outsourced globally. Anyone can bid, do the work and get paid (in theory). While this has been going on in the software sector for a while, it is becoming common in the less-skilled end of outsourced work.

The Oxford Internet Institute has initiated a project on 'Micro-work and Virtual Production Networks in Sub-Saharan Africa and Southeast Asia' funded by IDRC. This three-year project commenced in November 2013 and is still ongoing. Therefore the findings are not yet available. The purpose of this research was to understand the current and potential impact of Internet and mobile technologies on social and economic development, especially when it comes to the emergence of new and transformative 'virtual' economic activities and work, such as 'micro-work' and 'game labor' (Oxford Internet Institute, 2013). This is much broader and focuses on overall networks rather than on the

opportunities of individuals which will be researched by LIRNEasia. It also does not focus on women and under-employed youth.

Other literature available on micro-work tends to cover software development through micro-work platforms or crowdsourcing, but not much work on the inclusiveness of micro-work has been done. Possibly as it is a new area (Irani, 2013). The few papers on micro work inclusiveness is focuses on initiatives such as Samasource, which get the projects from the clients, split them into micro-work and gives them to under-privileged workers from developing countries. (Gino & Staas, 2012; Sharanappa & Leila, 2012).

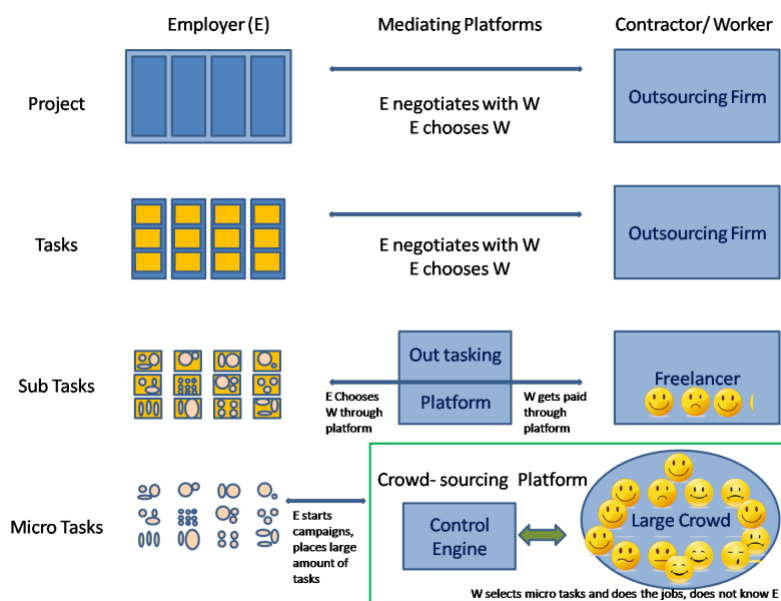
We will focus on India and Sri Lanka because of the importance of the BPO sectors in each country, the skill level and potential for including youth and women. See Annex 1 for basic BPO sector indicators for the two countries, and for the Philippines, which will be used as a reference.

Therefore this research proposes to study the enabling factors and challenges and how the successful rural impact sourcing initiatives mitigated these challenges. It is expected that through the dissemination of this knowledge, more rural impact sourcing initiatives will emerge. Our research question is as follows:

Q: What are opportunities for under-employed youth, women and previously-excluded persons to participate in micro-work platforms?

A trend in the outsourcing sector is that of large tasks being disaggregated into small components and being carried out by individuals over the Internet. These micro- work/ micro tasks can be considered as the smallest unit of work in an assembly line (Janah, 2010). This is a result of evolution of the granularity of work shown in Figure 2 (Hoßfeld, Hirth, & Tran-Gia, 2011). For employers this enables them to access a large global workforce, which may work during different time zones and complete projects fast and efficiently (Lynch, 2012).

