The Impact of Internet of Things (IOT) On Human Resource Management (HRM) In an Apparel Industry in Trincomalee District, Sri Lanka

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ABSTRACT

The apparel industry is one of Sri Lanka's major economic contributors, employing a large workforce. In Trincomalee district, apparel industry face HR-related issues including manual attendance tracking, limited performance monitoring, workplace accidents, and communication gaps between workers and management. IoT-based systems such as biometric devices, wearable safety sensors, automated attendance systems, and real-time production monitoring tools offer effective solutions to these challenges.

However, the growing interest in digital human resource management, there is limited academic research focusing on Internet of things adoption in human resource management within Sri Lanka's apparel industry. This study attempts to fill this gap by evaluating how Internet of things impact on human resource management in an apparel industry in the Trincomalee District, Sri Lanka. The independent variable of the study is Internet of things and its dimensions are IoT-Based Attendance Systems, IoT-Based Performance Monitoring, IoT-Based Communication and dependent variable is human resource management.

The researcher collects 200 data from employees who are in an apparel Industry in Trincomalee District, Sri Lanka based on quantitative method with the support of convenience sampling technique.

The conclusion of the study displays that, there is a high level of the Internet of things and high level of the human resource management exists in an apparel industry in Trincomalee district, Sri Lanka. Further, correlation analysis shows that, there is a strong positive relationship between internet of things and human resource management in an apparel industry in Trincomalee district, Sri Lanka. Finally, regression analysis shows that, there is a strong positive impact of internet of things on Human resource management in an apparel industry in Trincomalee district, Sri Lanka.

Keywords: IoT-Based Attendance Systems, IoT-Based Performance Monitoring, IoT-Based Communication, Human Resource Management.

INTRODUCTION

The Internet of Things (IoT) refers to a network of physical devices embedded with sensors, software, and other technologies that allow these devices to connect and exchange data with each other and centralized systems. Internet of Things is transforming industries by facilitating real-time data collection and automation.

The rapid technological advancements in the Internet of Things (IoT) have disrupted multiple sectors, including Human Resource Management (HRM). Only a few papers have examined the relationship between Internet of Things & Human Resource Management. So, there is a need to identify the impact of Internet of Things on Human Resource Management (Glogar, Petrak, Mahnic Naglic, 2025)

Therefore, the objective of this research is to identify the impact of Internet of Things on Human Resource Management in an Apparel Industry in Trincomalee District, Sri Lanka.

Problem Statement

The apparel industry, known for its dynamic, fast-paced environment, faces numerous challenges in managing its workforce effectively. These challenges include optimizing employee productivity, maintaining workplace safety, managing time and attendance accurately, and improving overall employee satisfaction. Traditional HRM systems often struggle to address these issues, relying on outdated manual processes or siloed technologies that do not provide real-time insights into employee performance or well-being. This leads to inefficiencies, increased operational costs, and limited ability to make data-driven decisions (Nath, Mustayin, Eweje, 2025).

The advent of the Internet of Things (IoT) offers a transformative opportunity to address these issues within HRM. IoT technologies, which enable devices and sensors to collect and transmit real-time data, could play a pivotal role in enhancing HRM in the apparel industry. From tracking employee productivity on the factory floor to monitoring health and safety in hazardous environments, IoT can provide HR managers with actionable insights that can improve decision-making and create a more efficient, engaged, and safer workforce (Kumar, Bhamu J, Sangwan, 2021)

However, while IoT has been adopted in various industries, its application in HRM within the apparel industry remains underexplored. The industry faces unique challenges, such as high employee turnover, long working hours, and a predominantly manual labor force, which may complicate the adoption and integration of IoT solutions.

Additionally, concerns around data privacy, employee acceptance, and the cost of implementation pose significant barriers to widespread adoption.

As a result, the study's key research question is:

"What is the impact of Internet of Things on Human Resource Management in an Apparel Industry in Trincomalee District, Sri Lanka?".

