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TECHNOLOGICAL DEVELOPMENT IN POULTRY BUSINESS

Comparative Analysis between Bangladesh and Finland

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The aim of the thesis was to analyze and identify significant factors in poultry farming in Bangladesh, challenges and opportunities, and a comparison of the business operations of poultry farms in Bangladesh and Finland with regard to the use of technology in poultry farming.

A practical research was conducted that showed presence of growth in the use of technology in poultry farming. However, disparities exist in the development and use of technology in poultry farming in Bangladesh and Finland, which the thesis sought to establish. The study was descriptive, with an analysis on past research conducted in the field of technology usage in poultry farming from periodicals, journals, annual reports and poultry websites that were accessed using the internet as valuable tool in outlining the disparities between the two countries.

The results of the study showed that farmers in Bangladesh continued to practice traditional poultry farming methods extensively and using simple technology. Bangladesh should have appropriate strategies for launching plans and strategies that promote the use of technology in poultry farming. The results of the study showed that both poultry farming in Bangladesh and Finland have numerous benefits that citizens profit from job creation, protein supply and trade improvement. At the end of the study, recommendations were made, for example, that Bangladesh would need cost-effective production to maximize poultry production technology, which could in practice be implemented to optimize poultry farming.

Key words
Day-old chicks, Grandparent stock, Parent stock, Poultry, Poultry Farming, Technology.
## CONCEPT DEFINITIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>BDT</td>
<td>Currency Code for Bangladeshi Taka Currency</td>
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<td>DOC</td>
<td>Day Old chicks</td>
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<td>GP</td>
<td>Grand Parent Stock</td>
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<td>NBR</td>
<td>National Board Revenue</td>
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<td>NRI</td>
<td>Natural resource institute</td>
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<td>PS</td>
<td>Parent Stock</td>
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<td>IOT</td>
<td>Internet of Things</td>
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<tr>
<td>LDR</td>
<td>Light Detector Receptors</td>
</tr>
</tbody>
</table>
ABSTRACT

CONCEPT DEFINITIONS

CONTENTS

1 INTRODUCTION..............................................................................................................................................1

2 TECHNOLOGY IN POULTRY FARMING ..............................................................................................................4
  2.1 Overview of Poultry Farming......................................................................................................................4
  2.2 Poultry firms in Bangladesh......................................................................................................................6
    2.2.1 The Status of Poultry Firms in Bangladesh.......................................................................................7
    2.2.2 The Opportunity of Poultry Farming in Bangladesh...........................................................................11
    2.2.3 Problems and Challenges of Poultry Farming in Bangladesh............................................................13
  2.3 Poultry farms in Finland..............................................................................................................................16
  2.4 Technology usage in Poultry Farming..........................................................................................................18
    2.4.1 Benefits of Technology in the Poultry industry..................................................................................19
    2.4.2 Technology Usage in Poultry Farming in Bangladesh....................................................................20
  2.5 Emerging Trends in Poultry Farming..........................................................................................................22

3 RESEARCH AND REPORTING METHOD.......................................................................................................25
  3.1 Research Design..........................................................................................................................................25
  3.2 Research Strategy.......................................................................................................................................26
  3.3 Population and Sample..............................................................................................................................27
  3.4 Data Collection Method.............................................................................................................................29
  3.5 Development of the questionnaire survey instrument................................................................................30
  3.6 Administration of the survey questionnaire.............................................................................................30
  3.7 Rates of response and return.....................................................................................................................31

4 RESEARCH ANALYSIS......................................................................................................................................32
  4.1 Information from Respondents in Bangladesh........................................................................................32
    4.1.1 Information from farmers rearing poultry birds................................................................................32
    4.1.2 Information from sellers and consumers of poultry products..........................................................35
    4.1.3 Information from consumers of poultry products............................................................................37
  4.2 Information from respondents in Finland..................................................................................................37

5 RESEARCH FINDINGS AND RECOMMENDATIONS.........................................................................................41
  5.1 Summary of Research.................................................................................................................................41
  5.2 Discussion...................................................................................................................................................42
  5.3 Recommendations......................................................................................................................................43

6 CONCLUSIONS..................................................................................................................................................45

REFERENCES

APPENDICES

GRAPH
GRAPH 1. Trends in poultry population and meat and egg production..........................................................8
FIGURES
FIGURE 1. Existing egg marketing system in Bangladesh.................................10
FIGURE 2. Existing Broiler marketing system in Bangladesh..............................11
FIGURE 3. Statistical presentation of poultry products .............................................17
FIGURE 4. Feedback from respondents on causes of issues in Bangladesh Poultry farming........33
FIGURE 5. Acceptability on the use of robots..............................................................34
FIGURE 6. Preference in distribution methods.............................................................35
FIGURE 7. Readiness for new technology.................................................................36
FIGURE 8. Effects of technology on production.........................................................38
FIGURE 9. Ready for new technology in poultry farming.........................................39
FIGURE 10. Respondent’s take on new technology in poultry farming.....................40
1 INTRODUCTION

Technology in poultry farming is the process of domesticating birds by use of advanced methods of farming that utilizes modern tools, equipment and simulators. The aim of technology in poultry farming is to maximize potential for meat, eggs, and easy collection of compost. Some of the tamed birds include chickens, turkeys, geese, and ducks. In some cases, pigeons, peacocks, and other small birds are reared for beautification purpose. In Bangladesh, chickens are widely preferred since they have a ready market and are easy to maintain. (Rahman, Jang & Yu 2017, 272.)

Bangladesh, with a population of 160 million people living within an area of 147, 570 square kilometers is ranked among developing countries that are densely populated. Eighty percent of the population lives in rural areas and practice poultry farming. (Islam 2014, 116.) The primary objective of poultry farming is to create revenue and act as a source of food to the family. However, due to the lack of appropriate technology, the maximum potential of this business endeavor is seldom achieved, with huge losses accounted each year. Most poultry farms utilize conservative means of production which are outdated and lack ideal measures in protecting both the birds and the byproducts. Lack of protection exposes the poultry birds such as chicken, and their end products to harm’s way that include diseases, breakage of eggs during transportation, and meat going stale before due dates.

Poultry farms across the world depend on the environment in which they are established. In developed nations, government involvement and advancements in technology often acts as a booster in mitigating disease, transportation, and storage risks. Poultry farms in developing countries, on the other hand, are private enterprises that are marred with the use of archaic and traditional methods of production, transportation, and storage. The situation often leads to losses due to lack of proper means to contain the effects arising from a disease outbreak, transportation, and storage issues. Bangladesh boasts of having a majority of its entrepreneurs involved in poultry farming. In 2017 around 2 million people were directly or indirectly employed in the poultry industry, with about 60,000 to 65,000 registered commercial farms. (Rahman, Jang & Yu 2017, 274.)

Finland, on the other hand, is ranked among developed nations. In Finland, chicken production is majorly done in factory farms. The government made efforts in combating Salmonella, a disease associated with poultry farming, thereby leading to more yields due to reduced disease prevalence. (Rahman, Jang & Yu 2017, 274.) About 400 poultry farms exist in Finland, with the production of
poultry meat rampant near slaughterhouses. Research into the health and general wellbeing of birds has been conducted, notably by Luke's research. (Jez, Beaumont & Magdelaine 2011.)

The main aim of the thesis is to compare technology usage in poultry farming between Bangladesh and Finland. Focus on technology in poultry farming is vital in the study, with a closer look at government involvement, and environmental factors. The potential of poultry farming in Bangladesh is as strong as that of Finland, with entrepreneurs from both countries putting in efforts to maximize revenue. However, entrepreneurs in Bangladesh, who mostly apply traditional methods of poultry farming and simple use of technology, seem to miss maximum utilization of income from poultry farming, with some instances reaping losses leading to the closure of poultry farms.

It is therefore of primary importance that this study comes up with a practical solution which revolves around technology in poultry production, and which is environmental, and culturally friendly to the people of Bangladesh to aid in poultry farming. Some technological advancements in poultry farming in Finland have cultural implications and may not be welcomed by the people of Bangladesh. Besides, the difference in the economy of the two nations may not allow certain technologies to be applied, hence a need for selective borrowing, with a keen view on Bangladesh culture, and socio-economic environment.

Another aim of the study is to outline the importance of using the practical technological solution, which primarily involves showing the competitive advantage the technological solution has over previously used methods of poultry farming. Although some technical applications in poultry farming in Bangladesh have been utilized, their usage is insufficient, thereby giving a competitive advantage to competitors from developed nations.

Additionally, the study is aimed to show the likelihood of the people of Bangladesh to accept technology, and the problems and solutions to the problems that exist in poultry farming. Some problems in poultry farming arise from personal, social and government regulations, while others are technological. Besides, efforts to address the persistent issues will be discussed with a keen view of establishing ways of eliminating the persistent defects in poultry farming.

Lastly, the study will look at the emerging trends in poultry farming, with the aim of selective borrowing of the most feasible emergent trends. Most emerging trends that are beneficial to poultry
farming revolve around the use of technology. Therefore, it is of great importance that Bangladesh adopts and applies such technological emergent techniques in poultry farming. Various studies in the use of technology have been carried out in Asia and the world across. Such studies include the use of technology in production, marketing, and employee management. However, research on technology use in poultry farming within the context of Bangladesh remains scanty, hence the need to fill the gap. The thesis will analyze the current situation of poultry farming in both Finland and Bangladesh and try to unearth the many advantages that exist with the usage of technology in poultry farming, with a view that such patterns, when used in Bangladesh, would lead to an increase in production, as well as ease the cost of carrying out poultry farming activities.

During the research, the need to address some questions deemed relevant to the study will emerge. The research is aimed at identifying whether there is an application of technology in poultry farming. After that, it will determine whether there have been improvements in poultry farming out of the use of technology. If present, what is the situation? Additionally, the research will show whether there is an improvement in production in Bangladesh poultry firms where technology has been inculcated to the system. Besides, the study will try to establish whether there is any apparent reduction in cost following the use of technology in poultry farming. Lastly, the research will disclose some of the emerging trends in the use of technology in poultry farming, with comparative analysis in both Bangladesh and Finland.