Figure 2: Evolution of the granularity of work



Source: (Hoßfeld, Hirth, & Tran-Gia, 2011)

Many platforms are currently available - Amazon Mechanical Turk and oDesk, where workers perform micro-work over the platform and get paid, are just two that have Indian and Sri Lankan workers. Preliminary research showed participation of workers from these two countries is by no means extensive, but further research is required before we can attempt to quantify the relative size compared to other (non-micro work based) outsourced activities. It is also unclear if participating has increased inclusion: is the work still being done by elite software engineers or others who can get high-paid jobs in the IT industry irrespective of these platforms? An often-cited barrier is the inability to receive payments via PayPal in some countries, limiting participation only to those who have a foreign bank account or a credit card. It is not only direct work (by individuals) that is popular on such platforms. Participation that is mediated by other organizations with a social objective and skills (e.g. those that know how to bid strategically for a piece of outsourced work) may have a significant role to play in making these platforms more inclusive. For example, Samasource is an organization which gets the projects from the clients (mainly in US and UK), split them into micro-work and gives them to under-privileged women and youth from developing countries so that they can earn decent wages.

In theory, micro-work enables people who are normally unable to work full time or who are not part of a large organization to work flexibly and earn an income. Therefore this may allow more women with small children enter the workforce as the timing is flexible. The commoditized nature of the small tasks means that less-skilled workers are able to perform the tasks. These are all ways by which inclusiveness can be increased.

Methodology

As many platforms are available, we selected the platform where the most Asians seem to be working, known as oDesk <https://www.odesk.com/>. At the time the data were collected, there were 50,087 workers based in India, 36,819 workers based in the Philippines and 2,644 workers based in Sri Lanka. oDesk allows clients to hire workers through the company's platform. One of the reasons many Asians to work on oDesk is because of their flexible payment methods including crediting into an account and solely through Paypal, which is not possible in many countries. We propose to select a random sample of workers from India, Philippines and Sri Lanka, stratified by gender, income and education levels. We propose to conduct the online survey through the oDesk platform as our population is computer literate, and pay them the hourly rate for participating in the study work. This would reduce non-response as the completion of the survey will be similar to doing micro-work. We will supplement the survey with one-on-one or phone interviews with workers who participate in oDesk or other online platforms, to gain a qualitative and in-depth understanding. A few expert interviews, site visits (if applicable, to observe a 3rd part/community based organization like Samasource that is mediating between the buyer and workers) and review of secondary data will be done.

One possible framework that can be used to assess the effects of micro-work on workers is a modified version of the Impact Assessment Framework in order to help social enterprises and Base of the Pyramid (BoP) ventures to gain a deep understanding of the effect on the BoP stakeholders (Malik, Nicholson, & Morgan, 2014). It assesses the changes in three areas:

1. Economic Well-being: Changes in income, income stability, assets, consumer surplus and economic productivity resulting from micro work.

2. Capability Well-being: Changes in physical (health, ability to perform specific activities, etc.) intellectual (skills, knowledge, capabilities, etc.) and psychological (self-esteem, dignity, etc.) well-being resulting from micro-work.
3. Relationship Well-being: Changes in roles and status (within family, community, etc.), access to social support (relationships with individuals, groups and partners) from work. (Malik, Nicholson, & Morgan, 2014).

Risk mitigation

The risk is the inability to use the work platforms. We believe that it is not significant because we do not need special permission and facilities, but will be conducting the research just like any person farming out work. The Indian government's attitudes toward research being conducted by think tanks has hardened in recent time. However, we believe this risk is minimal because ICRIER is one of the most prestigious organizations with ties to the government machinery.

Gender considerations

Shastri (2008) states that females often have difficulty in moving to urban areas (Shastri, 2008) to take up employment in the BPO sector. The focus on micro-work, which doesn't necessarily depend on physical presence at a mega-BPO city, will enable us to explore if the opportunities for women change as a result of digital platforms. We believe that micro-work also gives employment opportunities to women who are unable to work full-time due to family considerations. The platforms may also enable youth who are outside of the major cities to participate in The survey samples will be stratified by gender and age, among other things.

