Canada to Nepal Export Idea: SL1000 Portable Parallel Analyzer (Water Sampling Kits)

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Introduction

Water is not only an essential nutrient to human life (Kleiner, 1999) it is also the main resource for agriculture (Niyonzima, Stage, & Uwera, 2013). Plant life has a tendency to rely heavily on water use and consumption in comparison to the animal kingdom (Ehlers & Goss, 2003). It is in streams that contain a draining agricultural catchment where there are elevated concentrations of chlorine (Cl), nitrates (NO_3), and sulfates (SO_4); in comparison of forested catchments (Collins & Jenkins, 1996).

Nepal is one of the poorest countries in the world, defining it as a developing nation (Central Intelligence Agency, 2016b). It is in developing nations where more nitrogen fertilizer is applied in comparison to those of developing nations (Bijay-Singh, Yadvinder-Singh, & Sekhon, 1995). Given the amount of nitrogen fertilizer applied it is important to understand if leeching is an on-going occurrence, how much is being leeched, and if the drinking water has been contaminated to a point where it is no longer deemed potable (Bijay-Singh et al., 1995).

The purpose of this proposal is to export water sampling kits made by the Hach Company. The specific product that will be investigated as an export to Nepal is The Hach SL1000 Portable Parallel Analyzer™ (PPA) Kit. The kit can test for nitrates and nitrites both of which are by-products of nitrogen fertilizers.

Part I – Product Information

Product Description

The kit is intended to measure the number of particles of specific contaminants and acidity or alkalinity of the water. The SL1000 PPA measures for alkalinity, ammonia, ammonia free, chloride, chlorine free, chlorine total, conductivity, copper, dissolved oxygen, fluoride, hardness, iron, monochloramine, nitrate, nitrite, pH, and phosphorus (Hach Company, 2015c).

The SL1000 comes with a patented Chemkey® technology (Hach Company, 2015b). The Chemkey® technology uses the same chemicals and functions using the same process prior to Chemkey® technology; the main and notable difference is the technology is in a self-contained package (Hach Company, 2015b).

The SL1000 PPA weighs 1.2 kilograms (kg) and is measured at (height x width x depth): 258.3 millimeters (mm) x 130.8 mm x 58.9 mm (Hach Company, 2016).

The benefit of this kit as an export would be to have it serve as an instrument that tests water quality and water safety surrounding agricultural pollution as a cause of agricultural runoff.

Figure 1: SL1000 PPA (Hach Company, 2016).

Patented Constraints

As mentioned in the preceding section the SL1000 PPA uses Chemkey™ technology. This technology makes it so the only inputs for testing can come directly from the Hach Company themselves. This may prove to be difficult and much more expensive when exporting. Despite the difficulties this patented part of the product may have on exports, it uses a

technology that previous ways of lab testing use, just in a portable sense making it an ideal trusted piece of equipment (Hach Company, 2015b).

Producer Information

The company that manufactures The Hach SL1000 Portable Parallel Analyzer™ Kit is the Hach Company. The Hach company was initially founded in Ames, Iowa before expanding internationally (Hach Company, 2015e). The Hach company has several locations world-wide, two locations being in China and India, the countries that border Nepal (Hach Company, 2015a). The Canadian office is located at 3020 Gore Road, London, Ontario (Hach Company, 2015a).

The mission statement for the Hach Company is to "Ensure water quality for people around the world" (Hach Company, 2015f). Since being founded in 1947 the Hach Company has been committed to producing and delivering the highest level of quality products that maintain ease and accuracy while using (Hach Company, 2015f).

Product Costs and Labour

The Hach SL1000 Portable Parallel Analyzer™, as seen in Figure 1, is an expensive piece of technology at a price of $5134.00 Canadian Dollars (CAD) (Hach Company Customer Service Representative, 2016) or $417,165.55 Nepalese Rupees (NPR) (XE Currrency Converter, n.d.). This price does not include all the accessories or Chemkeys® required to get the most out of the instrument. Another cost constraint of this product is the Chemkeys® are single use, therefore, increasing on-going costs as it would not be a one-time fee. However, as more Chemkeys® become produced there is possibility to test for contaminants not currently listed making the investment more worthwhile, instead of purchasing one of several different water samplers.

The intensity of the labour of use for the kit is relatively low, and given its efficiency, and speed for results as a product an individual has the potential to perform several tests within a day. Considering this kit is handheld the portability of the equipment is high allowing for several tests to be ran year-round regardless of topographic location, and weather when used properly to collect data.

Product Inputs

As previously mentioned, the Chemkeys® are single use thereby making this component of the product an ongoing input. The battery life on the SL1000 is approximately 200 Chemkey® uses, afterwards the instrument will need to be charged using the rechargeable battery pack included in the box at the time of purchase (Hach Company, 2016). Should the individual wish to the data collected by the SL1000 can be downloaded to a computer and placed into an already built easily accessible spreadsheet generated by the Hach company. To perform this task, the requirements are to have a computer with a USB port to transfer the data from the instrument to the computer (Hach Company, 2014).