The thesis is divided into six chapters that begin with the introduction that provides a background study of the argument, with an emphasis on why the topic is of importance for research. The thesis further outlines the objectives of the study, followed by the research questions and their hypotheses. The theoretical framework supports and provides an analysis of past research on the topic by various authors. Secondary data involved previous articles, reports, journals, poultry websites and other scientific materials. In chapter three, the methodology adopted in the study is discussed. It includes the sample and population of respondents put under review. Chapter four, which covers content analysis and data presentation, followed. It discussed data collected and feedback from interviews. In-depth discussion of the findings is presented in the fifth chapter. The chapter stretches further and offers recommendations that could be put in practice in the future, by poultry farmers or entrepreneurs in the poultry industry. Conclusion of the thesis, with a summary of the thesis is presented in the sixth chapter. Within the chapter, criticism and final remarks on the study are offered.
2 TECHNOLOGY IN POULTRY FARMING

This chapter provides an overall view of global research previously conducted on technology in poultry farming. The chapter forms the basis of the research framework for the thesis. The feedback on the previous usage of technology in poultry farming will also be presented in the review. The literature review presented in the chapter is essential because it sets out the specific purpose of the thesis, revealing what has been achieved and what is yet to be achieved, hence showing the loophole that this thesis aims to cover.

The theoretical framework is charged with the primary purpose of outlining how the usage of technology in poultry farming has been applied in achieving objectives of firms in Bangladesh and the world across. Further analysis will cover how technology has been used in poultry farming in developed nations, with a specific consideration in Finland, which has shown an increased production and reduced wastes.

An analysis of the past application of the technology will provide the background in which judgment on adoption of technology in poultry farming will be based, and what to select and what to leave out during selective borrowing. This will offer a better understanding, using evidence, on the importance that underlies Bangladesh if it adopts technology in poultry farming.

2.1 Overview of Poultry Farming

Poultry farming using technology is dependent on the use of scientific knowledge and experience of farmers. (Loyon, Burton, Misselbrook, Webb, Philippe, Aguilar, Doreau, Hassouna, Veldkamp, Dourmad & Bonmati 2016, 1.) Over the years, modern breeding of poultry has been applied with a view of improving poultry breeds. Sophisticated technologies are required for the accomplishment of the target. In light to improved breeds, and output, appropriate technology, and a team of specialists are required. (Loyon et al. 2016, 1.) For instance, Bauer Technics, a company specialized in poultry farming boasts of applying technology in its operations, with the inclusion of construction engineers, feeding specialists, and veterinaries with services in both the Czech Republic and the world across. Therefore, a properly organized modern poultry farm must consider both the basic needs of the poultry
animals as well as be in harmony with their genetic potential of the animals by employing specialist in operations.

The recent trend in the usage of technology in poultry farming has received both positive and negative feedback. Developed nations tend to adopt technology in poultry farming operations, including Finland, while developing nations tend to be reluctant in inculcating technology. Developing countries seldom allocate time, resources and effort in learning the needs and importance that technology holds, especially in the poultry industry. Such nations remain stuck in the old traditional methods, with little technological application. This makes them lag as per the current changing trend in business operations.

In countries where technology in poultry farming is largely practiced, such as in Europe, certain factors determine individual poultry farms design. The factors include the condition of the landscape, farm zoning, the delivery system for farm feeds, the ventilation system, and efficient ways of collecting, storing and utilizing compost. (Loyon et al. 2016, 3.) On landscape consideration, construction of poultry shelters is based on corresponding climatic conditions and other regional requirements. Farm zoning, on the other hand, requires that poultry farms be set up in areas with efficient road and driveway connections. The design of the ventilation system is dependent on the needs for cooling and heating ideal for the poultry.

Poultry farms range from small scale to medium size, and large scale. Large scale farms are mostly found in Europe, where technology has been applied to ease on work, and increase output while maximizing on efficiency. Medium and small-scale poultry farms are found mainly in Asia and other third world countries, where traditional methods of farming are applied. Although the conventional methods are not efficient, they ensure the continued production of poultry products. However, some Asian countries, including Bangladesh have adopted technology in poultry farming. The biggest problem such countries face is, particularly Bangladesh has high poverty levels and lack of government support in the form of subsidies, loans, and a weak economic background curtail the application of the available technology in poultry farming.

Majority of poultry farms in Bangladesh utilize traditional methods of poultry farming, where an outbreak of diseases is capable of sweeping off all the poultry birds. Therefore, these farmers lack the necessary tools to mitigate disease outbreak. Consequently, these farms are still using traditional methods of chick production, rearing, and storage. Marketing is often locally conducted. This,
therefore, places the poultry industry in Bangladesh as a local, small scale business endeavor. Technology in poultry farming is a new topic, and after the study, it will enable poultry farmers to see the need for inculcating technology in their business endeavor.

The distinction in poultry farming in Bangladesh and Finland, therefore, comes to light. Technology in poultry farming has been harnessed and supported by governments in developed countries such as Finland, thereby leading to a boost in the poultry sector. Technology in poultry farming goes further than just involving disease control measures to the development of better chick breeds, efficient method of storage of produce, better feeds, and better ways of sales promotion. The inclusion of technology in poultry farming in Finland has not only led to an increase in production but also leads to ease in rearing, harnessing and distributing poultry by-products.

2.2 Poultry Firms in Bangladesh

The poultry industry in Bangladesh is a vital part of the economy that is essential for fostering the growth of the agricultural sector and helping in reducing malnutrition. Additionally, the industry is prided for having created both direct and indirect employment to about six million people. It is reported that poultry meat in Bangladesh accounts for 37% of the total amount of meat produced in the country. Besides, more statistics show that 27% of the total animal protein comes from poultry. (Hamid et al. 2017.) The sector is comprised of hatcheries, farms for breeding, milling industries where birds feed are manufactured, industries for manufacturing vaccines and medicine, and marketing organizations.

In Bangladesh, poultry farming is mostly run by the private sector. According to the Annual report on livestock (2015), private poultry farming began in the 1990s with several parent stock farms producing and selling day-old broiler and layer chicks. The report shows that since 1995, an average annual growth rate of 15%-20% was achieved. However, the outbreak of avian influenza in 2007 led to a decline in the growth rate. The report also shows that there were 82 parent poultry stock farms and hatcheries by 2011. The supply from the firms amounts to 80 percent of the total parent stock demand, with the remaining 20 % amounting from imports. Additionally, by 2011, there were 74 feed producing mills for poultry birds. ([Annual report on livestock, 2015]; Hamid et al. 2017.)
In the public sector, 31 chicken farms, and two duck farms exist. Besides, six chicken and two duck hatcheries were in operation under the public sector by 2014. ([Annual report on livestock, 2015]; Hamid et al. 2017.) Due to the inadequate supply of poultry meat and egg supply, and lack of enough funds to invest in the sector, the government is encouraging the private sector to venture into the poultry industry. The feedback from the government initiative is positive, with many people in rural areas joining the industry as small scale and medium scale farmers. Other than the rural population, other organizations such as Kazi poultry, Paragon poultry, Bangladesh Rural Advancement Committee (BRAC) and Aftab poultry have been set up and work in the poultry industry. Recently, majority of the organizations have integrated their operations. (Rahman, Jang & Yu 2017, 278.) The big firms (APPENDIX 1) have been instrumental in producing farm feeds and processing of poultry meat.

Most poultry farms in Bangladesh operate at a household level. Therefore, access to sources of funds for expansion and acquisition of technological equipment is limited. Besides, being a developing nation, the economy is not stable enough to fully support the inclusion of technology in poultry farming. However, a few privately owned farms, as mentioned earlier apply the use of technology in the poultry sector. The demand for poultry products is propelled by cultural values that discourage the consumption of meat and pork. Therefore, the available poultry reared in Bangladesh is often inadequate.

2.2.1 The Status of Poultry Firms in Bangladesh

The population of poultry in Bangladesh is estimated at 304.17 million in 2014. The population of chicken ranked highest at about 255.31 million. The duck population comes second. The firms experienced a change in pattern from 2004-05 to 2013-014. Between 2004-2017, the poultry growth rate increased by 6.21% but in 2007-2008, it declined by 2.70% due to the outbreak of avian influenza. There was an improvement in 2008-2009 to 4.20% and then experienced a decline of 2.89% in 2009-2010. (Rahman et al. 2017, 275.)
From the projection above, it is evident that the outbreak of avian influenza largely affected the poultry industry in Bangladesh. However, the volume of poultry meat and eggs and the number of poultry birds is on the rise. High yield breeds produced in breeder companies and the emergent trend of rearing poultry birds in backyards and commercial farms may have led to the trend. (Rahman 2017, 275.)

The average poultry meat and egg production in Bangladesh for the past ten years was 19.38 and 7.77% consecutively. 2010-2011 produced the highest rate of meat production at 57.94, while the year 2006-2007 recorded the lowest at -7.96%. For egg production, the highest production rate was recorded in 2013-2014 at 33.48% while 2008-2009 registered the lowest egg production at -17.00%. Therefore, the production of poultry products has never met the demand level. (Hamid et al. 2017.)

The progress in the poultry industry has been significant in the past two decades. The private sector is responsible for the growth in Bangladesh poultry industry. (Hamid et al. 2017.) Two aspects of poultry farming exist in Bangladesh, the farming business and the manufacture of feed business. Both the sub-sectors showed remarkable improvements. The growth of the feed manufacturing sub-sector has been on the rise due to the demand by poultry farmers. (Hamid et al. 2017.)

Another factor that may have led to an increase in output in the poultry sector may be due to the joining of some commercial industries. (Rahman 2017, 278.) The commercial feed production sub-
sector is comprised of 74 industries that manufacture and market poultry feed. 35 to 40 of the industries operate on a large-scale basis, producing both fish and poultry feeds. However, demand for feeds still outmatches the supply. The total amount of poultry feeds produced in the country amount to 2.73 million tons. However, the total amount of poultry feed required in the country stands at 5.94 million tons. (Hamid et al. 2017.) Therefore, poultry feed production only meets 46% of the demand. The statistical presentation shows the need for investing in the industry and adopting a different strategy to meet the national demand.

The grandparent’s stock and the parent stock present in Bangladesh are of world class. Additionally, poultry vaccines in the country are those that adhere to world-class status. The adoption of GP, PS, and vaccines of high quality is responsible for the growth of the poultry sector in Bangladesh. (Hamid et al. 2017.)

The poultry meat processing industry in Bangladesh is a new addition to the processing sector of the economy. Despite the integration, there is only one beef processing industry is in operation in Bangladesh. Processed meat makes less than 1% of the total amount of meat produced in the country (Rahman 2017, 278). Therefore, more investment in the sector is needed. Bangladesh prides of a single large meat industry located at the district of Pabna. Besides, other small-scale plants are also present that contribute significantly to the total meat production. An increase in the supply of poultry meat production is attributed to the rise in the fattening program that are conducted in small and medium scale farms where fattening of poultry birds takes place show significant growth in the country. (Hamid et al. 2017.)

The poultry production industry in Bangladesh shows a deficit that needs to be filled. There is a need for increasing poultry meat processing plants. The decline in poultry production in the 2007-2008 year was due to the outbreak of the bird flu that is transmissible from birds to humans hence a need for selling processed poultry products. The need for processing poultry products calls for more set up of poultry processing plants. Once the industries are set up, they will create more employment opportunities. Besides, people have shown a preference for poultry products. This shift in preference is likely to attract more investors to the poultry industry.