Theoretical Framework

Figure 1: Conceptual Framework
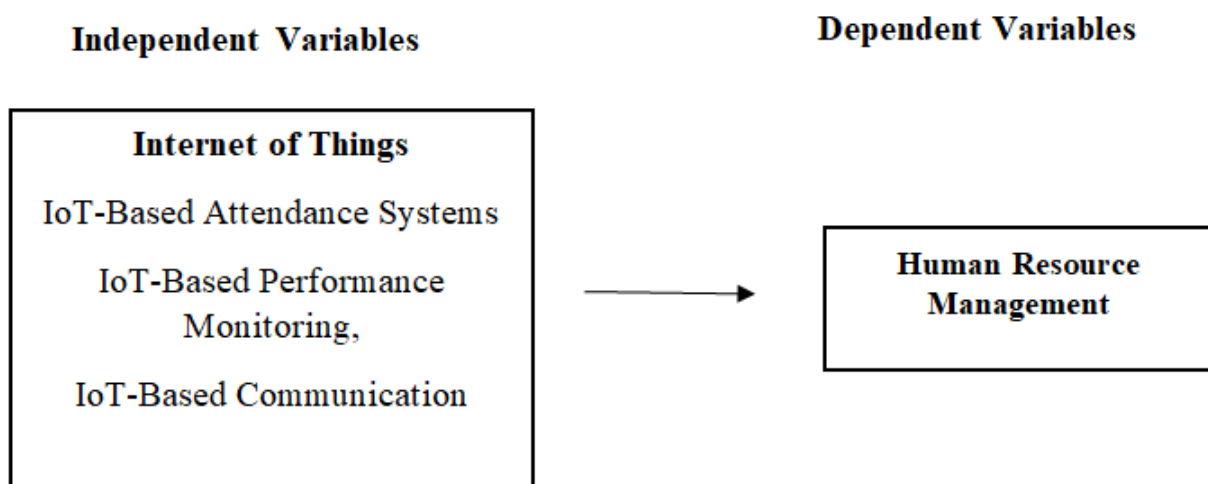
(Source: Developed for Research Purpose)

Research Objectives

1. To identify the level of internet of things in an apparel industry in Trincomalee District, Sri Lanka.

2. To identify the level of human resource managemtn in an apparel industry in Trincomalee District, Sri Lanka.

3. To identify the relationship between internet of things and human resource management in an apparel industry in Trincomalee District, Sri Lanka.

4. To identify the impact of internet of things on human resource management in an apparel industry in Trincomalee District, Sri Lanka.

METHODOLOGY

As pointed out by Kothari (2004), the study population is the total collection of relevant elements, individuals or items to be considered in the study. This study focuses on the all employees who were working in an apparel industry in Sri Lankan context as a population of the study.

A sample is defined as an element or item selected to represent the target population, and a sampling design is a framework used by the researcher to support the sample selection procedure (Collis & Hussey, 2014). According to the Export Development Board's Industry Capability Report (2024), there are 20 major players in the Sri Lankan apparel industry, representing the major contributors to the growth and development of the sector. For this study, five apparel companies located in the Trincomalee district were selected from these 20 major players as the target population. This selection was made based on accessibility, relevance, and the important role these companies play in the industry. The selected sample size of five factories was considered sufficient to meet the research objectives and ensure comprehensive data collection.

This research used convenience sampling, considering practical constraints such as availability, accessibility, and participant willingness. The study is entirely based on primary data, collected through a structured closed-end questionnaire from 200 respondents who are engaged in human resource management in 05 apparel factories in the trincomalee district. A five-point Likert scale ranging from "Strongly Disagree- 1" to "Strongly Agree-5" is used for the variables in the theoretical model. The collected data were stored and analyzed using the SPSS software package (IBM SPSS Statistics, version 22). Descriptive statistics, correlations and regression analyses were used to analyses the data.

