

**SUB THEME 09**  
**Authentic Science and Technology**

# Study on the Demand for Degrees in Bachelor of Science (BSc.) Honours in Information Technology, Sri Lanka

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## **Background**

There are many state and non-state higher education institutions both local and foreign operating in Sri Lanka who have introduced Bachelor's level degree programmes in the field of Information Technology. These institutions introduce new programs regularly, and the success of a program depends on student enrolment, which is influenced by the demand in the job market. The study emphasizes the need to assess the market demand for IT degree programs in Sri Lanka and whether prospective students are interested in specializing in Bachelor of Science (BSc) Honours in Information Technology. Additionally, the research aims to understand the specific areas of specialization within IT degrees that are preferred by students in Sri Lanka.

## **Objectives**

The specific objectives were as follows:

1. Identify the current demand for Bachelor of Science (BSc) Honours degrees in Information Technology among the Sri Lankan population.
2. Assess the demand for specializations associated with the Bachelor of Science (BSc) degree among the Sri Lankan population.
3. Determine preferences for areas of specialization within Bachelor of Science (BSc) Honours in Information Technology degrees in Sri Lanka.

## **Research Questions**

The research survey aimed to address the following questions:

- R1.** Is there a demand among the Sri Lankan youth for degrees in Bachelor of Science in Information Technology?
- R2.** What is the nature of demand related to specializations in degrees of Bachelor of Science in Information Technology in Sri Lanka?
- R3.** What were the preferred areas of specialization among the prospective Sri Lankan students who would follow a degree in BSC in Information Technology in Sri Lanka?

## **Methodology**

This study was conducted during the year 2019. An opinion-based questionnaire was designed and distributed among potential undergraduates, primarily focusing on young individuals who were either in the process of completing their Advanced Level studies or had already finished them. This sample was chosen due to its significance as the main demographic in Sri Lanka considering higher education, representing those on the verge of entering degree programs.

Students following the Ordinary Level studies were also selected, since there is a tendency among certain Sri Lankans to join a degree programme as soon as they complete Ordinary Level exam.

Research survey focused on respondents chosen from Kelaniya, Colombo, Panadura, Gampaha, Kandy, Matara, and Kegalle districts representing diverse areas in Sri Lanka and not restricting the respondents to one district. Diverse areas were chosen since that could represent the whole of Sri Lanka on a percentage basis.

The respondents were broadly from the age group of 16 to 28, but the majority belonged to the age-group of 19 – 21.

58% of the participants were female, and 42% were male. 65% were undergraduates, 22% were those who were following Advanced Levels, 11% were Postgraduates, and 2% were following their Ordinary Levels.