Marketing of poultry products in Bangladesh is still carried out using traditional methods. Consequently, producers are getting little remuneration while consumers endure high prices (Hamid et al. 2017.) The main reasons for the lack of remuneration to the small-scale producers is because
producers have to adhere to government policy when setting up a marketing system. Government policy comes with many restrictions and charges. Additionally, producers are far away from consumer hence often unable to recognize what consumers want. Besides, most producers operate on a small-scale basis about their output. Another reason for the lack of remunerative price is because most small-scale producers lack vehicles to transport their products to clients. Lastly, the purchase and consumption of live chicken are high in Bangladesh. (Hamid et al. 2017.) The people believe in what they see, and the need to adhere to the slaughtering method associated with the Islamic religion. Therefore, the present condition shows a need for a proper marketing channel that favors both the producers and consumers.

**FIGURE 1. Existing egg marketing system in Bangladesh (Adapted from Hamid et al. 2017)**

Based on figure 1, it is evident that there exists a long chain between egg consumers and the producers of the commodity. Along the chain, the price keeps increasing. Therefore, the producers have to sell at low prices so that after the price appreciates in the market chain, the customer can still afford the commodity.
2.2.2 The Opportunity of Poultry Farming in Bangladesh

In the next 20 years, developing nations are likely to register significant expansion, especially in their livestock industries. The increase is expected to occur majorly in the poultry meat and egg production sector. Based on the present GP and PS breeding and marketing firms in Bangladesh, the country holds potential for such an opportunity for development. A point in question comes on the sustainability with which Bangladesh is to withstand the projected growth. The current feeds produced inadequate, making Bangladesh rely on importation of feeds and other requirements. The need for alternative measures to contain the expected rise in poultry farming becomes relevant. (Farrell 2003.)
The opportunity for growth in supply and demand varies. Poultry farming in Bangladesh is mostly demand driven. Urbanization, income growth and population growth determine the elasticity of demand. Steady growth in population in Bangladesh, urbanization, and income shows a future increase in demand for poultry products. The rise in demand is a clear indicator of the potential of growth in the poultry industry in Bangladesh. (Rahman et al. 2017, 274.)

The potential for a shift in the price of poultry meat and egg is high, with emphasis on increasing production to target the export market. At present, the amount of mutton, fish, and beef is higher compared to egg and broiler meat. Poultry products offer the cheapest source of protein afforded by most people. Besides, egg and poultry meat serve as a substitute for other proteins. (Ali & Hossain 2012, 4.) Therefore, the demand for poultry products will always persist.

The potential of the poultry industry to create huge job opportunities is high. Currently, the sector offers both full and part-time employment. Employment opportunities in Bangladesh associated with poultry farming, which is mostly carried out in rural areas are open to women, children and the elderly. (Ali, & Hossain 2012, 10.) In industries, professionals, primarily men, are employed to handle both technical and non-technical jobs. Job hiring based on gender is attributed to the cultural subscription of the people of Bangladesh.

There is potential for growth in Bangladesh poultry farming due to a favorable environment for foreign investment. The government of Bangladesh has created a pleasant business environment for investors from other countries in the poultry sector. Presently, few international companies operate in Bangladesh poultry industry. The companies include Godrej, Sokuna and New Hope. Additionally, the current trend in government support in the form of tax holidays, incentives for export and electricity subsidy is likely to attract more investors into the country. (Hamid et al. 2017.) The persistence gap in demand and supply of poultry products in Bangladesh shows the need for more international companies to venture into Bangladesh poultry farming.

Another factor causing an increase in the opportunity for growth of Bangladesh poultry industry is the increase in processed meat and processed food demand. For the past five years, international restaurants such as Macdonald, A and W, and KFC have been carrying out operations in Bangladesh. Besides, there is an increase in fast food shops yearly. (Hamid et al. 2017.) The shops demand hygienically slaughtered meat thereby opting for processed meat. The trend is an indicator of the potential of opening more processing industries.
Increase in supply of products and services for poultry farmers also increases the potential for growth of the industry. Recently, there has been an increase in government involvement in supplying poultry health products. Besides, animal health companies under the private sector have been instrumental in ensuring the supply of poultry health products thereby making all health products available in Bangladesh. (Hamid et al. 2017.) Where medicine and vaccines are available, the rate of growth in the poultry sector is bound to increase.

The involvement and representation of Bangladesh in international or regional seminars help in exchanging knowledge. Some of the workshops include taking part in the World Poultry Science Association (WPSA). Consequently, the organization of international workshops and shows every year by WPSA Bangladesh branch serves to not only attract investors but also shed more information to the citizens on the importance of poultry farming. (Hamid et al. 2017.)

2.2.3 Problems and Challenges of Poultry Farming in Bangladesh

The outbreak of Avian Influenza is a significant threat to the growth of poultry farming. In 2007-2008, the industry suffered huge losses which were never compensated by the government to mitigate the loss. (Ali & Hossain 2012, 10.) The effects of Avian Influenza are devastating to the poultry industry in Bangladesh and other five countries, notably, China, India, Egypt, Indonesia and Vietnam, which have been experiencing the Avian Influenza virus H5N1. The devastations on poultry from the outbreak is associated with poor service delivery in form of veterinary and vaccination services from the government. (FAO Journal 20 April 2011.) As such, a negative impact on the poultry sector has been felt.

Another problem facing poultry farming is the high price of poultry feed materials. (Ali & Hossain 2012, 9.) The poultry subsector faces a significant challenge with the acquisition of sufficient feed that is appropriate for the poultry breeds in Bangladesh. The country depends on both mixed ingredients and manufactured feeds on its poultry sector. Besides, plans for imposition of new taxes by National Board of Revenue (NBR) Bangladesh on maize imports have created new problems due to the fact that maize is a key ingredient in the preparation of feeds for poultry birds. (Ali & Hossain 2012, 9.) Additionally, prices for poultry feeds are determined by feed manufacturers who set the price high.
The price of raw materials used in the manufacture of poultry feeds has hiked up in the international market, leading to a hike in the production cost. (Ali & Hossain 2012, 10.) An approximate of 45% to 50% of the total cost of rearing broilers in Bangladesh is used in the acquisition of feeds. The leading cause of the high price in feeds is because most ingredients used in the production of the feeds such as maize, soybean meal, and protein concentrates are primarily imported from countries such as Germany, Thailand, and China.

There is potential for growth in the transportation and marketing of day-old chicks (DOC). Bargaining is not practiced between buyers and sellers of DOC. It is primarily the seller that sets the price that is usually determined by the supply. Owners of hatcheries either sell the DOCs directly to farmers or use agents who are paid a little commission. (Ali & Hossain 2012, 10.)

Potential for improvement in the pricing of the broiler and egg exists. At present, intermediaries determine prices during the supply stage. (Ali & Hossain 2012, 10.) The prices make the actual producers without reaping the actual selling prices as the intermediaries oppress them and suck most of the profits. Besides, there is a lack of up to date storage facilities and specialized channels for marketing. Processed birds are usually sold at departmental stores and hotels. Consumers put more preference to small sized birds of about 1-1.5kg over bigger birds. The price of indigenous chicken is determined based on chicken size, color, appearance, and sex. Indigenous chicken attracts almost double the number of broilers.

The purchase of eggs is based on type, color, and species. Type denotes the poultry birds with which the eggs are gotten from such as exotic or indigenous chicken or duck. The price of the indigenous egg is approximately 6% higher than that of farm egg. Also, the cost of white shell egg is lower by 10% to that of a brown shell egg. Season also influence prices of eggs, with summer attracting lowest prices, and wither the highest rates. (Hamid et al. 2017.)

Potential in the system of marketing also exists. In Bangladesh, the traditional method of marketing, which comprise a high number of intermediaries is in practice. (Islam 2014, 121.) Therefore, farmers at times are made to sell poultry products at lower prices due to lack of adequate marketing information, appropriate means of storage and transport of their products. In most instances, the egg and chicken marketing are in the hands of middlemen who alter prices for their benefit. Therefore, the buyer ends up getting the unintended price from the seller. Due to the presence of many intermediaries,
the farmers have been reaping meager profits, with buyers charged high rates. (Ali & Hossain 2012, 10.) The phenomena translate to high production costs and low selling price.

The preference of most consumers is on the purchase of live birds. This attachment is associated with the Islamic religion, which has specific laws governing on the ritual of slaughtering birds. Additionally, consumers prefer live chicken because they want to confirm the health of the birds before being plucked feathers due to fear of purchasing processed poultry meat from diseased birds. (Pozzi, Geraisy, Barakeh & Azaran 2015, 3.) Ultimately, deshi chicken is preferred for its taste, leanness, pigmentation, and firmness.

The solution to the high veterinary drug prices and lack of disease control shows great potential for poultry farming in Bangladesh. There is a high mortality rate of about 35% to 40% arising from predators and infectious diseases. In Bangladesh, only the common poultry diseases such as Newcastle, Fowl fox, Mycoplasma and infectious bronchitis that farmers vaccinate and acquire medication to alleviate (Hamid et al. 2017). Newcastle disease in Bangladesh is referred to as poultry cancer due to the complexity associated with its treatment. Despite the determination by farmers to purchase medication, the medication at the district livestock offices and poultry medical facilities are inadequate and often lack the necessary supplies. (Hamid et al. 2017.)

The government has made efforts in trying to supply essential vaccines to farmers at lower prices. However, the supply always never meets the demand. Therefore, farmers are forced to buy poultry drugs and vaccines at the local market where prices are high. Despite the willingness of farmers to purchase poultry vaccines and medication, some of the necessary treatments lack, especially in rural areas. Additionally, vaccination offered by both farmers and the government often fails due to lack of proper storage facilities. The vaccines, therefore, go stale before they are given to the poultry birds. Another problem associated with vaccines and diseases is on the application of the purchased drugs. Most farmers reported using of poultry vaccines and medicine without considering flock antibody status. The trend is due to the long chain of drug distribution from pharmaceutical companies to wholesalers, then to the retailers and consumers. Most retailers have no idea about drug specification. (Hamid et al. 2017.)

Another opportunity for the growth of poultry farming in Bangladesh lies on the possible shift in bank interest rates. The banking sector is coupled with a lot of hidden charges and high rates. This
discourages lending by farmers. The bank interest rates range between 12% to 14% per year. The recommended bank rate based on Bangladesh economic status should not exceed 10% per annum. (Islam 2014, 120.) This demotivates the rural people, who are associated mainly with poultry farming.