RESULTS & DISCUSSION

Discussion about Demographic Information

The frequency analysis conducted in this research, the results indicate that internet of things are widely accepted, with 97.36% of the participants confirming its use in their companies. This highlights the importance of using internet of things to monitor human resource management activities. A mere 2.64% indicated that they did not use internet of things, highlighting its universal use in the industry. The survey participants came from five well-known apparel companies, with the majority coming from Jay Jay Mills Lanka (Pvt) Ltd (34.1%) and Nor Lanka Manufacturing Company (25.6%). This research shows that the participants have varying levels of familiarity with internet of things. About 67.8% of the individuals have been using these systems for more than four years, indicating a significant level of familiarity and skill. 35.7% of individuals in this group stated that they have been using it for four to six years, and 16.7% have more than ten years of experience. On the other hand, 32.2% of the participants are relatively recent users, with less than four years of experience using internet of things. This indicates a continued increase in internet of things, as companies increasingly realize its importance. Most respondents were female, representing 76.4% of the sample, while males were 23.6%. This is consistent with the demographic patterns found in the apparel industry, where a large portion of the workforce is female. Furthermore, respondents demonstrated a significantly high level of proficiency in using internet of things. A combined 95% rated their skills as "good" or "excellent", indicating confidence and competence in using accounting systems for their jobs. A very small percentage of individuals rated their skills as "fair" (4.7%) or "poor" (0.4%), indicating that organizations have implemented training and skills development effectively. 51.9% of respondents were between the ages of 26 and 30, while 38.8% were 25 years old or younger, indicating a younger workforce in terms of age distribution. A low percentage of people are between the ages of 31-40 (8.9%), with only 0.4% of people over the age of 40. This shows a young workforce who are in the early stages of their careers and are open to embracing technological changes such as internet of things. This finding is supported by the fact that 49.6% of participants have between two and four years of experience in their current

positions, while 43% have less than a year of experience. A small portion (7.4%) have more than five years of experience, indicating a field known for its young and developing workforce. Overall, these results indicate how widely internet of things is used in the apparel industry. The data highlights the importance of internet of things in improving human resource management in the apparel industry in the Trincomalee district, Sri Lanka.

Discussion about Objective 1: To identify the level of internet of things in an apparel industry in Trincomalee District, Sri Lanka.

Table 1: Descriptive statistics of Internet of Things

	N	Minimum	Maximum	Mean	Std. Deviation
IoT-Based Attendance Systems	180	1.00	5.00	3.66	.620
IoT-Based Performance Monitoring	180	1.00	5.00	3.77	.798
IoT-Based Communication & HR Analytics	180	1.00	5.00	3.73	.784
Internet of Things	180	1.00	5.00	3.82	.846

(Source- Survey Data)

The first objective of the study is find to identify the level of internet of things in an apperal industry in Trincomalee district, Sri Lanka. The internet of things Mean 3.82 with standard deviation 0.846.

The findings of this study displayed that a high level $(3.5<X<5)$ of the internet of things is in an apperal industry in Trincomalee district, Sri Lanka. The results show that the mean score that is close to the scale's maximum value. It can be inferred that most respondents believe the internet of things are reliable and efficient because the average rating is closer to the upper end (5.00) and the standard deviation shows minimal variation among replies. This dimensions that their internet of things support operations well, which is critical for IoT-Based Attendance Systems, IoT-Based Performance Monitoring, IoT-Based Safety & Workplace Monitoring, and IoT-Based Communication & HR Analytics which is a good result for the apparel industry in that area.

Discussion about Objective 2: To identify the level of Human Resource Management in an apparel industry in Trincomalee District, Sri Lanka.

Table 2: Descriptive statistics of Human Resource Management

	Minimum	Maximum	Means	Std.deviation
Human Resource Management	2.00	5.00	3.63	0.764

(Source: Survey Data)

The second objective of the study is to identify the level of Human Resource Management in an apperal industry in Trincomalee district, Sri Lanka. The Human resource Management Mean value is 3.63 with standard deviation 0.764.

The findings of this study displayed that a high level $(3.5<X<5)$ of the human resource management exists in an apperal industry in Trincomalee district, Sri Lanka. The results show that the mean score that is close to the scale's maximum value. It can be inferred that most respondents believe the human resource management are reliable and efficient because the average rating is closer to the upper end (5.00) and the standard deviation shows minimal variation among replies.