Ethical considerations

The proposed research includes surveys, interviews and observation of micro-work stakeholders during working hours. There are ethical considerations when conducting such studies. As in the past, LIRNEasia will follow IDRCs guidelines on these matters. Routine actions such as obtaining the subject consent (to being surveyed, and separately, to being photographed or videotaped, where applicable), and informing the subject to opt-out of the research at any point will be done. No personally identifiable information about the subjects will be maintained in research databases, including those of field research firms that may be hired (these conditions are specified in the contract LIRNEasia signs with the research firm).

It is also important to note that when we conduct the survey through oDesk, a platform which is not under the control of LIRNEasia, the data maybe captured in their systems as well. But since the subjects are already on the oDesk platform, we believe that this should not affect the subjects adversely. Here different workers will be paid according to their hourly wage, which varies from person to person. But as this can be equated to the workers doing micro-work, it seems fair.

Dissemination strategy

The main findings from the research will be disseminated through multi-stakeholder meetings to inform decision makers of the findings of the research conducted in India and Sri Lanka (with the Philippines used as a reference, where applicable). In addition to these meetings, it is also proposed to disseminate

these findings in Myanmar as their ICT sector is developing and it is receiving funding and attention from donors and private sector firms. Sri Lanka, a country that has some similarities with Myanmar, succeeded in quickly developing jobs in the BPO sector despite having less than half the population of Myanmar, after the telecom reforms. Therefore it is believed that a paper on “Lessons for Myanmar” drawing from all the work done in both study areas would be beneficial to Myanmar. Theory of Change is in Annex 2.

Proposed work stream 3: Developing indicators for IT and IT enabled services (ITES)

IT & ITES are expected to be major contributors to employment growth in many countries, especially those not well positioned for manufacturing and agriculture. For example, in Sri Lanka, ITES employment was only 75,000 in 2013 (SLASSCOM & PWC, 2014), but, the government and industry is committed to create 200,000 direct jobs in ITES alone for USD 5 billion in increased revenue, by 2022. Broader ICT related indicators such as the Network Readiness Index (NRI) have been in place since 2000. To our knowledge, there has not been an effort to match such indicators to emerging definitions of skills required specifically for IT and ITES. In the proposed module, we will develop a set of indicators for use in Malaysia, Myanmar and Sri Lanka in the first instance, with possible expansion to developing Asia or a selected region in Asia, at a later date.

Currently available ICT related indicators include the composite indices such as Network Readiness Index (from the World Economic Forum), Knowledge Index (World Bank) and the multiple Information Society Indicators from the OECD and the Partnership for Measuring of ICT for Development at the UN. The education and skills-related measures included in these indicators are limited to enrollments in primary, secondary or tertiary education. Missing are measures of quality. The literacy rate, which is based on the ability to read and write a simple sentence, is the only measure of quality available. Lacking are higher order measures to assess the literacy and numeracy of those joining the workforce or are already in the workforce. The Program for Student Assessment (PISA) and Trends in Mathematical and Science Study (TIMSS) are good indicators of knowledge and skills of school leavers. However, participation in these surveys is not universal.

Direct measures of IT/ITES readiness are available through: reports published by national ICT agencies of most countries; initiatives by ICT companies such as Cisco and Mozilla; and academic research papers by Hamid (2011) and van Dijk (2014) for example. These sources lack of depth in IT/IES workforce issues, they do not include indicators of quality and suffer from definitional issues pertaining to tertiary enrollment rates, in particular.

As is the case in the early stages of developing any indicator, the biggest problem is the lack of informative indicators that are easy to obtain on a regular basis from a large number of countries. The solution is to develop indicators for a few countries, which can then be gradually expanded.

The broad research question that is addressed is :

Q1. How can we develop human resources appropriate for the IT and ITES sectors in developing Asia, with a focus on Malaysia, Myanmar and Sri Lanka in the first instance?"

Malaysia is the most developed of the three and may be expected to have the best indicators. Myanmar is the least developed, but has high potential due to young Myanmar citizens who have returned home after studying overseas, and in possession of skills and networks that are necessary for entering the ITES sector.