## Sampling in Data Collection

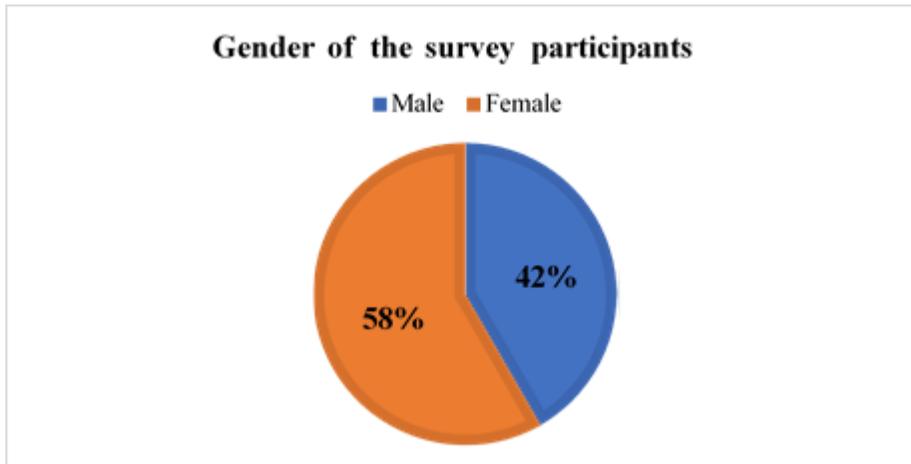


Figure 1

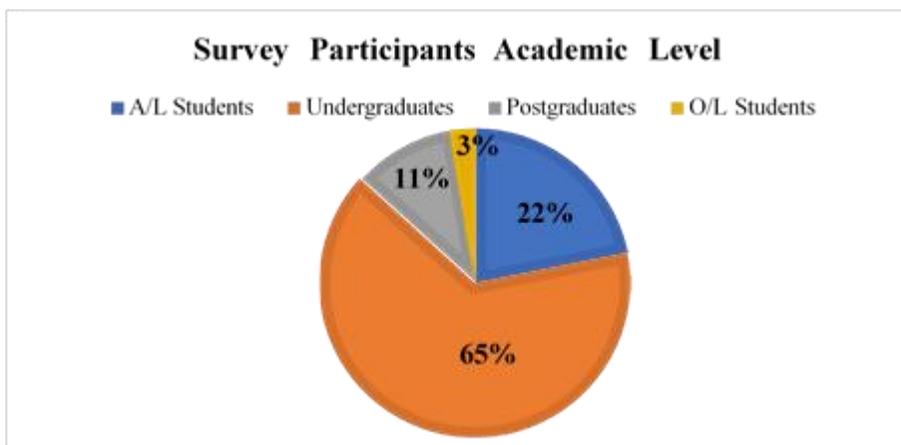


Figure 2

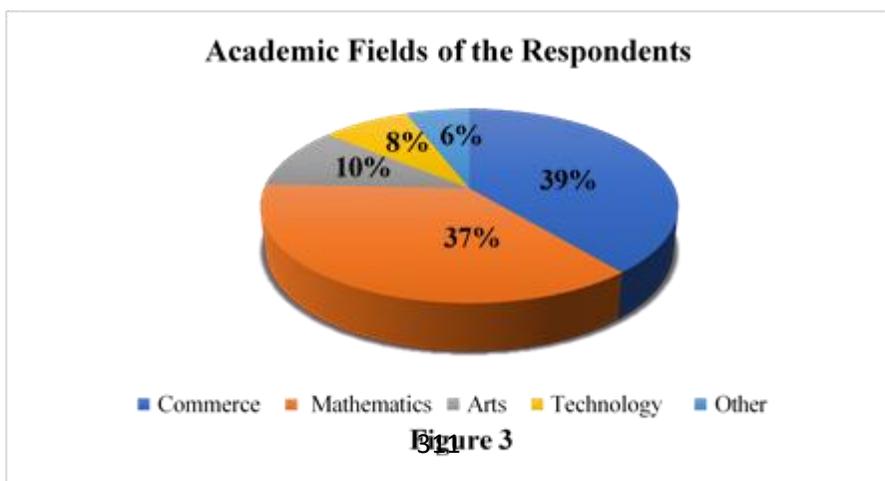


Figure 3

Respondents who participated in the survey were from diverse academic fields such as; Science (Mathematics, Bio Science), Commerce, Arts, Technology, etc.

39% of the respondents represented the Commerce Stream, 37% of the respondents represented the Mathematics stream, 10% represented the Arts Stream, 8% represented technology stream and 6% were from other streams.

### Data Presentation and Analysis

According to the questionnaire, the percentage of participants who wanted to follow an IT Course was 68%, and the percentage who did not want to follow an IT course was 32%, while the rest of the sample was uncertain.

#### **Data Analysis:**

Thereby, according to the data, one can argue that the **majority of the participants wished to follow an IT Course**. There was a difference of 36% between those who wished to follow an IT course and those who did not wish to follow an IT course.

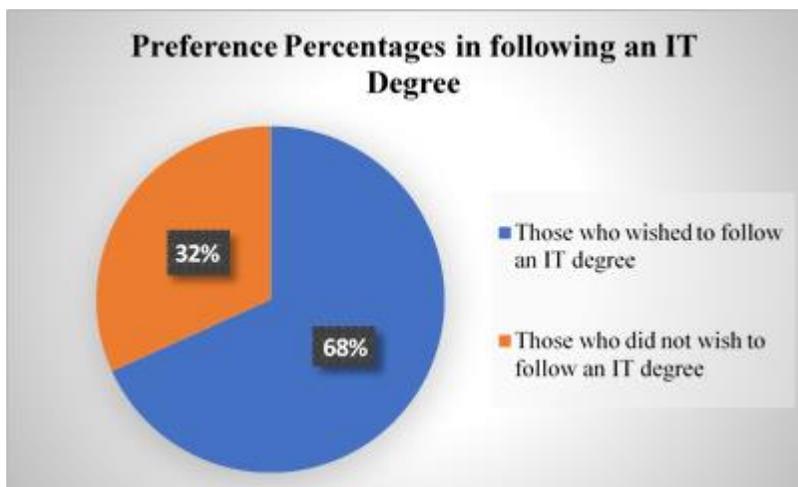
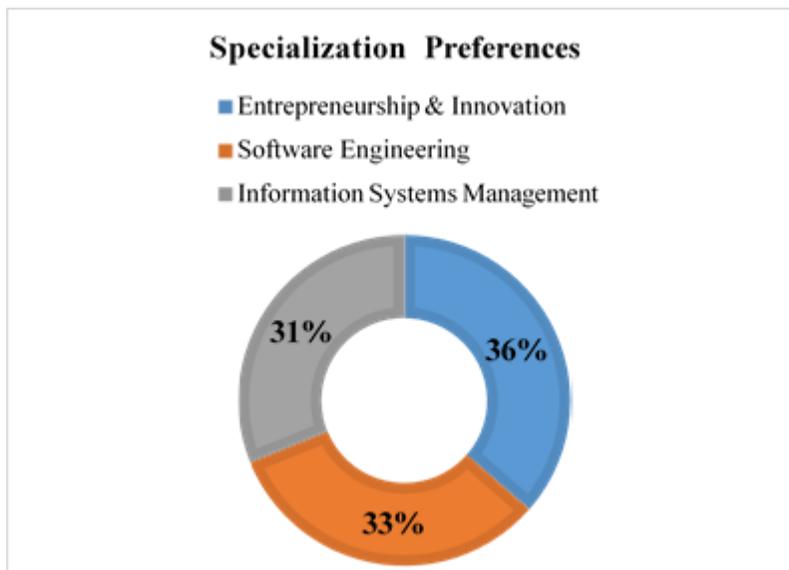