Discussion about Objective 03: To identify the relationship between internet of things and Human Resource

Management in an apparel industry in Trincomalee District, Sri Lanka.

The third objective of this study is to identify the relationship between internet of things and Human Resource Management in an apperal industry in Trincomalee district, Sri Lanka. For the fulfillment of the objectives of the study it is necessary to investigate the relationship between independent and dependent variable.

Table 3 Determine the relationship between Internet of Things and Human Resource Management

Correlations		Information system	Change management
Internet of Things	Pearson Correlation	1	.894**
	Sig. (2-tailed)		.000
	N	200	200
Human Resource Management	Pearson Correlation	.894**	1
	Sig. (2-tailed)	.000	
	N	200	200

(Source: Survey Data 2024)

Correlation measures the relationship between internet of things and Human Resource Management. The results show coefficient correlation (r) for the study is 0.894 and similarly level of significance is 0.00, (P<0.005). Correlation value range consists between (-0.5) to (+1). If the results indicate (-0.5 to -1.0) means perfectly negative relationship, (0) means no relationship and (+1) means strong positive relationship between variables. According to the results of the table...correlation is 0.894 and we can conclude it as strong positive relationship between internet of things and Human Resource Management.

Discussion about Objective 04: To identify the impact of internet of things and Human Resource Management in an apperal industry in Trincomalee district, Sri Lanka.
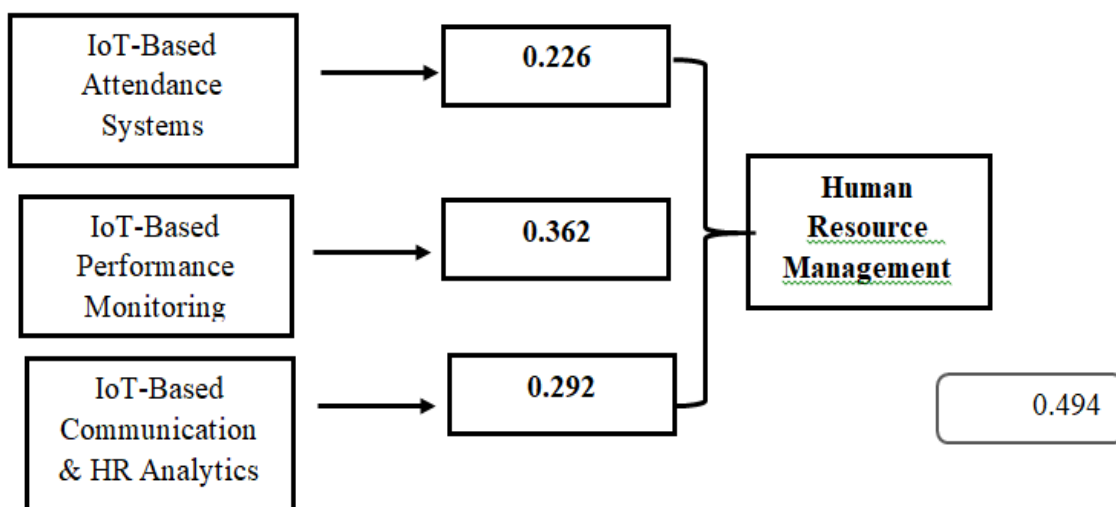

Figure 2: Determine the impact of IoT on HRM

Table 4: Internet of Things and Human Resource Management

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.895ᵃ	.801	.798	.25293
a. Predictors: (Constant), Information quality, system quality service quality				

The adjusted R square between the components of the internet of things and Human Resource Management is 0.801, which mean that 80% variance in the dependent variables of human Resource management is explained jointly by the IoT-Based Attendance Systems, IoT-Based Performance Monitoring and IoT-Based Communication & HR Analytics

The regression equation for human resource management can be formed as follows.