Market in Canada

The market within Canada belongs to a variety of industries (Hach Company, 2015f). The Canadian market for water sampling kits to ensure water quality can consist of agriculture, water treatment, wastewater treatment, and sectors within environmental services to name a few. It is a market that is also continuing to grow as it is estimated that water analysis instrumentation is expected to generate $3.6 billion United States Dollars (USD) by 2020 on the global scale (Hermes, 2015).

Benefits to Canada

From an economic trading point of view it is unlikely this will create a significantly noticeable increase in Canada's gross domestic product (GDP). In 2015 Canada's GDP was estimated at $1.552 trillion USD (Central Intelligence Agency, 2016a) whereas Nepal was estimated at $21.36 billion USD (Central Intelligence Agency, 2016b).

On a smaller more localized point of view, there is the possibility for more jobs to be generated if the SL1000 were to become an export to Nepal as if the demand increases the supplies must follow. Situationally, should there be a need for more supplies and jobs became available this could benefit Canada's economy from within.

Another benefit to Canada would be for Hach Company Canada to increase their sales coverage and gain momentum as a reputable company while the water analysis instrumentation market is on the rise. By doing so, they are potentially filling the economic trading gap that otherwise cannot be filled by just exporting this product to Nepal.

Part II – Export Potential to Nepal

About Nepal

Nepal is a landlocked country in Southern Asia, surrounded by China and India, as represented by Figure 2 below (Central Intelligence Agency, 2016b). The total area of Nepal is 147,181 square kilometers in which 3,830 of that total is consumed by water (Central Intelligence Agency, 2016b). In 2016 the total population of Nepal was estimated to be a little over 29 million people (Central Intelligence Agency, 2016b). Of the population, Hinduism is the most commonly practiced religion at 81.3% based on 2011 estimations (Central Intelligence Agency, 2016b).

Figure 2: Map of Nepal (Central Intelligence Agency, 2016b)

The lay of the land for the Nepalese is Terai in the South, hilly regions located centrally, and the Himalayas in the North (Central Intelligence Agency, 2016b). Of this topography in Nepal it was estimated in 2011 that 28.8% of land use was agricultural land (Central Intelligence Agency, 2016b). In 2012, it was estimated 13,320 square kilometers of the agricultural land was irrigated (Central Intelligence Agency, 2016b). One of Nepal's current environmental issues is contaminated water, with agricultural runoff being a contributor to this problem amongst others (Central Intelligence Agency, 2016b).

Reasons for Exportation

As of 2014 it was estimated in Nepal 69% of the labour force is in the agricultural sector, and contributes to 29.4% of the total GDP (2015 estimate) (Central Intelligence Agency, 2016b). Given agriculture is such a dominate sector in Nepal, it is important to assist with preventing consumption of contaminated water as many human diseases in Nepal are caused by a lack of clean drinking water (Ghimire, 1985). Much of Nepal's population uses surface water as a potable source, which is most susceptible to pollution from agriculture (British Geological Survey Natural Environment Research Council, 2001).

Generally, information about water quality in Nepal, with the exception some research, is scarce. There is a lack of documented data that can be assessed to determine the agricultural sectors impact on the quality level of water. Therefore, another reason to have the SL1000 as an export to Nepal is to provide individuals with the right tools to start documenting and analyzing the extent of the issue. Not only will it help with maintaining a record, it is a self-safety instrument ensuring the users state of mind whether the water is safe to consume or not.

Transportation Logistics

There are instances in marketing and manufacturing where companies decided to only ship inside their country's border. Unfortunately, this product is not shipped outside of Canada directly by the Hach Company (Hach Company Customer Service Representative, 2016). Thus, a system would have to be put in place where a Canadian buyer shipped the kit to Nepal using a third-party company. However, batteries are a prohibited item from importation suggesting there is a chance this product can be refused entry because of the battery contained within (Canada Post, 2016).

Given a circumstance where there would be no importation logistics or issues; the package would fly from Toronto, Ontario, Canada to Kathmandu, Nepal using A1 Freight Forwarding. Air freight for one unit would cost $229.62 CAD whereas shipping five units would cost $232.00 CAD (A1 Freight Forwarding, 2016). Therefore, when transporting this product from Canada to Nepal, it is most cost effective when done in bulk.

After the product, has arrived in Nepal, the product can be driven out to the individual or community purchasing the instrument using a small courier service or picked up from the arrival location due to its small, compact size.

Needs and Benefits to Nepal

As previously discussed in the reasons for having the SL1000 PPA as an export, the need is to know what is happening to the waterways as a cause of agriculture in Nepal. The lack of published material about agriculture affecting water sources for communities that rely on surface water for consumption is alarming. There needs to be a program in place for those communities to understand and learn about the harm of ingesting water contaminated by agriculture runoff.

