ROBERT GORDON UNIVERSITY ABERDEEN

SCHOOL OF COMPUTING SCIENCE AND DIGITAL MEDIA

MSc Business Analytics

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Project Title: A Machine Learning Model to Predict Machine Breakdown in the Apparel Manufacturing Industry	
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CONSENT

I agree ✓
I do not agree ☐

That the University shall be entitled to use any results, materials or other outcomes arising from my project work for the purposes of non-commercial teaching and research, including collaboration.

DECLARATION

I confirm:

- **That the work contained in this document has been composed solely by myself and that I have not made use of any unauthorised assistance.**
- **That the work has not been accepted in any previous application for a degree.**
- **All sources of information have been specifically acknowledged and all verbatim extracts are distinguished by quotation marks.**

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Abstract

The aim of this study is to develop a predictive model for machines used in the apparel manufacturing industry in Sri Lanka and elsewhere. The Apparel Manufacturing industry is heavily and entirely dependent on an expansive number of different machines and machine breakdowns driving production runs result in delivery delays leading to staggering financial losses to the organisation. Available literature on previous research reveal that the Sri Lankan apparel industry lacks a prediction solution to identify machine breakdown.

This research intends to find a correlation between the reasons for machine breakdown; the independent and dependent variables for the study, respectively, and thereby a Machine Learning based clustering model to predict machine breakdown. The research will also take an alternate approach of validating the variables applicability to each other through a Statistical Analysis. Hypotheses will be built with reference to the evidence learnt through the literature review.

Historical data relating to sewing machine downtime and the machine repository of ABC Company, have been used for the Machine Learning approach of this research. An empirical study with a quantitative approach has been taken where statistical analysis methods have been used to derive the correlation between the variables described in the conceptual model and how predictions can be derived from the same. Responses were collected from 200 participants for a Likert scale questionnaire containing 40 questions.

The Machine Learning techniques used for this research prove that Hierarchical clustering is the most suitable method for the purpose of this research and informative and thereby useful for the professionals in manufacturing. AdaBoost and Gradient Boosting yielded highest scores in terms of accuracy and Random Forest technique yielded close results. Thereby amongst the techniques evaluated in this research, these three techniques are concluded to be the most suitable Machine Learning model for this purpose.

In comparison of the two statistical models derived through the empirical approach, the Logarithmic Regression model proves to be a better choice for predicting machine downtime.

Keywords: Apparel Industry, Sri Lanka, Machine Learning, Statistical Analysis, Predictive Modelling