BPO workers and firms (including e-lancers and micro-workers) compete for work in a global market. Therefore, it is important to have a method of comparing workforce-readiness, and other data across countries. Therefore, identifying and developing meaningful, global or regional indicators becomes an important task.

In order to answer the above question, we will expand on the following questions:

Q1.1 What are the skills expected of an IT and ITES workforces?

The challenge here is how we can derive a set of requirements suitable for regional or international comparison

To our knowledge, international agencies have refrained from identifying skills necessary for an IT/ITES workforce, leaving the task to authorities in individual countries taking into account situations unique to each country. NASSCOM in India, for example, has identified four major sectors in IT/ITES as (1) IT services (2) Business Process Management (3) software Products and (4) Engineering R&D. In the occupational analysis for each sector NASSCOM further identifies generic and functional skills necessary for each sector.¹¹

The ICT Agency of Sri Lanka defines IT/ITES sectors more broadly to include (1) Suppliers of ICT products and services (ICT companies) (2) Suppliers of IT-enabled services (ITeS; BPO companies) (3) ICT training organizations and (4) Users of ICT products. ICTS further identifies fourteen occupations that cut across all four sectors and the generic, functional and technical skills necessary for each occupation.¹²

Van Dijk and van Deursen (2014) use conceptual analysis and empirical observations to identify five sets of skills needed in the use of digital media, primarily computers and the Internet. These skills are categorized as operational, information, communication, content-creation and strategic. Such generalized skills are more useful for cross-country comparisons.

Q1.2 What workforce readiness measures are currently used in information society indicators? What are the gaps?

Currently available ICT related indicators include Network Readiness Indicator (World Economic forum), Knowledge Index (World Bank) and Information Society Indicators (OECD and the Partnership for Measuring of ICT for Development at the UN). The education and skills related measures included in these indicators are limited to enrollments in primary, secondary or tertiary education. Missing from these measure are (1) definitional issues pertaining to tertiary enrollment rates (2) measures of

¹¹ <http://www.sscnasscom.com/>

¹² National ICT workforce survey, 2013, ICTA, Sri Lanka. <http://www.icta.lk/attachments/article/1247/Final%20Report-WFS.pdf>

educational attainment and quality of education to supplement enrollment rates and (3) lack of an effort to connect educational measures to skills necessary for an IT/ITES workforce. Literacy rate, which is the ability to read and write a simple sentence, is the only measure of quality used in above indicators. Lacking is higher order measures of the literacy and numeracy of those joining the workforce or already in the workforce.

The Program for Student Assessment (PISA) and Trends in Mathematical and Science Study (TIMSS) are good indicators of knowledge and skills of school leavers. However, participation in these surveys is not universal.

Direct measures of IT/ITES readiness are available through (1) reports published by national ICT agencies of most countries (2) initiatives by ICT companies such as Cisco and Mozilla and (3) academic research papers by Hamid (2011) and van Dijk (2014), for example.

Q1.3 What other measures are available nationally, regionally or globally and how can they be modified or improved?

Other possible measures include results of national examinations and other educational achievement indicators from national databases in each country. If one starts with a few countries that have comparable data in regard to their national examinations, local surveys on ICT skills such as those carried out by ICTA in Sri Lanka and other local efforts, it would be possible to develop a more comprehensive set of measures that correct for problems of definition, quality and relevance found in global indicators. Initially, the focus would be on three countries in Asia- Malaysia, Myanmar, Sri Lanka, which broadly fall within the ambit of the British Commonwealth system of education and training. In addition to an exhaustive survey of local available measures in these countries, we will also explore the reasons why these countries do not participate in some of the global assessments such as PISA and TIMSS. More countries can be added to the set until a comprehensive set of IT/ITES readiness measures that can be applied across minimum of three countries is derived.

Method

We will look in detail at measures of tertiary enrollment, results of national examinations and other educational achievement indicators from national databases in each country, in addition to PISA, TIMSS, Mozilla and Cisco and other international data sources. Collected data will be organized as a comprehensive database with country, year, measure, value and source as the key variables. The measures will be further analyzed to produce a succinct set of IT/ITES readiness indicators and measures. Initially, the focus is on three countries in Asia- Malaysia, Myanmar, Sri Lanka, which broadly fall within the ambit of the British Commonwealth system of education and training.