Figure 4

**Finding:** Thereby, one can come to the conclusion that the tendency towards following an IT degree among the young generation is quite high in Sri Lanka. This factor indicates that there is a high demand for IT degrees for the prospective IT degrees offering institutes in Sri Lanka.

According to data, the participants' preferences for the three specializations were converted into percentages. The results were as below;

Entrepreneurship & Innovation	-36%
Software Engineering	- 33%
Information Systems Management	- 31%



**Figure 5**

**Data Analysis:** The analysis reveals slight variations in specialization preferences; for example, the difference between those preferring Entrepreneurship & Innovation and Software Engineering was 4%, while the gap between Entrepreneurship & Innovation and Information Systems Management was 5%. In summary, the results suggest a relatively balanced distribution of specialization preferences among the three options.

**Finding:**

Thereby, the most preferred specialization was Entrepreneurship & Innovation among the three specializations, followed by Software

Engineering, and lastly by Information Systems Management.

According to the data received on the opinion whether Sri Lanka has enough capacity to employ ICT graduates, 66% of the respondents agreed that Sri Lanka has enough capacity to employ ICT graduates, 26% disagreed that the Employment Sector had enough capacity to absorb ICT graduates. 8% of the respondents were not certain.

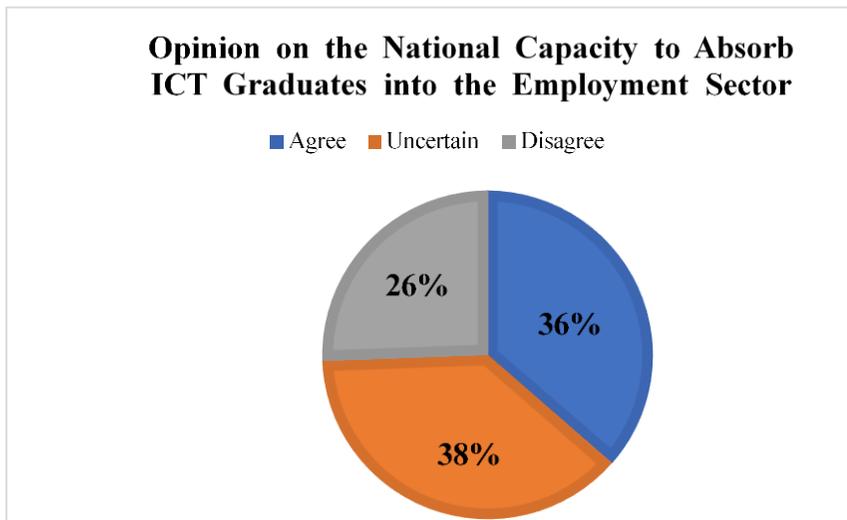


Figure 6

**Data Analysis:**

According to data received the difference between those who agreed that Sri Lanka has enough capacity to employ ICT graduates, and those who disagreed is 10%.

Thereby, it can be argued 10% more of the participants agreed that that Sri Lanka had enough capacity to absorb the ICT graduates into the Employment Sector.

**Finding:**

Thereby, based on the survey results, and applying it to the whole population, it can be argued that a majority of the Sri Lankan youth believe that Sri Lankan Employment Sector had enough capacity to employ ICT graduates.