Research and training are another area that holds potential for poultry farming. In Bangladesh, livestock, despite holding much stake in the national economy receives little investment in terms of research and training of the farmers. Precisely, scientific research on economic models and methods of conducting poultry farming lack in Bangladesh. There seems to be a lack of enthusiasm to address the issue in spite of the urgency with which the inevitable change is needed. Due to lack of research, innovation, and training, it has been difficult to build confidence in people of the possibility of transforming the current local business endeavor to an attractive and profitable international transaction.

2.3 Poultry Farming in Finland

The inclination of Finland towards the development of a bio-economy society calls for the mechanization in almost all sectors of the economy for sustainable development. Technological knowledge and adoption of new models in the business and agricultural sector, therefore, became of prime importance. The government, through curriculum shifts, focused on the production of natural resource experts and sustainable food production techniques in the education sector. Luke’s research provides the official statistics on Finland food and natural resources. Luke’s research, also known as Luonnonvarakeskus is a non-profit organization for the public sphere and is the leading institute in research that touches all areas of bio economy. (Natural Resources Institute Finland 2019.)

Poultry farming in Finland is carried out using new methods of agriculture that extensively employ technology in operations across the country. About 400 poultry farms are present in Finland. Slaughterhouses for poultry meat are concentrated near areas where poultry farms are set up. The areas that are mostly utilized for poultry meat farming include southwest Finland, Pirkanmaa, Satakunta, and South Ostrobothnia. The production of eggs, however, is carried out across the country. (Jez, Beaumont & Magdelaine 2011.)

In Finnish poultry farming, various new types of rearing methods have been embraced. Besides, the usual methods of production such as free- range egg and chicken production are still used. Therefore,
there is an amalgamation of both the new and the conventional methods of poultry farming. (Jez et al. 2011.)

In Finland, research on the rearing of healthier birds is majorly conducted by Luke's research. The organization focuses on experimenting on new ingredients to be added in feeds by manufacturers, as well as enhancing the use of automatic machines in poultry farming. From the research, poultry farming has gained tremendous improvements through improvements in the health of birds, an increase in production, and reduction of human labor. (Jez et al. 2011.)

In Finland, four categories of eggs exist. Prices of the egg types differ depending on the poultry bird, and the kind of farming method applied. The categories include eggs from caged hens, eggs from barn hens, A class free range eggs, and A class organic hens (NRI Finland, 2019). The following statistics shows the trend in the production of eggs in Finland from 2015/04 to 2018/08.

The statistics on egg production shows a general increase of 1% in 2017 as compared to 2016. In 2007, 73.5 million eggs were produced. In enriched cages, the number of eggs produced reduced by 3%
while those produced in barns and free-range houses had an 8% increase. Besides, eggs produced in organic poultry farms increased by 16%.

In poultry meat production, broiler meat production increased in 2017 by 3% leading to a general increase in the poultry meat production record as compared to the previous year statistics. Additionally, there was a growth in turkey meat production adding up to the general increase in poultry meat. In 2017, 129 million kg of poultry meat was produced.

2.4 Technology Usage in Poultry Farming

Different technologies have been developed to enhance the efficiency of poultry farming. These technologies have been used to increase the number of chicks hatched using limited space, reduce wastage of feeds and water and also the elimination of diseases. However, these technologies are not affordable to small-scale farmers due to the price associated with their acquisition, maintenance and operation. The techniques include modernized housing system, brooders, and wastes recycling machines, temperature controlling equipment, house constructions designs, broiler colony system, nipple drinking systems, low slats system, and environmental controllers. (Prafulla 2015.)

Technology in poultry farming has brought considerable advantages to the industry. For instance, the techniques have been authenticated for use in the current world where the environmental concerns over climate changes have increased. They can control the release of pollutants into the environment due to their well-structured controlled systems. Additionally, the need to know the levels of stress in poultry birds, air quality taken in by the birds, a need to recognize a new disease outbreak before it affects the entire flock, and an urge to increase yield by modifying and enriching yields call for the use of technology in poultry farming. (Jez et al. 2011.)

Additionally, Technology has been used in housing, and in improving resistance and yield in poultry birds. In the construction of poultry barns, proper ventilation systems have been developed to allow aeration, and limit cold into the sheds. Customers in developed nations in Europe and the United States have shown considerable efforts in applying technology in the construction of poultry barns. (Jez et al. 2011.)
2.4.1 Benefits of Technology in the Poultry Industry

The technological advancements in poultry farming have considered the automatic control of activities taking place in the rearing system. The automated equipment includes laying cages, broiler cages, and brooder cages. The laying cages are designed in such a way that eggs are automatically removed after been laid. This reduces the chances of the eggs been pecked and eaten by the laying hens. In some technologies, the broilers’ cages are an automatic closing and opening structures that limit the movements of the hens to prevent them from wasting much energy while moving around; the preserved energy is used in bodybuilding. (Bessei 2006.) Therefore, faster growth is achieved.

The automatic feeding equipment has also proved efficiency in scaling the feeds, therefore, reducing wastage. These features of the feeding equipment have saved the farmers and companies from spending too much money on feed, thus, maximizing profit. This equipment has saved energy which would have been used by workers in the feeding process. Therefore, the cost of production is cut off due to reduced labor.

Every technology aims at increasing environmental sustainability during operations. It is through this aspect that dripping technology has been developed to conserve water and also reduces the cost of buying it. Dripping technology ensures that water is available upon the need of the birds. (Damerow 2008.) Also, dripping technology prevents the spoilage of manure due to water clogging. It has been identified that poultry manure is the most preferred by crop and fish farmers due to its high nutrients content. This technology is necessary for the efficient preservation of manure.

The availability of brooding machines has aided large scale poultry farming. The equipment regulates the temperature of the eggs to be hatched and also has a self-turning mechanism of eggs. The brooder is capable of hatching hundreds of eggs within 21 days. Eggs hatched through the brooder have a high hatchability rate compared to those that are sat on by chickens. The ability of the machine to enhance the high rate of hatching is due to the controlled conditions that are essential in the whole process. (Damerow 2008.) The requirements include optimum temperature, humidity, and air circulation.

In temperate regions, poultry farming has been facilitated by the availability of environmental controller equipment, which can moderate the temperature and humidity of the poultry houses. This equipment makes it possible for poultry to survive in extreme weather conditions that they would not have endured if reared using the free-range system. The controller enables the producers to extract
useful data that is used in designing further conditions that facilitate better rearing of the birds. (Damerow 2008.) The controllers are computerized in such a way that daily data is recorded and stored for further analysis.

As opposed to the free-range system, indoor rearing of birds has been facilitated by the use of the broiler colony system, which has allowed rearing of poultry in a limited space. (Prafulla 2015.) This system has allowed the producers to keep twice the number of birds as in a free-range system. The system has maximized the profit from poultry farming.

Poultry farming is among the most profitable agribusinesses across the world. Some years back, rearing of birds was mainly for domestic purpose. However, with the advancement in technology, the farming system has been embraced by many people due to its promising ready market. These technologies have simplified every activity from hatching to rearing, therefore, cutting off the labor cost. However, there is a need for more research to help in controlling diseases and pests affecting the birds.

2.4.2 Technology Usage in Poultry Farming in Bangladesh

Poultry farming is one of the primary sources of income and employment in Bangladesh. There is an estimation of 255.31 million chicken and 48.86 million ducks that were produced between the years 2004 to 2012. The enhanced form of rearing poultry has increased food security and supply of nutrients to the population of Bangladesh. (Farrell 2003.) Apart from small scale farming, Bangladesh has improved on large scale poultry farming to meet the growing demand for meat by the consumers. (Pica-Ciamarra & Dhawan 2010.) The sector has become a significant employment opportunity employing over 0.6 million people in the whole country. The birds are raised through modernized systems including hatcheries, feed mills, breeders, and controlled through environmental controller systems.

Various technological advancements have led to the improvement of poultry farming in Bangladesh. The use of breeders, housing technology, brooders, and internal environmental control systems are among the modern technology responsible for the improvements of large-scale farming. Also, intensive research on various diseases and the use of antibodies has been initiated to help in raising a disease-free population of poultry. (Rahman 2017, 281.) Most farmers in Bangladesh have also started relying on renewable energy to assist in heating the houses for their birds. This type of energy is not
only environmentally friendly but also cheap. Therefore, the cost of production is lowered. Renewable energy sources include solar panels and wind.

The technology of controlled heating of the poultry houses has provided uniformity in heat distribution among the birds. This has reduced deaths associated with cold. The controlled environmental system does not give room for pathogen establishment. Therefore, diseases are controlled too.

The introduction of brooders in the market has facilitated the production of chicks in large scale, leading to commercial production of meat and eggs. Brooders contain a set of controlled conditions which are essential for the hatching process. (Rahman et al. 2017, 263.) The requirements include controlled temperature, humidity, and air circulation. Also, the brooder has a mechanism of turning eggs on a 90 degrees angle; a practice is done to increase air penetration into the eggs.

Recently, most farmers have adopted the broiler colony system where small pieces of land are now capable of holding twice the population of birds raised in the free-range system. This method entails building shelf-like structures on top of each other and then stocking the birds on each shelf. (Rahman et al. 2017, 264.) However, the technique is not favorable in regions where air-borne diseases are prone to occur.

Most commercial production of birds in Bangladesh has adopted the use of environmental controllers designed for monitoring and managing large farms irrespective of the geographical distribution. These controllers regulate individual house climates, receive and send alarms and provide strategies on how technicians can control the environmental conditions. Also, the controller helps the farmer to extract vital data that would be later used to analyze the current and future climatic changes. This helps the producer to prepare a farming calendar. (Sassi, Averós & Estevez 2016, 2.)

Technologies such as the dripping system of watering birds have made the sustainable usage of water to be possible. The system has facilitated a lot of savings on the cost of water. Besides, the quality of poultry manure is not spoilt by this system. Clogged manure attracts flies, which are major vectors of diseases, therefore, killing the birds. In addition, clogged manure is smelly, and this makes it uncomfortable for people living near the farm. Poultry manure is used in aquaculture due to the high nutrient contents particularly the potassium and phosphorus elements. (Akbar 2013.) The water drips system ensures that water is not spoiled therefore becoming one of the effective mechanisms of watering the birds.
The Bangladeshi producers have adopted the use of plastics slat system to substitute the expensive bedding materials like rice husks, sawdust, and wood-shavings. The slats have a height of 15-20 cm and are suspended above the floor. (Akbar et al. 2013.) These slats are considerably cheap compared with other materials. The slats are useful during disease control mechanisms.

Researchers are currently working on a mobile application for assessing the welfare of livestock that will help in remote control of poultry houses no matter where the owner is located in the world. The software will help in monitoring the climatic conditions of the house, management of brooders, feeding the birds, and watering. Besides, the software will be able to give recommendations on any situation that may be facing birds such as the occurrence of any disease or adjustment of temperatures in the houses. This will be the future of extra large-scale poultry farming. (Sassi et al. 2016, 9.)