Data sources that will be used will include ILO, OECD, UN and WEF databases; www.oecd.org/pisa and <http://timssandpirls.bc.edu/>; CISCO.com, Mozilla.com; National: ICT agency reports, Labor force surveys; Census reports, reports of Departments of education and/or departments of examination in Malaysia, Myanmar and Sri Lanka.

Risk mitigation

The desk research based on publicly available data for the most part poses few risks. The few instances where granular data not fully in the public domain may require consent of the data holders do pose a

risk but this is normal in this kind of research. Indeed, the ability to extract the data is part of the research.

Ethical considerations

No serious ethical concerns have been identified as research is based on examination of publically available data. If indicator research succeeds new indicators are accepted. The new indicators may present one group in a more favorable light. This is part of policy activity.

Gender considerations

All efforts will be made to ensure that gender data are included in the research. The work has been conceptualized and will be executed by the team leader of the Human Capital Research Group, a female.

Dissemination strategy

The primary audiences are the national statistical organizations of the region. A regional expert forum will be organized. In addition, we will also communicate to the members of the UN Partnership for Measuring ICT for Development, such as UNESCO and ITU. The findings will be disseminated to them using the relationships built up over the years. Conference papers and journal articles will be prepared. Theory of Change is in Annex 2.

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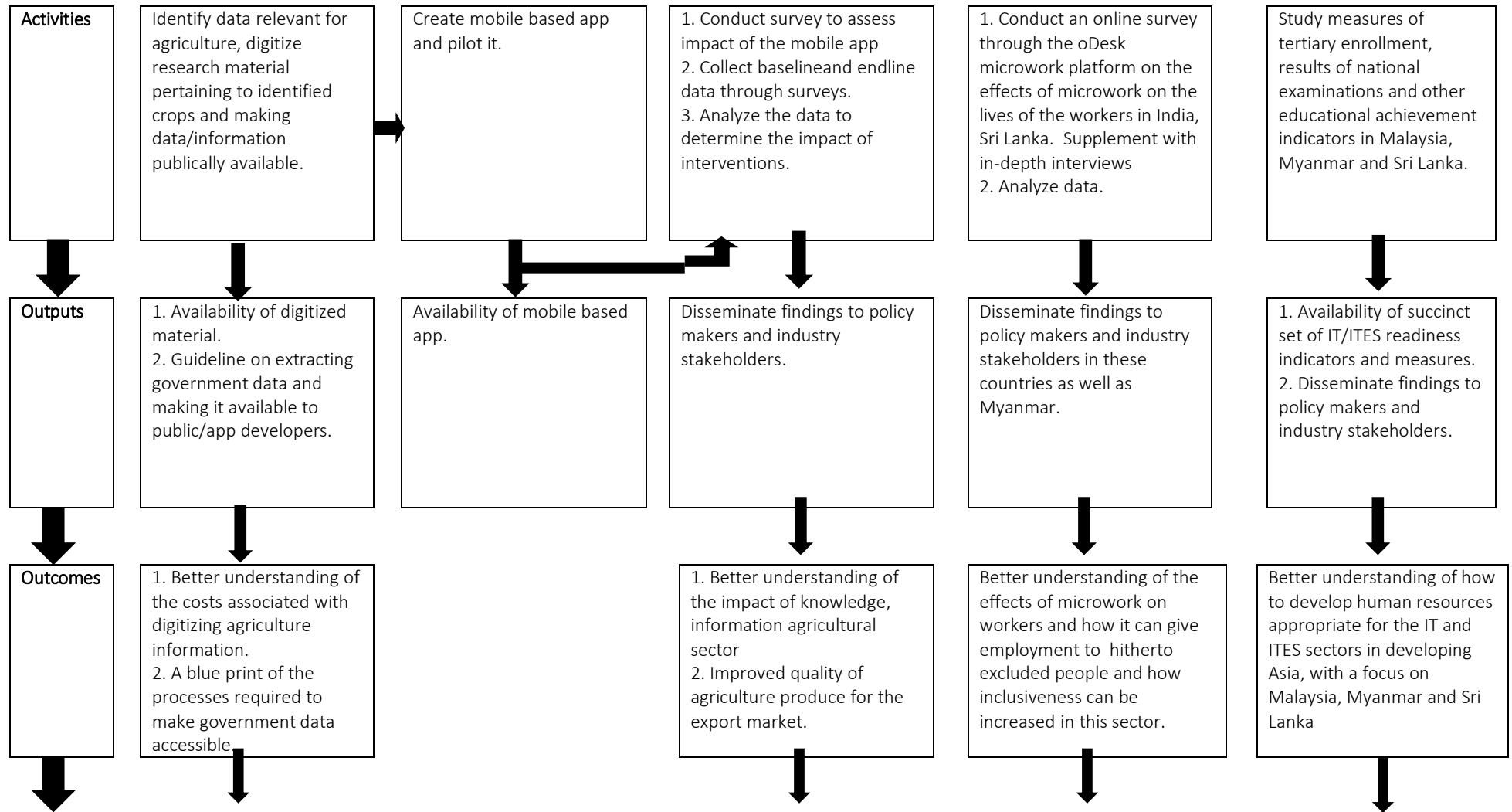
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Annex 1 – Demographic and IT indicators of India, the Philippines and Sri Lanka