Further, it can be understood that the majority of the Sri Lankan

population were of the opinion that ICT graduates have enough employment opportunities within the IT sector, given that they would be positively motivated into following an IT degree. The data gathered on the opinion of the survey participants on the ability to gain employment among ICT degree holders in Sri Lanka was calculated into percentages in the following manner.

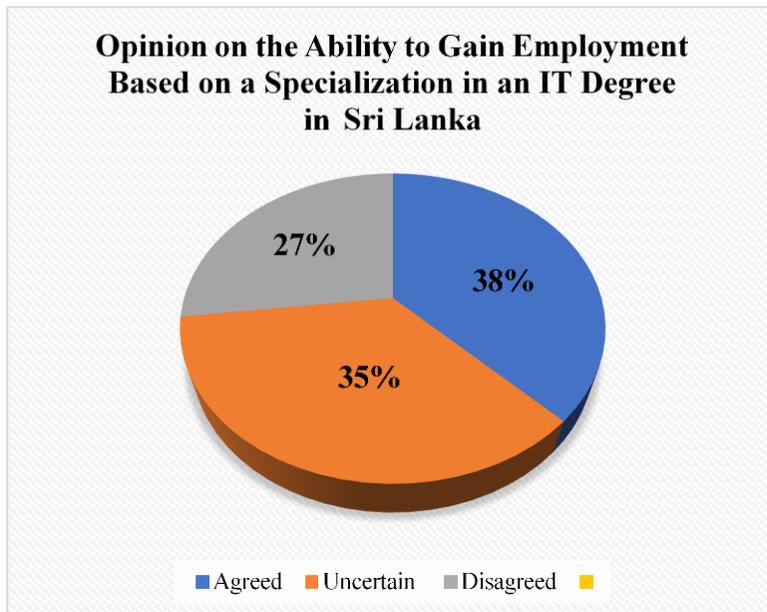


Figure 7

**Data Analysis:** 38% of the respondents agreed that a specialization in IT will help Sri Lankan graduates to easily obtain employment, while 27% disagreed.

The difference between those who agreed that IT specialization was important and those who believed that IT specialization was not important is 11%.

**Finding:**

Thereby, within the context, **11% more participants, and therefore the majority** agreed that ICT specialization aided to gain employment in Sri Lanka, indicating that the Sri Lankan opinion towards IT specialization

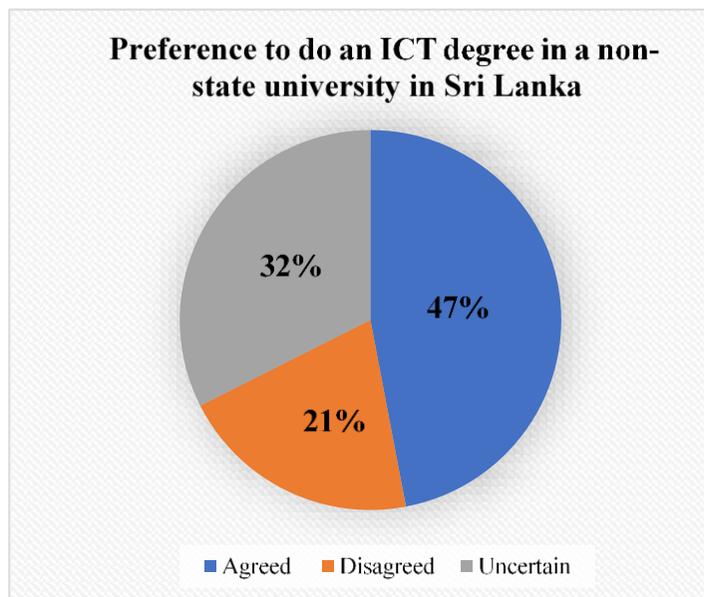
is comparatively positive, and that demand for IT specializations are high.

Regarding the question about enrolling in a non-state university for an ICT degree, the collected data showed that 47% of participants favoured pursuing an ICT degree at a non-state university, while 32% were not inclined to do so. Additionally, this question also gauged the willingness of respondents to pay a course fee for a BSc Honours in ICT degree.