Some farms in Bangladesh have started interbreeding the genetically modified birds with the local ones to produce more viable and diseases resistant ones. These hybrids can adapt to a variety of environmental conditions. Besides, Hybrid poultry birds generally grow faster than the indigenous or GMO breeds. (Pym 2013, 2.)

The availability of current technology has facilitated improvements in agricultural production, hence enhancing food security across the globe. Technology has led to the production of farm produce in regions that could not have supported any form of agriculture. These technologies include hybrid production, improved hatching, and improved diseases control using environmental controller systems. However, there is a need to enhance the research on various diseases that are currently attacking birds. In addition, the reduction of the price of feeds by the government of Bangladesh will help in improving poultry farming.

2.5 Emerging Trends in Poultry Farming

New trends in carrying out tasks have emerged the world across. Over time, technological advancements have been absorbed into poultry farming. Such trends have led to improvements in the income generated from poultry farming. However, the expense and technological complications associated with their usage limit their adoption, especially in developing countries. Besides, controversy on their effect on employment levels poses a considerable drawback.
The trend in the use of robots in feeding poultry birds in Thailand has been used to maintain the health of the poultry birds. Loyon et al. (2016) report that Cheroen Pokland Group uses "nanny robots" to alert the farmer on potential disease outbreak and the ideal time to supply more feeds. The robots are used to maintain the health of approximately three million hens at the egg-laying stage. For instance, the robots are designed to detect an ill bird, notify the human caretakers so that the bird is secluded before transmitting the infection to other birds.

Another emerging trend in poultry farming is in the use of drones to protect the flock. This technological milestone is however marred with uncertainty and doubt. Loyon et al. (2016) report that drones are likely to cause tension to poultry birds, especially for chicken kept in houses. On the contrary, free-range poultry birds or chicken kept at the yard report significant positive feedback on the reception of the technology. However, for the efficiency of the program, training of the birds is vital.

The emergent trend in the use of sensors to monitor individual poultry birds also shows positive reception. Big Dutchman, a modern poultry housing in Asia uses sensors on each poultry bird to detect ammonia in hen houses. Additionally, in the Republic of the Philippines, sensors are used in regulating and controlling climatic variations in the hen houses, which include monitor on ventilation and temperature variations. In Greengage, the utilization of a unique lighting system that uses sensors efficiency in the growth of the birds. (Sassi et al. 2016, 2.)

The use of LED bulbs to regulate temperature and lighting consistently helps to reduce cost and improves wellbeing of birds because they allow free movement of the birds. From the use of sensors, farmers could gain a better understanding of the condition of their poultry birds. Besides, using tags flitted with sensors for poultry birds under study could be used by researches to gain more information efficiently by studying the birds in a natural environment. (Sassi et al. 2016, 2.) The observation could be used to explain more on the ideal method of poultry farming between caging and free-ranging based on poultry bird behavior.

Artificial intelligence, popularly known as AI has received a considerable rejection from sociopolitical activists. AI is the carrying out of tasks by robots following a command signal from computer sensors. (Loyon et al. 2016.) For instance, Loyon et al. (2016) report that the robots, guided by sensory receptors from computers can recognize bone and meat structure of a hen thereby cutting it to perfect pieces as required. For example, in two to three seconds, the Gibbet robot used by SINTEF can
debone a chicken. Statistics show that such an action may lead to unemployment of up to 30 human being operators.

Another emerging trend in poultry farming is the application of block chain to safeguard on production. Giant food producers such as Walmart, Nestle, and Unilever work in conjunction with IBM by utilizing block chain technology that secures and provides digital records. Consequently, the technology monitors on the food supply chain that traces on the entire poultry product sold in stores. (Loyon et al. 2016.) The technology has received a considerable accolade from Walmart which was among the pioneers to institute it. Additionally, the ability of clients of Zhong an technology to send thanksgiving to the turkey farm that dispatched the product shows the applicable and positive reception of block chain technology.

Internet of Things (IOT) is a developing emergent trend that is utilized by all the technologies as mentioned earlier in the dissemination of services to poultry birds. For instance, IoT is the technology that connects all the individual chicken sensors in a poultry farm to one computer for analysis. (Nukala, Panduru, Shields, Riordan, Doody & Walsh 2016.) The emergent technology, when applied in poultry farming may enable a farmer to rear poultry birds remotely, and away from home. In robotic applications in poultry farming, IoT is used to collect information of all the birds, their current and previous health conditions and their immediate need. (Nukala et al. 2016.) This technology is labor intensive and more efficient because it allows comparison of a broad range of issues and timeframe.
3 RESEARCH AND REPORTING METHODS

This chapter majorly deals with the methodology that was applied in meeting the objectives of the study. The first three parts cover the research design, followed by the research approach, and then the study population. The fourth part of the chapter describes the sample and the sampling procedure to utilize in the thesis. The last part describes the questionnaire design, and data collection instruments.

3.1 Research Design

This part presents the overall strategy chosen for the integration of various components of the study coherently and logically to effectively address the research questions and the research problem. This study is intended to come up with a comparative analysis of the current trends in the use of technology in Bangladesh and Finland, with a view of showing how Bangladesh can utilize the current technological advancements in poultry farming in Finland. Research design constitutes a blueprint for the analysis, measurement, and data collection. The research design, as presented in the study is a plan that offer the backbone from which the elements of the research emerge with regard to the use of qualitative and quantitative research methods. (Creswell & Creswell 2017, 11.) Research design aims at providing a solution to the appropriate methodological approaches to answering research questions and the provision of a solution to the research questions being investigated. (Creswell & Creswell 2017, 11.) The study also logically integrates all other research components such as instruments and measurement tools, data analysis, and data collection to help in effectively tackling the research problem. Therefore, in general, the research design is the choice of data collection methods and data analysis techniques.

The research employs two common research approaches; qualitative and quantitative methods. Quantitative research design uses some observations and numerical data to explain and examine the reflection of observation. (Creswell & Creswell 2017, 12.) On the other hand, qualitative research design uses observation and non-numerical data to explain the meaning and organization of relationships. (Creswell & Creswell 2017, 13.) Quantitative research deals with sampling or study population and hence giving room for methodological planning before data collection begins. In quantitative research, the core roots for analyzing relationships and drawing conclusions are the research variables. In most instances, the relationships involve a dependent and independent variable.
The most appropriate method of studying variables is using quantitative method since it allows obtaining of the appropriate outcome by testing variables with the help of theories. The nature of the research questions and research problem in this study requires the use of quantitative research method to aid in making statistical comparisons on information on technology usage in poultry farming in Bangladesh and Finland. The past strides in poultry farming in both Bangladesh and Finland were further analyzed to avoid an overlap in developing objectives.

Based on the research design, the goals of the research to identify the current position of poultry farming and use of technology in the industry have been met. The use of formative research provided an avenue for identifying the real situation of poultry farming from Bangladesh and Finnish farmers. Consequently, descriptive research aided at provision real evidence information by extracting data from government portal on the status of poultry. The research design applied in the study, therefore, proved indispensable for the realization of the objectives set forth.

3.2 Research Strategy

According to Kratochwill (2013), a researcher uses a research strategy to answer the research questions. The research objectives and questions thus guide the choice of research strategy. Other factors determining the choice of research strategies include philosophical underpinnings, availability of time, and the extent of existing knowledge. There are seven types of research strategies namely; case studies, ethnography, surveys, experiments, action research, archival research, and grounded theory. Action research focuses on the purpose of the research and hence the role of the researcher here is within the research study. Ethnography explains and describes the research subjects and requires a lot of time. Archival research involves analyzing data collected for different purposes to determine the implications of the same. Experiments are used in studying casual links and examining whether a change in independent variable causes the dependent variable to change. The survey enables a researcher to gather a huge amount of data from a population. Various sources of evidence are used in studying contemporary phenomenon under case studies. Gaining in-depth insight into the context of research is enabled by this strategy. Grounded theory is adopted to help in explaining and predicting a behavior and it involves basing on a theoretical framework to develop new theories. (Cresswell 2014.) The above research strategies are useful because they enable the researcher to answer questions of the research and hence shaping the structure and flow of the study.
This research is carried for explanatory reasons because its aim is to show the different levels of technological application in poultry farming in both Finland and Bangladesh. Survey research strategy is thus appropriate in this study. This research employed a survey research strategy and structured and semi structured questionnaires to collect data from the participants. Another reason for choosing method is that the targeted population is large and hence selected sample can be used in generalizing outcomes. This strategy is also appropriate because the study also aims at coming up with technologies that are culturally and contextually appropriate to be used in poultry farming in Bangladesh.

It is important to state data collection and the unit of analysis in any research. In this study, data collection in form of administration of questionnaires was conducted by a facilitator since the researcher was not in the country at the time of the research (APPENDIX 2). The feedback will later be sent by the facilitator to the researcher to aid in analysis. Data collection and analysis will be conducted at the individual level thus the individual was the unit of analysis. The individuals that will participate in the study in Bangladesh include sellers of poultry products, Bangladesh poultry farmers and general consumers of poultry meat and eggs. In Finland, information from Luke’s research database and 20 random respondents will be used to get information on the state of poultry farming. These individuals are appropriate and suitable to respond to the research questions properly. This study’s research objectives and questions as outlined below have a close relationship with sellers, consumers and those rearing poultry birds hence using them in this research is appropriate.

The first objective the researcher aimed to achieve is to come up with technological solutions for poultry farmers in Bangladesh and Finland to use in maximizing on production. The second objective was to show the benefits of using technology in poultry farming, with a view of outlining the competitive advantage of applying the strategies identified in the study. The third objective was to show the advantages of technology in operations conducted in the poultry farms with a view of providing evidence on practicability, efficiency, and economy out of the technological application in poultry farming.

3.3 Population and Sample

According to Gray (2013), any research involving human beings needs to compose a detailed and clear definition of the study population. Defining the population of the study is important in determining individuals who are eligible for the study. It is also useful in assuring the overall validity of the study results. Research population as a large collection of objects or individuals who are under study.
Large sizes of the population always make researchers not to test every individual in the population since it consumes a lot of time and costly. Targeting population that will answer research questions is important. Also, sampling technique to be used determines the nature of research population. (Grey 2009.)

This study targets entrepreneurs involved in the poultry industry in Bangladesh. The reason for choosing entrepreneurs in the poultry industry is because they are critical in determining the current status of poultry farming, and the technologies they would like to adopt. This study considered individuals from all parts of Bangladesh, especially in Sujapur town. The town has many poultry farmers keeping Bengali chicken compared to other parts of the country and hence is the major part that the study focuses to obtain information on the status of technology in poultry farming and ways of improving.