HRM= 0.494 + 0.226 (IAS) + 0.362 (IPM) + 0.292(ICH)

Where,

HRM – Human Resource Management

IAS   - IoT-Based Attendance Systems

IPM   - IoT-Based Performance Monitoring

ICH   - IoT-Based Communication & HR Analytics

CONCLUSION

This study investigated the impact of the internet of things on the human resource management of the apparel industry in the Trincomalee district, Sri Lanka. The research was conducted using descriptive statistics, frequency analysis, reliability analysis, correlation, regression, and other analytical techniques.

Data collected from 200 respondents were analyzed using SPSS 22 software, providing valuable insights into the significant relationships between internet of things and human resource management.

In terms of frequency analysis, the demographic distribution of respondents indicated that 58% were male and 42% were female. The majority of respondents (45%) were between the ages of 31-40, followed by 35% aged 20-30, and 20% aged above 40. Furthermore, 60% of respondents had more than five years of experience in the apparel industry, highlighting the expertise of the participants. Additionally, 72% of respondents reported using internet of things for more than five years, indicating the widespread adoption of internet of things within the industry.

The reliability analysis results demonstrated that the Cronbach's Alpha values for all internet of things and human resource management dimensions were above 0.7, indicating a high level of internal consistency and reliability for the measurement scales used in the study. This suggests that the data collection instruments were well-structured and provided consistent results.

The descriptive analysis revealed that the overall level of internet of things and human resource management in the apparel industry are high.

The correlation analysis confirmed a strong positive relationship between internet of things and human resource management.

The regression analysis results indicated an R-squared value of 0.80, meaning that internet of things dimensions explain 80% of the variance in human resource management.

This research offers valuable insights for apparel industry stakeholders, policymakers, and practitioners, emphasizing the necessity of continuous investment in internet of things and related training programs. By adopting best in internet of things utilization, apparel companies in the Trincomalee district can further enhance their human resource management and competitiveness in the market. The study's contributions pave the way for future research on internet of things adoption in other industries and regions, ensuring its relevance and applicability beyond the apparel sector.

RECOMMENDATION OF THE STUDY

This study provides critical insights into the role of internet of things in enhancing human resource management in the apparel industry in the Trincomalee district of Sri Lanka. Based on the findings, several high-level recommendations are made to improve knowledge, bridge research gaps, and provide practical guidance for optimizing internet of things implementation in similar contexts.

The study addresses a significant gap by focusing on internet of things adoption in the apparel industry in a developing economy, an area that is often underrepresented in the global literature. This localized and industry-specific approach provides a nuanced understanding that diverges from the generalized findings of previous internet of things studies, emphasizing its application in the Sri Lankan apparel industry. A key contribution is the high reliability and validity of the developed framework, as demonstrated by Cronbach's alpha value of 0.915, thereby establishing the model as a benchmark for future research. Furthermore, unlike findings in developed economies where system features and technological capabilities often dominate, the study highlights the unique role of internet of things in resource-constrained environments where management support emerged as the most influential factor.

Limitations of the Study

This study was limited to Trincomalee district, which is a critical center of Sri Lanka's apparel manufacturing industry. Although this region exhibits the most advanced industrial systems in the country, the results are not applicable to other regions with different economic, technological and infrastructural conditions. Additionally, the research focused exclusively on the apparel industry, which operates with specific operational and financial characteristics. Therefore, the findings of this study may not be fully applicable to sectors such as manufacturing or retail, as the impacts of internet of things may vary based on their unique circumstances.

The research included feedback from 200 individuals from five apparel companies. Although the sample size is sufficient for statistical analysis, it is only for a small part of the industry. Smaller firms, which may face specific barriers to using internet of things, were underrepresented in the sample.

The study used a cross-sectional design, collecting data at a specific point in time. Although this method successfully identified relationships between internet of things dimensions and human resource management, it did not consider possible changes in these relationships over time.

Quantitative methods such as descriptive analysis, correlation and regression are the main techniques used in this study to analyze the data. Although these techniques accurately evaluated the relationships and effects of internet of things dimensions, they failed to consider qualitative aspects of internet of things implementation.

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