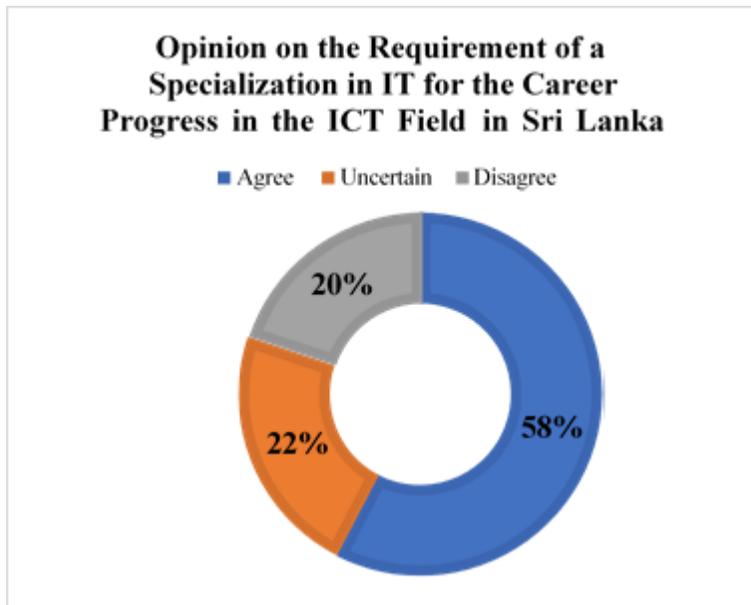
**Data analysis:** The research indicated that a portion of 15% was more in favour of doing a private university degree.

**Finding:**

Thereby applying this to the whole Sri Lankan population it can be suggested that **the majority of the population were interested in investing money in obtaining a degree related to ICT at a non-state university.**



**Figure 8**



**Figure 9**

According to the questionnaire, data was gathered to indicate that 58% agreed that a specialization in IT was required for ICT career progress, while 20% disagreed.

**Data Analysis:** The difference between the percentage of those who agreed that a specialization was important, and those who disagreed was 38%.

**Finding:**

Thereby, it can be argued that the respondents who agreed that a specialization in IT was important was more than those who disagreed. **Therefore, it can be concluded that the majority of the Sri Lankan population agree that the specialization in the ICT field was important in the career progress within the ICT field in Sri Lanka.**

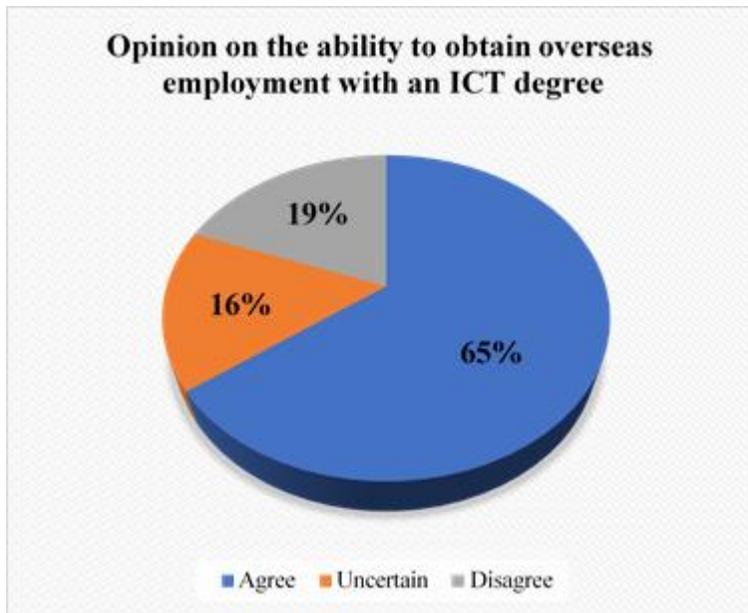


Figure 10

The questionnaire revealed that 65% of respondents believed that an ICT degree would improve their chances of obtaining employment abroad, whereas 19% disagreed with this notion. This data underscores a significant agreement among participants regarding the potential of an ICT degree to enhance overseas employment opportunities.

**Data analysis:** Thereby the difference of the percentage of those who agreed on the importance of an ICT degree and those who disagreed was 46%.

**Finding:**

Thereby, it can be concluded that **the majority agreed that an ICT degree was important to obtain employment.**

**Conclusion**

In conclusion one can state that majority of the respondents who were chosen to represent prospective students in University system from all parts of Sri Lanka expressed their opinion that an **ICT degree was important in obtaining a job in the same sector in Sri Lanka and overseas.**

Thereby, the responses to this survey proved that a majority of Sri

Lankans were of opinion that **it was important to pursue a specialization in an ICT degree in the career progress within the ICT field in Sri Lanka.**

- That it was important to have an **ICT degree and a specialization to further their career in the ICT field.**
- Majority thought they preferred to do an **ICT degree in the private sector indicating that they would invest money in an ICT degree at a non-state university.**
- Further, the research proved that the majority of the respondents wished to do a specialization in ICT and that their preferred specialization period was **Entrepreneurship & Innovation.**
- Further, it can be understood that the majority of the Sri Lankan population were of the opinion that **ICT graduates have enough employment opportunities** within the IT sector, given that they would be positively motivated into following an IT degree.
- The most **preferred specialization was Entrepreneurship & Innovation** among the three Specialization it can be concluded that Sri Lanka has a favourable market for ICT degrees, and upcoming and new institutes stand to gain from commencing new courses degree programmes in ICT.