A sample is a population's subset used in representing the entire group as a whole. (Mujere 2016.) The reason for using samples in any research is because the number of objects or people involved is too large and hence it is impractical to survey every member. This study selected members of a given population to help in arriving at the conclusion of the whole population. The study also ensured that the samples selected represented all relevant characteristics and features of a population by basing data collection on populations that are involved in the poultry industry. It was thus possible for the researcher to generalize the results represented in a sample. In research, sampling enables a researcher to use the targeted population in selecting an adequate number of elements to enhance in making generalizations about the sample and its features. (Mujere 2016.)

Sampling is divided into two categories namely: the non-probability sampling and probability sampling. Probability sampling uses random selection and it involves setting up some procedure or process that will ensure that different units in a population have equal chances of being chosen. This method usually uses computers when generating random numbers. On the other hand, non-probability sampling collects samples in a way that not all objects or individuals in a population have equal chances of being included. This method of sampling usually selects samples in a population by basing on their accessibility and the researcher's personal judgment. Also, using this strategy means that the sample may or may not be accurate in representing the entire population and hence the results of the research cannot be generalized. This study employs large probability sampling since it gives more reliable and better results than the small sample size.
This study used simple random sampling in selecting participants. 37 farmers in Bangladesh involved in rearing of poultry birds and 23 entrepreneurs selling poultry bird’s eggs were randomly selected and supplied with questionnaires having open ended and closed ended questions. Most of these participants were involved in rearing of birds at the villages. The results obtained are useful in determining the status of technology in poultry farming in the rural areas of Bangladesh. The study also applied simple random sampling in selection of 20 consumers of poultry meat and eggs and supplied with both open ended and closed ended questionnaires. In Finland, 20 respondents were selected and supplied with questionnaires (APPENDIX 3).

3.4 Data Collection Method

Data collection is a process that involves the collection of information from various sources to help in answering the research questions and solving the research problem. (Gill, Stewart, Treasure & Chadwick 2008.) There are different ways and different sources of collecting data but are generally divided into three namely: primary methods of collecting data and secondary methods of collecting data, and mosaic information. Primary methods used in collecting data includes all kind of information obtained from the first-hand experience. It is usually collected from the field instead of books or other written materials. There are three methods that can be employed to obtain primary data. One of them is using a questionnaire. This method is most common because of its simplicity of just asking questions to the already selected focus group or sample. (Johnson & Turner 2003.) In this study, questions were asked using survey method. Another method used for collecting primary data is observation. In this method, the participant does not know that he or she is under observation and hence his or her behavior will be natural. This method was not employed in our study since it is only used on a small scale. Lastly, an experiment is used in collecting data directly from the respondents. The common features of every experiment are a simulated market and laboratory conditions. Also, this study did not use experiment method.

Gathering of quantitative data involves using two means namely: structured interview and self-administered questionnaire. The choice of choosing one between the two depends on the research problem’s nature to be solved and the type of data to be collected. The main instrument adopted by this study in collecting data was questionnaire since it is quantitative in nature thus the data obtained was considered as first-hand information. The reason for choosing the questionnaire over other methods is because it is suitable for collecting data from a large population. This method is also appropriate in
situations where respondents have a limited time of responding to research questions and are always busy. (Bourque & Fielder 2003.)

3.5 Development of the Questionnaire Survey Instrument

The questionnaires used in the study acted as the main instrument for survey used in the collection of primary data. A questionnaire is a research instrument that consists of series of questions that help research in gathering information from participants and can be carried out in using three ways namely: through computer, by telephone, or face to face. (Grey 2013) Through a questionnaire, a researcher is able to collect information from a large sample of people in an efficient and quick way. This method is thus useful for use when the population involved is large. (Grey 2013.) further suggested that a researcher need to be careful when collecting information using this method because social desirability may make respondents to lie in order to bend the truth to look good or present positive image of themselves.

The study identified major factors determining use of technology in poultry farming as cultural endowment, technological knowhow and lack of information. This study used the questionnaire designed in different sections to ensure that research questions are suitably answered. The first part of the questionnaire aims to obtain information on the factors affecting use of technology in poultry farming while the second part aims to obtain the current status of use of poultry farming as well as the views on how to improve the usage of technology in the poultry industry. The participants of this study are the major stakeholders of poultry farming in Bangladesh and consumers of poultry meat and eggs. In Finland, information was collected from respondents from the general English and Islamic speaking population (APPENDIX 3) and Luke’s research database. There are two ways of coming up with a questionnaire namely: adopting it from previous similar studies or freshly developing it. (Grey 2009, 354.) This study developed questionnaire afresh.

3.6 Administration of the Survey Questionnaire

According to Zohrabi (2013), there are various ways of administering the questionnaire. The research in this study used the help of a facilitator to distribute the questionnaires to the participants. The reason for choosing to administer questionnaires with the help of a facilitator is the researcher was not present in Bangladesh at the research period. Therefore, prepared questionnaires by the researcher were
distributed to the targeted participants by the facilitator. Each questionnaire had a section that offered
guidance on how to answer the questions which ensured that the respondents received guidance from
the researcher on how to answer questions in the questionnaire.
The exercise of data collection took a period of one months and one day. Data collection started in
March 13\textsuperscript{th}, 2019 to April 14\textsuperscript{th}, 2019 whereby 80 questionnaires were distributed by the facilitator with
a laid down plan (APPENDIX 4) to the participants, while 20 questionnaires were distributer by the
researcher himself. The facilitator (APPENDIX 2) disseminated the questionnaires on Saturdays
because he was occupied during the week. From the total 100 copies distributed, 84 questionnaires
were retrieved. 19 questionnaires out of 84 were found to be unusable because some questions were
blank while some were not filled properly. Only 65 questionnaires were thus used in the analysis.

The questionnaires were divided into four classes and put into pamphlets that were labeled with
stickers that showed time for dissemination and collection (APPENDIX 4), and given letters A, B, C,
D. The ascending order of the classes guided the facilitator in distribution of the questionnaires to
respondents with the first letter in the alphabet serving as the first bunch for dissemination. Class A
pamphlet had twenty-seven questionnaires to be distributed to respondents rearing poultry birds,
pamphlet B had thirteen questionnaires to be distributed to entrepreneurs selling poultry birds and their
products while pamphlet C had twenty questionnaires for collecting data from consumers of poultry
products. The researcher retained pamphlet D, which had twenty questionnaires that he used to collect
data from respondents in Finland.

3.7 Rates of Response and Return

According to Baruch & Holtom (2008), the response rate is obtained by the number of individuals who
participated in answering the survey by the number of individuals in the sample. On the other hand, the
return rate is obtained by dividing the total number of questionnaires returned after completion by the
total number of questionnaires that were distributed.

A good response rate generally ranges from 30-40%. (Deutskens, De Ruyter, Wetzels & Oosterveld
2004.) In this study, 100 questionnaires were distributed to stakeholders involved in the poultry
industry in Bangladesh. 84 out of 100 questionnaires were retrieved indicating a return rate of 84%.
Consequently, 65 questionnaires were used in analyzing data and hence giving a response rate of 65%
4 EMPIRICAL RESEARCH ANALYSIS

This chapter offers an analysis of the information gathered from the field about the research, presented in charts, tables and graphs. The research revolved around the usage of technology in poultry farming. The research aimed at identifying the current situation of farming in both countries, the acceptability of the people of Bangladesh to take in technology in poultry farming, and the position of the economic and political environment about the usage of technology in poultry farming in Bangladesh.

4.1 Information from Respondents in Bangladesh

In Bangladesh, as previously mentioned, primary methods of data collection were applied mainly in the study. A total of 80 respondents from Bangladesh were involved in data collection for the realization of the objectives of the study. The feedback from respondents showed that poultry farmers were not satisfied with the current technology usage in poultry farming. The respondents comprised groups of farmers rearing poultry birds, sellers of poultry products and consumers of poultry meat and eggs.

4.1.1 Information from Farmers Rearing Poultry Birds

Twenty-seven questionnaires were distributed to farmers rearing poultry birds (APPENDIX 5). However, only twenty-six questionnaires returned from the field that targeted farmers rearing poultry birds. Among the collected questionnaires, four had defects in marking two choices instead of a single choice, two lacked the names of the participant, and one was totally left blank. Therefore, only nineteen questionnaires were used in the analysis. From the response, 73% of respondents complied with the subject on the main problems facing application of technology in poultry farming which they identified as Culture. In Bangladesh, certain methods and rituals of slaughtering animals and birds are a necessity. The birds should not undergo any unnecessary pain. (Pozzi et al. 2015, 3.) The rituals limit technology in poultry farming, especially packaging because the consumers cannot ascertain whether the proper rituals were followed in slaughterhouses. Therefore, the market for packaged poultry meat is low, rendering use of technology less appropriate in Bangladesh.
From the feedback, 20% of respondents cited other factors as the cause of the current low technological use in Bangladesh. The cited factors included lack of information on available poultry rearing technologies, poor government involvement in offering loans to small scale and medium scale farmers as well as inability to access the technologies. 4% of the respondents did not know the reason for the current state of technology in poultry farming.

FIGURE 4. Causes of issues in poultry farming

From figure 4, it is evident that culture is the main cause of the current status of poultry farming. Islamic religion and culture have therefore been instrumental in shaping poultry farming in Bangladesh. The presence of some section of the population unaware of technologies that can be used in poultry farming calls for more enlightenment of the population on technology in poultry farming.

The question on familiarity with technologies received varied responses. Majority of the respondents had not heard of the idea, with the choice on not heard of the idea recording an entry of 70%. The use robots in poultry farming had the highest response at 24%. It was followed by the use of sensors at 4%. Internet of things received 1% of the respondents view for having heard the technology while the other technologies received less than 1%.
The question on whether the respondents would accept the use of robots in their farms also received varied responses. 34% of the respondents cited that they would use robots in their farms. 40% of the respondents were unsure on the use of robots in their farms while 26% of the respondents declined the use of robots in their farms.

FIGURE 5. Acceptability on the use of robots

Based on figure 5, a large number of respondents showed positive reception to the use of robots in farms. However, an even larger number of respondents declined to the use of robots. The greatest concern shifts to the segment of the population unsure of the use of robots. In an event that proper motivation, enlightenement and provision of robots’ sis carried out, a higher number of Bangladesh citizens can embrace use of robots in farms.