Not only can agriculture runoff pose a threat to human health but it can harm the environment. Nitrogen pollution in the waterways can contribute to ecological degradation (Hou et al., 2016). By having data to display and explain to the agriculture sector about the harm runoff is posing not only on human life but the environment can be enlightening.

The two major benefits to Nepal this product can have is having accessible data about what is happening to the water as a cause of agriculture and the education this data can bring to communities that rely on surface water. These are benefits because as previously mentioned there is a lack of data to examine what is happening with the water being consumed, how is it contaminated, why is it contaminated, and what are the major contaminants in the water being consumed to name a few.

Market in Nepal

The market for this product in Nepal is small but directed. This product as an export can aid agricultural communities that use surface water as the main source of potable water and health and environmental researchers.

To market to agricultural communities an educational and informational approach should be taken as it could be to a lack of understanding the water being consumed is contaminated and should be further tested.

To market to those in the research sector the best approach is the less time and variability this product takes in comparison to other ways. This can be done by doing two tests side by side to display accurate results of the water sample can be acquired while using this instrument.

Potential Program Partners

The main concern about this product specifically becoming an export to the Nepalese people is the cost. Given the GDP per capita was estimated to be $2,500 USD in 2015 it seems unlikely this product can become a reality without some support (Central Intelligence Agency, 2016b).

The Hach company is currently partnered with both Water for People and Water Missions International (Hach Company, 2015d). Both organizations have the purpose of ensuring safe water in developing nations (Hach Company, 2015d). Water Missions International already operates within Nepal, thus having an established relationship (Water Mission, 2016b).

Though Water Missions International generally operates under disaster situations, one could claim the lack of access to safe water due to agricultural pollution is an ongoing disaster (Water Mission, 2016a).

Water Missions International as a program partner in promoting this product could market towards the farmers by implementing a trial and use program. The company could bring the SL1000 PPA to Nepal while working and display how the product works and explain the benefits it could have on the community while searching for a reliable, safe water source.

A potential program partner for those in the research sector can universities themselves. Given there is a lack of published data, said universities can begin to work towards collecting and publishing the data. To minimize the costs of this product to the universities perhaps the Hach Company can introduce an education grant, giving those in developing nations who work

at an educational institution a subsidized rate. Or as technology advances and companies wish to upgrade their equipment there could be a recycle program in which older technology is provided to those institutions.

Should a recycle program be created this can be helpful not only to the Nepalese population by providing them with instruments that can be beneficial to research and human health but on the global scale of waste. By creating recycle programs waste in landfills can be lowered as they would not be contributed towards via this product. While this may seem small scale, anything done to reduce waste can be considered a long term large scale project.

Regional and Global Competition

The market for water sampling instruments is huge and there are several water sampling kits made around the world. Though through thorough research no sampling kit was found that could provide the same product as the Hach Company. There are digital water sampling kits on the market that can test for some but not all the same contaminants as the SL1000. There are also no other companies that have the same technology as the Chemkeys™ which uses the same chemicals to determine contaminants as done in laboratories.

Therefore, while there are alternatives that can test for singular contaminants or multiple contaminants there are no alternatives that can provide the same product as the SL1000. Due to the patented technology, such as the Chemkey™ that uses the same chemicals used in laboratories, there is no other product that is on the market today that can provide in field laboratory results.

Future Studies and Unknowns

The most ideal place to start with future studies is to begin collecting and documenting data continuously as to how agriculture runoff is contaminating the water. This means

understanding which chemicals are most abundant and deeming the water unsafe for consumption.

A major unknown for this product of exportation is how well it will take off within the communities. Will it be a one-time use for communities although that is not its design? How well will this product be received within the entirety of the Nepalese population? Unfortunately, many of the unknowns and questions at this time cannot be answered as they would involve actual implementation of the device.

Conclusion and Recommendations

In conclusion, there is a market and requirement for water sampling kits to be used in Nepal. Perhaps the advancements of an electric handheld model may not be necessary now, kits that can test for contaminants within the watershed should be explored further as an export to Nepal. However, with that said the SL1000 has an ease of use being one of its more enticing characteristics especially if the product were to be exported to those with a lesser understanding of how to use laboratory testing kits.

Recommendations are that if communities were going to invest in water sampling, this kit would be an ideal investment. As a community investment, the overall cost can be lowered as not one individual will be making the investment. Should the communities wish to allow outside sources and educational institutions to do the sampling it may be more ideal to use kits that have lesser inputs and where time of determining the results is not a variable. Although given the technology the SL1000 has in a handheld device and everything it can include ease of use, this product is strongly recommended despite the price constraints it has and the ongoing inputs it requires. It may be a niche market that is looking to invest in this product and not many units may be sold however, it is a very valuable piece of equipment.

Should there become more price practical instruments that can perform the same duties as the SL1000, those instruments should be looked at as potential imports. Therefore, it is not about the SL1000 itself in aiding the communities and researchers but rather its capabilities that make it an ideal product.

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