**Keywords:** *Bachelor of Science (BSc); Employment opportunities; Higher Education; ICT degree; Information Technology*

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# A critical review of *Manasa Roga* in Ayurveda Sanskrit texts and an observational study of *Sarasvatha Choorna* in the Management of Dementia (*Smruthibramsha*)

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## Introduction

The present data shown that there is a high prevalence of Mental Disease among elders of Sri Lanka (3.1%). Prevalence of Dementia (*Smruthibramsha in Ayurveda*) is 4% of elders in between the age of 65 years and over. Dementia is a chronic brain disease and there may be a decline in thinking, memory, cognition, language skills, understanding and judgment. This will be a big issue for Health policy planning and Health management in future. Among many preparations mentioned in the authentic Ayurvedic Sanskrit texts as a treatment of *manasa roga*, *Sarasvata choorna* has been used frequently in the management of *Unmada* (Insanity), it has mentioned in *Bhavaprakasha*. The Ayurvedic science is originally composed of in the Indian traditional language called Sanskrit. Hence naturally all the Ayurvedic Terminology in the Authentic Ayurvedic texts are invariably in Sanskrit language. A critical review of *Manasa Roga* in Ayurveda Sanskrit texts and an observational study of *Sarasvata choorna* in the management of Dementia (*Smruthibramsha*) is the main objective of this study. Other objectives of the study are, to standardized *Sarasvata choorna*, to estimate anti-oxidant capacity of *Sarasvata choorna* and to study safety measures of the *Sarasvata choorna*.

## Literature Review.

Literature review was carried out to find the descriptive facts about *Manasa Roga* and their treatments modalities mentioned in Sanskrit Ayurvedic texts specially in the *Vruddatraya* and *Laguthraya*. The *Dhee*, *Dhruiti*, *Smruti* enhancing, Ayurveda herbal Remedy (*Sarasvata choorna*) for Dementia was selected for the observational clinical study. Alzheimer's disease (AD) is the most common type of dementia. Symptoms of

Alzheimer are including problems with memory, judgment, and thinking, which make it hard to work or take part in day-to-day life. As the stages of Alzheimer's progress, memory loss and other signs of Alzheimer's become more apparent. Many people find help with Alzheimer's drugs, but there is no effective treatment for this form of dementia.

### **Methods and Methodology**

Selected test drug has been using for centuries in Ayurveda, was prepared and standardized under the authorized supervision of department of *Dravyaguna vignana* of institute of indigenous Medicine. The test Drug Standardization was carried out at the Institute of Technology Industry (ITI), Bawuddaloka Mawatha, Sri Lanka. In the observational clinical study, total number of 40 diagnosed patients have memory impairment on the basis of questioner according to the DSM-IV-TR diagnostic criteria for dementia and Mini mental State Examination- Sinhala (S-MMSE), attending *Swasthavritta* Clinic at the OPD in the Ayurveda Teaching Hospital at Borella were selected. Non randomized, retrospective, one group pre-test-post-test study design was adopted irrespective of their sex, religion, occupation, educational status and Income. Routing hematological and biochemical test will be carried out before and after the treatments. Full Blood Count, Liver Function Test (SGPT, SGOT), Kidney Function Test (creatinine, Urea, Uric acid), Random Blood Sugar were assessed.

### **Results and Discussion**

As a result, it was revealed that mental disease, especially *Unmada* and *Apasmara* have mentioned in *vedic* period and Samhita period. There is no definite pattern of classification of *Manasa Roga* in Ayurvedic Sanskrit texts. Description of *Manasa Roga* is found in scatted form at different places in texts of Ayurveda. In Samhita period mental disease is elaborately describe with the etiological factors, pathogenesis, pre monitory symptoms, symptoms complications along with the treatment modalities and side effects. In the Ayurveda literature has clearly mentioned that impairment of memory as *Smritibramsha* which occurs due to a person being overcome by *rajas* and *tamas Dohsas* in the mind. Aging is described in Ayurveda term as *Kalaja jara*. So, memory

impairment of aged can say "*Jara janya smritibamsha*" in the Ayurvedic point of view. Memory impairment is predominant symptom in dementia as well as Aging is the biggest risk factor in dementia. So, there is a correlation in between dementia and *smritibamsha*.