The question on whether robots would attract men to carry out the rearing of birds also received considerable backing. 76% of the respondents who accepted the use of robotic equipment in their farms believed that robots would attract men to carry out rearing of birds. 13% of the respondents declined while 11% of the respondents were unsure.
4.1.2 Information from Sellers and Consumers of Poultry Products

Twenty-three questionnaires were distributed to entrepreneurs dealing in the sale of poultry products (APPENDIX 6). However, only eighteen questionnaires were collected from the field. Among the collected, two lacked the names of the participants hence could not be used in the study. Therefore, only 16 questionnaires were put under analysis. From the analysis, 25 % of the respondents agreed to use new technology in supplying poultry products, 69 % of the respondents believed in existing regular methods, while 6 % of the respondents were unsure of the method they would adopt. The most chosen existing method of supply was face-to-face transactions.

![Preference in distribution methods](image-url)

FIGURE 6. Preference in distribution methods

From figure 6, higher number of respondents were ready to welcome new technology in the distribution of poultry products and birds. However, from the projection, more than half of the population is happy with the current distribution methods. The capability of changing the current situation, therefore calls for intensive campaigning and motivation of the population to embrace new distribution methods.
The most highly ranked use of technology in poultry farming was on storage facilities. The technological equipment that had the highest ranking was the deep freezer followed by use of machines in cutting meat in poultry butcheries to reduce on human labor and increase efficiency, and the use of led lights that have sensors that detect changes in room temperature and respond appropriately. From the analysis, it is evident that shift toward technology usage will reap more benefits to poultry farmers who are likely to receive the new inventions wholeheartedly.

The question on whether Bangladesh was ready for technology in poultry farming also formed a greater part in the analysis on the possibility of the adoption of technology in poultry farming. 69% of respondents were of the opinion that Bangladesh was ready for adoption of new technology. However, 18% of the respondents were against the opinion while 13% of the respondents were unsure of the status of Bangladesh in relation to acquisition of new technology.

![Figure 7. Readiness for new technology](image)

From figure 7, the respondents show high acceptability for new technology. However, some respondents decline that Bangladesh is not ready for new technology. Consequently, there is a considerable number of respondents who are unsure of the situation in the country in relation to acquisition of new technology.

Two other questions that were used in the analysis and cut across both consumers and sellers of poultry birds were on the usage of smartphones and access to internet. 78% of the respondents gave the
feedback that they were using smartphones, while 22% of the respondents said they were not using smartphones. Out of the sample with access to smartphones, 96% of them responded to be using the internet while 4% of the respondents reported to not using the internet.

4.1.3 Information from Consumers of Poultry Products

The researcher, with the help of the facilitator supplied questionnaires touching on how technology can be used to enhance poultry farming and how to acquire technology in poultry farming (APPENDIX 6). All the twenty questionnaires returned from the field. However, one questionnaire had been marked wrongly hence could not be used in the study.

An analysis on the feedback showed that Bangladesh is capable of having technology in poultry farming as any other nation in Asia. 75% of respondents were of the opinion that technology can be used to increase production of poultry birds, 7% did not agree that technology can be used to increase production of poultry birds while 18% were not sure whether it was right to use technology to increase poultry bird production.

The question on whether the respondents were happy with the current technology usage status in the poultry industry in the country was set to both consumers and sellers of poultry birds and eggs in Bangladesh. A majority the respondents, 75% were of the opinion that they are not happy of the current poultry status. 6% of the respondents reported to be comfortable with the current status while 19% were not sure. From the above presentation, it is evident that the people of Bangladesh are willing to adopt new technology in the poultry industry, because they are not contented with the current status.

4.2 Information from Respondents in Finland

In Finland, 20 questionnaires were supplied to a sample of Finnish and English-speaking respondents provided data on the state of technology usage in poultry farming (APPENDIX 7). 17 questionnaires were retrieved from the field. However, 2 questionnaires had numbers 8 and 10 left blank hence could not be used in the analysis. The questionnaires were supplied randomly to the respondents. 15 questionnaires from Finland were used in the analysis. On retrieval, the researcher realized an
emergent trend where some respondents were not consumers of poultry meat and eggs. Therefore, he sorted the questionnaires and divided them into two classes, those filled with respondents who do not consume poultry meat or eggs, and those filled by respondents who consume.

The question on whether technology usage in the poultry sector would increase poultry production received outstanding support from the consumers of poultry produce. 87% of the respondents believed technology usage would increase poultry production. No respondent filled the questionnaire for the option of technology usage would not increase poultry production, while the remaining 13% were not sure of the opinion.

![Figure 8. Effects of technology on production](image)

Based on figure 8, it is evident that there is high acceptability rate in both Bangladesh and Finland on technology usage positively affecting poultry farming. The projection is in line with the higher number of people ready to embrace technology in poultry farming as presented in figure 7. Therefore, where the population thinks that adoption of technology in poultry farming would increase yield, there is high acceptance for adoption of such technologies.

The researcher made an analysis on the feedback on the question on whether third world countries were ready to receive technology in poultry farming. The feedback from the questionnaires revealed all
respondents having sided with the option that third world countries are ready for technological developments.

![Bar chart showing response to new technology in poultry farming](chart.png)

**FIGURE 9. Ready for new technology in poultry farming**

Figure 9 presents a comparative analysis on the response from both Bangladesh and Finish respondents. From figure 9, a large proportion of respondents are of the view that the country is ready for adoption of new technology in poultry farming. Additionally, all respondents in Finland are of the opinion that third world countries are ready for technology in their poultry sector. Bangladesh being a third world country, is also ready for technology in her poultry sector.

The researcher concluded the analysis by analyzing the question on whether the respondents were happy with the status of technology in poultry farming in the country. The analysis touched on both the feedback of consumers and non-consumers of poultry meat and eggs in Finland. From the feedback, 93% of the respondents were satisfied with the current status while 7% were not sure of their verdict on the subject. No respondent marked the questionnaire not being happy.
FIGURE 10. Respondents’ take on new technology in poultry farming

Based on figure 10, a large proportion of respondents in Bangladesh were unhappy with the current status of poultry farming in the country. In contrast, almost all respondents in Finland were happy with the status of poultry farming in the country. Learning from Finland, Bangladesh can be able to borrow the desirable traits and revolutionize her poultry sector.
5 RESEARCH FINDINGS AND RECOMMENDATIONS

This chapter discusses the results and findings on technology usage in poultry farming, a comparison between Finland and Bangladesh. The significance behind this study was to show how the two countries carry out poultry farming with a view of informing poultry farmers of the important technologies in poultry rearing and marketing methods ideal for selective borrowing. The research was aimed at realizing the current state of technology usage between the two countries, to identify and present the strides taken by poultry farmers in Finland, a developed nation that can be embraced by poultry farmers in Bangladesh, a developing country. Therefore, the research established the benefits of using technology in poultry farming, which include increasing sales, reducing the work load and enhancing efficiency.

Further, the research established the feasibility of technology application borrowed in Finland to be used in Bangladesh socio-economic and political environment. After that, the discussions presented herein were based on the findings from the field research conducted by the researcher, with the assistance of a facilitator in distributing questionnaires in Bangladesh. The findings were obtained from the utilization of both primary and secondary data collection methods, with a view of comparing poultry farming in Bangladesh and Finland.

5.1 Summary of Research

The motive behind the research was to come up with a comparative study of poultry farming using technology in Bangladesh and Finland, with a view of recognizing the many strides and advantages gained by Finland for its wide application of technology in the poultry industry. The need for identification of various technologies used to enhance efficiency, reduce cost and ease on human labor needs in poultry farming in Finland necessitated the use of practice-based research.

Questionnaires were used in Bangladesh and Finland to collect data. The feedback from the questionnaires was aimed at gaining information on the underlying state of poultry farming, and the problems faced by farmers in the country.
5.2 Discussion

In this study, the state of poultry farms and technology usage in the farms has been analyzed by comparing the poultry sector in Finland and Bangladesh. The success in poultry farming to meet the international demands of a self-sustaining industry largely depends on the use of technology. Farms that use technology in rearing poultry birds have recorded outstanding gains in terms of revenue earned and the ease at which the farm activities are carried out.

In Finland, poultry farming is extensively carried out using technology, while in Bangladesh, traditional methods of poultry farming persist and record the highest number in use for farming. Consequently, the use of technology has resulted in large scale operations in the poultry industry in Finland. The success in large scale poultry farming is attributed to the presence of machines, poultry educational portals, and knowledge in online marketing that ease the operations and flow of new information. Besides, the use of technology in marketing has eased access to international markets that provide a ready market for the sale of produce. Availability of market has served to encourage more farmers into large scale livestock production.

A closer reflection on the research revealed that the major drawback for the use of technology in Bangladesh is culture. The country, built on the dictates of the Islamic religion, subscribes to some restrictions about processed meat and use of Robots in farming. For instance, companies in Bangladesh that produce processed poultry meat often face difficulty in the sale of their produce to Bangladesh households strict on the procedure used in slaughtering the birds. On robotic use, religion assumes the use of robots as evil and ungodly.

Reflection on the acceptability of technology usage in farming, however, exceeds the drawbacks. Women, the majority of gender involved in poultry farming appear to accept changes. The women are not inclined to strongly relating religion on the use of technology in farming as men. Instead, they seem to embrace technology once put to their disposal. Therefore, if given an opportunity, they are likely to adopt their usage. Besides, the positive response from entrepreneurs rearing poultry birds on the subject of technologies such as use of robots would attract more men to participate in rearing poultry birds shows that adoption of technology in the country would increase the number of people involved in the poultry sector hence more output.
The economic and technological environment in Bangladesh also proved compatible with some of the technologies put in use in Finland. For instance, the presence of a high number of the population with access to smartphones in the country and the presence and usage of internet connectivity will enable the use of technology will allow farmers to access the information provided by research institutions on technology such as Luke's research.

5.3 Recommendations

The study recommends that poultry farmers in Bangladesh should try to embrace the use of modern technology in farming especially the use of machines such a robot and sensors that were likely to be accepted by majority of the population. The use of robots will not only attract men to the rearing of poultry birds but will also ease work in rearing the birds. Sensors on the other hand are able to detect any sick bird and notify the caretaker. This will enable the caretaker to seclude the sick bird before the disease spreads to the entire flock. Ultimately, the use of modern technology such as sensors and robots will lead to higher profits.

Besides, the government and non-governmental organizations should put efforts and enlighten citizens, especially poultry farmers on available cost-effective technologies that could be used to increase yield and reduce workload on the farmers. The research revealed that most poultry farmers in Bangladesh were not aware of technologies that could be used in poultry farming.

Moreover, poultry farmers in Bangladesh should embrace large scale farming to attract higher creditworthiness from financial lenders. The researcher concluded that majority of poultry farmers carried out small scale farming. This was a limiting factor with regard to acquisition of capital from lenders such as banks for expansion of their businesses. Therefore, it is vital that entrepreneurs are encouraged to carry out large scale farming.