Indicator	India	Philippines	Sri Lanka
Population (millions)	1,200 (2013) (World Bank, 2014)	98.4 (2013) (World Bank, 2014)	20.5 (2013) (World Bank, 2014)
Female population %	49 (2013) (World Bank, 2014)	50 (2013) (World Bank, 2014)	51 (2013) (World Bank, 2014)
Rural population %	67.6 (2013) (United Nations Department of Economic and Social Affairs, 2014)	55.5 (2013) (United Nations Department of Economic and Social Affairs, 2014)	81.7 (2013) (United Nations Department of Economic and Social Affairs, 2014)
Direct employment in IT sector	1.5 million (2013) (DeitY, 2015)	1.3 million (2013) (Romulo, The economic footprint of BPO industry, 2013)	75,100 (2013) (SLASSCOM, 2014)
Employment in the BPO sector	0.95 million (2013) (DeitY, 2015)	1 million (2014) (Barbour-Lacey, 2014)	40,000 (2010) (Kamburugamuwa, 2010)
Participation of women in the sector	IT-BPM sector: 32.3%, (2014) (NASSCOM, 2014)	BPO sector: 55% (2008) (Asian Development Bank, 2013)	IT sector: 29%, (2013) (Pricewaterhousecoopers, 2014)
Unemployment rate/ amount among educated youth	Technical degree: 21.4% (2004/2005) (CRISIL - Centre for Economic Research, 2010) Tertiary educated: 23.1% (2010) (The World Bank, 2011)	Tertiary educated: 42.0% (The World Bank, 2011)	Advanced Level and above: 7.5% (2012) (Department of Census and Statistics, 2012)
BPO sector as % of GDP	IT-BPM sector: 8.1% (2014) (NASSCOM, 2014)	BPO Sector: 5% (2014) (IBPAP, 2014)	Post and telecommunication sector: 0.4% (2013) (Department of Census and Statistics, 2013)
% of individuals using internet	15.1% (2013) (International Telecommunication Union, 2013)	37 % (2013) (International Telecommunication Union, 2013)	21.9% (2013) (International Telecommunication Union, 2013))
Access to electricity	75.30% (2010) (The World Bank, 2011)	70.20% (2010) (The World Bank, 2011)	85.40% (2010) (The World Bank, 2011)

Annex 2: Simplified Theory of Change



**Long
Term
Outcomes**

Due to the greater understanding of how specific ICT applications change the conditions under which hitherto excluded people can connect to global supply chains, the lives of these people are expected to improve through higher income.