Standardize *Sarasvatha Choorna* has done using standard protocols. Standardization of the *Sarasvatha Choorna* was assessed by total ash, water soluble ash, acid insoluble ash contents, microbial counts, heavy metals, phytochemical screening and TLC-densitogram fingerprints. Standardization of *Sarasvatha Choorna* study reveals the quality of *Sarasvatha Choorna* for the first time and quality control parameters resulted from this study can be used as a reference standard for quality control of *Sarasvatha Choorna*.

Results of the before and after treatment was analyzed by using paired sample *t* test for the observational study on scores for total of MMSE, ADLI, BPSD (Delusion, Repetitive behavior, Agitation, Apathy). The findings showed that, there was a significant effectiveness of before and after treatment of *Sarasvatha Choorna*. Moreover, mean change of scores indicated that, (M= 19.65, SD=3.325),( M= 22.55, SD=4.920);  $t(39) -3.652, p<0.05$ ; (M= 18.22, SD=2.496), (M= 18.32, SD=2.235);  $t(39) -0.781, p<0.05$ ; (M= 0.65, SD=0.736); (M= 0.25, SD=0.439); $t(39) 3.766, p<0.05$ ; ( M= 1.10, SD=0.871) (M= 0.50, SD=0.716);  $t(39) 4.878, p<0.05$  ; ( M= 1.35, SD=0.736) (M= 0.52, SD=0.716);  $t(39) 6.983, p<0.05$  ; ( M= 0.88, SD=0.822) (M= 0.50, SD=0.679); $t(39) 3.777, p<0.05$  respectively.

### Conclusions and Remarks

There was a significant difference in the total score of MMSE, BPSD, before and after treatment. ADLI is stable. According the data obtained it was revealed that there are satisfactory safety measures of *Sarasvatha choorna* on kidney. This finding has to be confirmed with clinical studies including larger population. According the data obtained it was revealed that there are satisfactory safety measures of *Sarasvatha choorna* on Blood components of Dementia patients. This finding also has to be confirmed with clinical studies including larger population.

In conclusion, *Sarasvatha Choorna* can be used in the management of Dementia without any serious side effects.

**Keywords:** Alzimer Dementia, *Manasa Roga*, *Sarasvatha choorna*, *Smruthibramsha*.

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# Development of a Framework for Health Data Governance in Sri Lanka

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## Introduction

The scientific community commonly perceives the health system as a complex entity as it demonstrates complex system characteristics. The growth of health informatics as a specialised area within the healthcare domain immensely helps in adopting ICT effectively in the healthcare domain. To deliver high-quality health services, effective collaboration and a comprehensive understanding among diverse professional groups are imperative due to the complex nature of the system (Greenhalgh and Papoutsis, 2018; Sturmberg and Martin, 2013). Compared to other disciplines, the health system generates an extensive volume of data at a rapid pace, further amplifying the system's complexity. Consequently, there is an escalating demand for the collection, retrieval, and utilization of health record information in electronic format to enhance flexibility. This enables the retrieval and presentation of data in numerous locations and formats, irrespective of the origin of the data (Hovenga and Grain, 2013). However, unless properly administered, health information systems have the potential to escalate the complexity of the health system. Healthcare organizations should implement appropriate data governance mechanisms to ensure health data availability, usability, integrity, quality, and security. However, implementing data governance mechanisms can pose challenges, the benefits are considerable, as proper data governance can substantially enhance the overall quality of healthcare.

## Literature review

The World Health Organization (WHO) in 2012 introduced the National eHealth strategy toolkit for developing or revitalizing a country's eHealth strategy. The developing strategy should be based on the existing maturity level of the eHealth ecosystem of the country. The national

maturity level can be evaluated based on two dimensions. The first dimension, the ICT environment (vertical axis), encompasses the national ICT market and the general degree of computerization and networking infrastructure penetration. The second dimension, the enabling environment for eHealth, plays a pivotal role in augmenting and preserving ICT adoption in the healthcare sector. This dimension comprises critical aspects such as governance, policy, legislation, standards, and human resources (World Health Organization, 2012).