Another recommendation put forward is for Bangladesh poultry farmers with access to the internet should make use of online educational platforms such as Luke's research that provide free educational materials essential for improvement and modernization of poultry farming. The biggest challenge with the use of online educational platforms is lack of knowledge on their existence. Therefore, for maximum utilization of the online platforms, the government of Bangladesh should put efforts in enlightening the citizens on the availability of such study platforms.
In addition, the government of Bangladesh should put efforts in setting standard prices for poultry products. At present, the research has revealed that middlemen affect the prices of poultry products and birds to their advantage. This discourages farmers, who end up selling their produce at lower prices, and consumers who buy expensively from the middlemen. Government involvement in price regulation would reduce the influence of middle men who have frequented the Bangladesh poultry industry.

The research also recommends that Finland should try to adopt and apply some of the emergent trends in use of technology in poultry farming that have seen profitability in the application in the United States such as the use of artificial intelligence in poultry farming. The research conducted has revealed that the people of Bangladesh are ready to receive new technology.

Additionally, the government should promote international studies and exchange programs. This will give scholars from Bangladesh an opportunity to travel the world, and access countries such as Finland, which has revolutionized its poultry sector. Through exchange programs, and international study programs, the people of Bangladesh will be exposed to technologies which they can learn and apply back at home.
6 CONCLUSIONS

The first objective of the thesis was to compare technology usage in poultry farming between Bangladesh and Finland. Another objective of the research was to come up with technological differences that exist in the two countries. Besides, the thesis also aimed at showing the likelihood of the people of Bangladesh to accept technology, and the problems and solutions to the problems that exist in poultry farming. Lastly, the study aimed at identifying and discussing the emerging trends in poultry farming, with the aim of selective borrowing of the most feasible emergent trends.

The researcher made use of quantitative methods of data collection by supplying questionnaires to respondents in Bangladesh and Finland. Besides, the researcher made use of available literature in trying to answer the research aims put forth the first chapter. Data analysis and interpretation further enabled the researcher to answer the research objectives.

The first, the second and the fourth objectives of the thesis were achieved through the use of secondary data. Secondary data, in the thesis included journals, magazines, and poultry websites and published thesis on poultry farming. The third objective of the thesis, which was to show the likelihood of the people of Bangladesh to accept technology, and the problems and solutions to the problems that exist in poultry farming was achieved by the use of primary data. However, the thesis was not able to completely identify all problems and possible solutions to the problems identified. For instance, the researcher was not able to provide a various answer on ways of tackling culture, which the researcher identified as one of the problems affecting use of technology in poultry farming. Therefore, the researcher welcomes anyone willing to expand research on this subject on poultry farming in Bangladesh and Finland.

The research concluded that the poultry industry in Bangladesh and Finland should maximize use of technology in poultry farming. In Finland, more than 90% of poultry farmers use modern technology in farming while in Bangladesh, less than 30% of poultry farmers apply technology in poultry farming.

Both Finland and Bangladesh have the potential to grow their poultry industry using technology. In Bangladesh, a developing economy with a large population of its citizens in the rural area has most of the rural population practicing poultry farming at the small scale and medium scale level. Among the population is a large number of females who participate in poultry farming and show the willingness to
adopt technology in their economic activity. In Finland, the potential for growth of poultry farming is also high due to government involvement and the presence of research institutes such as Luke's research that develop new and improved equipment and methods of farming for the finish poultry farmers.

Besides, both Bangladesh and Finland have the opportunity of accessing online tutorials and educational websites. Websites that provide educational information on livestock farming, particularly poultry farming are accessible on the global internet platform. Both Bangladesh and Finland have internet connections that can be used by the farmers to gain information from their comfort, at any location.

In Finland, high technological equipment and methods of farming are applied such as the use of robots, but in Bangladesh, culture tends to dictate the extent of technological application in livestock keeping, precisely poultry farming. Therefore, simple technologies are used in farming that is in unison with the Islamic religion. Besides, in Bangladesh, the current population involved in the rearing of birds is selective on the technology it would embrace in the rearing of poultry birds. Significant backing is on adoption of the use of robots and sensors.

Consequently, in Bangladesh, poultry farming is mostly conducted at the rural areas while in Finland, rearing of poultry birds are carried out mainly in the urban centers. Besides, at the Bangladesh rural areas, it is mostly the women, children and the elderly that rear birds while the men are frequently involved with the sale of the poultry products. In Finland, both the rearing and the sale of bird’s sector of the economy is composed of mixed gender.

Concussively, the objectives set forth in the study necessitated the researcher, with the assistance of a facilitator to take thirty-one days distributing questioners in Finland and Bangladesh in order to attain the aim of the study. It is evident that the practice of poultry farming by use of technology is conducted in both Bangladesh and Finland. However, Bangladesh has to make efforts and apply the recommendations provided at the end of the study in order to maximize on poultry farming as other nations using technology in the industry do. Consequently, Finland is not at home with all the technologies. The nation should look forward to other developed nations such as the United States to learn and share its technological advancement in an effort to obtain more emergent technologies in poultry farming. It was a pleasure conducting the research.
REFERENCES


1. Questionnaire to respondents rearing poultry birds in Bangladesh

Dear esteem respondent,

Thank you so much for taking your time to go through the questionnaire. The main intention for the questionnaire is to extract information on the effectiveness of the use of technology in poultry farming in Bangladesh. Attempting the eight questions will aid in providing a reliable analysis. This questionnaire is distributed randomly. The approximate time provided to answer the questions is 24 minutes, with the feedback treated unanimously. The questionnaire forms a key part in the completion of master’s program in International Business Management. The poultry industry will be enriched with information on availability of technology that can be used in poultry industry.

Regards,
Al Mamun
Central University of Applied Sciences
Master’s - International Business Management

Instructions

1. You are supplied with a single questionnaire that has two printed pages
2. Make sure that you attempt all 8 questions
3. Tick on the box that holds your ideal thoughts on the question
4. Do not add or subtract any question from the ones given below
5. Ask for any assistance in filling the questionnaire from the facilitator in areas you do not understand

Questions

Mark on the correct choice among the ones provided

1. What is your gender?
   A) Male
   B) Female

2. How many poultry birds do you keep?
   A. 1-200
   B. 201-400
   C. 401-600
   D. Above 600 but below 1000
   E. Above 1000

3. Do you use any form of technology in rearing your birds?
   A. Yes
   B. No

If yes, proceed to question 4. If no, proceed to question 5.
4. Mention two main technologies you use
   1. 
   2. 

5. What is the main problem facing technology use in poultry farming?
   A) Culture
   B) Other factors
   C) I don’t know

6. Would you accept to use robots in your farm?
   A) Yes
   B) No
   C) I don’t know

7. Do you think the use of robots in farms would attract males to carry out rearing of birds?
   A) Yes
   B) No
   C) I don’t know

8. Would you accept to use technology in poultry farming?
   A) Yes
   B) No
   C) I don’t know

Thank you so much for taking part in this project. Your time and effort are greatly appreciated.
1. Questionnaire to consumers and sellers of poultry products in Bangladesh

Dear esteem respondent,

Thank you so much for taking your time to go through the questionnaire. The main intention for the questionnaire is to extract information on the effectiveness of the use of technology in poultry farming in Bangladesh. Attempting the eight questions will aid in providing a reliable analysis. This questionnaire is distributed randomly. The approximate time provided to answer the questions is 24 minutes, with the feedback treated unanimously. The questionnaire forms a key part in the completion of master’s program in International Business Management. The poultry industry will be enriched with information on availability of technology that can be used in poultry industry.

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2. Make sure that you attempt all 8 questions
3. Tick on the box that holds your ideal thoughts on the question
4. Do not add or subtract any question from the ones given below
5. Ask for any assistance in filling the questionnaire from the facilitator in areas you do not understand

Questions

Mark on the correct choice among the ones provided

1. What is your gender?
   A) Male
   B) Female
2. Do you have access to a smartphone?
   A) Yes
   B) No
   If no, proceed to question 4, if yes proceed to question 3.
3. Do you use your smartphone to access the internet?
   A) Yes
   B) No
4. Who are you in the poultry industry?
   A) Poultry customer
   B) Poultry product trader
   If you choose A, proceed to question 5. If you choose B, proceed to the next question.
5. Which is the most appropriate marketing strategy to adopt?
   A) Use of new technology
   B) Use of regular methods
   C) I don’t know
6. Do you think technology can be used to increase poultry bird’s production?
   A. Yes
   B) No
   C) I don’t know
   If you chose A or C, proceed to number 5. If you choose B, proceed to number 4

7. How can technology be used to enhance poultry farming? Write two ways.
   1.
   2.

8. Do you think Bangladesh is ready for technology in poultry farming?
   A) Yes
   B) No
   C) I don’t know

Thank you so much for taking part in this project. Your time and effort are greatly appreciated.
2. Questionnaire to respondents in Finland

Dear esteemed respondent,
Thank you so much for taking your time to go through the questionnaire. The main intention for the questionnaire is to extract information on the effectiveness of the use of technology in poultry farming in Bangladesh. It would be a pleasure if the eight questions are attempted to aid in providing a reliable analysis. This questionnaire is distributed randomly. The approximate time provided to answer the questions is 24 minutes, with the feedback treated unanimously. The questionnaire forms a key part in the completion of master’s program in International Business Management. The poultry industry will be enriched with information on availability of technology that can be used in poultry farming and its impact in the industry.

Regards,
Al Mamun
Central University of Applied Sciences
Master’s - International Business Management

Instructions
1. You are supplied with a single questionnaire with two printed pages.
2. Make sure that you attempt all 8 questions
3. Tick on the box that holds your ideal thoughts on the question
4. Do not add or subtract any question from the ones given below
5. Ask for any assistance in marking the paper from the facilitator in areas you do not understand

Questions

1. What is your gender?
   C) Male
   D) Female

2. Do you have access to a smartphone?
   C) Yes
   D) No
   If no, proceed to question 4, if yes proceed to question 3.

3. Do you use your smartphone to access the internet?
   C) Yes
   D) No

4. What is your take on the use of technology in poultry farming?
   A) Technology is a bad thing
   B) Technology is a good thing
   C) I don’t know

5. Do you think technology can be used to increase poultry bird’s production?
   A) Yes
   B) No
6. How can technology be used to enhance poultry farming? Write two ways.
   1. 
   2. 

7. Do you think third world countries are ready for technology in poultry farming?
   D) Yes
   E) No
   F) I don’t know

8. Tick on the technologies you have ever heard of being used in poultry farming
   A) Robots in feeding poultry birds
   B) Use of Drones to protect the flock.
   C) Use of sensors to monitor individual poultry birds
   D) Artificial intelligent,
   E) Block chain
   F) Internet of Things (IOT)
   G) None of the above

Thank you so much for taking part in this project. Your time and effort are greatly appreciated.