As per the National eHealth Strategy Toolkit classification of the World Health Organization concerning the accessibility of ICT services and eHealth interventions, Sri Lanka falls under the third category (Scaling and Mainstreaming) that entails the expansion and integration of digital health interventions (Dissanayake, 2021). According to the eHealth strategy toolkit, a country in category three should prioritize interoperability and adoption of standards, incentives for innovation and integration of eHealth into core services, identifying funding for medium-to-long-term implementation, responding to citizens' expectations for more efficient, effective, and personalized services, using data and information for public health planning, policies for privacy and security of information, and undertaking monitoring and evaluation to ensure that eHealth delivers according to health priorities (World Health Organization, 2012). To achieve this goal country should implement a proper health data governance framework.

The recently published National eHealth Blueprint of the Ministry of Health, Sri Lanka, emphasizes the importance of proper data governance mechanisms for the success of eHealth initiatives. As such, this study aims to develop a holistic data governance framework that aligns with the objectives of the blueprint. The blueprint recognizes the need for effective data governance to ensure health data quality, privacy, security, and integrity. Specifically, it highlights the need to establish data standards, protocols, and policies that govern health data collection, storage, sharing, and use. Additionally, it underscores the importance of building capacity in data management, analysis, and reporting to enable evidence-based decision-making (Ministry of Health, Sri Lanka, 2022).

This research addresses the critical need for robust health data governance in Sri Lanka. Through discussions with experts in the field, it has become evident that current policy frameworks fall short of providing

a comprehensive approach to data governance in the health sector. Therefore, this study aims to explore the components of data governance and best practices identified in the existing literature to develop new frameworks to address the gaps in health data governance in Sri Lanka. Similarly, the literature suggests that every organisation must develop data governance mechanisms that are unique to the organisation. It will maximise the healthcare quality of the organisation (Brous et al., 2016). In the realm of information management, implementing proper data governance mechanisms is a critical step towards establishing effective information governance frameworks. This is because effective information governance requires a robust framework for the management of data, which serves as the foundation for all subsequent information management activities.

Given the time constraints of the study, it is limited to the data governance of curative sector Health Information Management Systems in Sri Lanka. By narrowing the focus to this aspect of health data governance, the study aims to provide a more in-depth analysis of the specific issues that may be unique to this area and to develop practical and targeted recommendations for improving health data governance in this context. The literature suggests that the earliest evidence of research on data governance dates back to the early 1980s. Since then, researchers have conducted significant research on various components of data governance. However, most research has focused on specific components of data governance and holistic studies on data governance have been limited (Erkka, 2013). Therefore, the objective of the study is to address this gap in the literature by developing a comprehensive framework for data governance tailored to low-resource settings. By developing a framework that considers the unique challenges and opportunities in low-resource environments, this study aims to provide a novel contribution to the field of data governance.

## **Methodology**

This study employed a mixed-method approach consisting of three distinct phases. Initially, a comprehensive literature review was conducted to identify the existing domains and strategies related to data governance. Phase 2 of the study involved qualitative research methodology, specifically in-depth interviews. A total of 15 stakeholders, including

Medical Administrators, Clinicians, Health Informaticians, Nurses, and Healthcare Assistants, participated in this phase. The interviews aimed to uncover the prevailing data governance issues within the Clinical Information Systems of Sri Lanka, specifically in the western province. The participants were selected through purposive sampling to ensure representation from each group. In Phase 3, the identified domains and strategies obtained from the literature review were validated in the context of clinical information systems in Sri Lanka. This validation was accomplished through the use of nominal group techniques, involving a panel of six experts comprising individuals with expertise in health informatics, medical administration, and software engineering. Phase 3 of the study employed a mixed-method approach.

## **Results**

In phase 1 of the study, the literature review revealed eight distinct domains and a total of 50 strategies pertaining to data governance in clinical information systems. Phase 2 involved a thorough thematic analysis of in-depth interview data, leading to the identification of seven critical data governance issues within the clinical information systems of Sri Lanka. Through the expert panel's validation process in phase 3, a comprehensive set of 49 strategies across the eight domains of data governance was confirmed as essential for enhancing holistic data governance in the clinical information systems of Sri Lanka. Drawing on these validated strategies, a robust and all-encompassing data governance framework specific to the clinical information systems of Sri Lanka was subsequently developed.

## **Conclusion**

The framework covers all essential components and can be customized for implementation in other low and middle-income countries. The study highlights the lack of knowledge among stakeholders regarding data governance, emphasizing the need for targeted interventions to enhance their understanding. The presence of information silos in the clinical information systems of Sri Lanka is also identified as a significant issue, requiring further investigation. The study acknowledges the limitation of not analyzing the patient's perspective on data governance issues, suggesting the inclusion of patient viewpoints in future research.

**Keywords:** Health Data Governance, Clinical Information Systems, Low resource setting, Health Information Management, Curative sector

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