Aston University | College of Business and Social Sciences

REFERRED/DEFERRED COURSEWORK ASSIGNMENT

Coursework Title: Simulation of a supermarket operation

Task Details/Description: A typical/hypothetical supermarket has a total of 25 cash/checkout counters, 10 of which are self-checkout counters. Due to a shortage of staff, there are only 10 cashiers available to operate the manual cash counters. The customers arrive at the supermarket at a steady rate of 100 per hour. And the service times at the cash counters are those typically experienced at a supermarket. Also, the time spent by the customers in making their selection of items/goods is typically experienced at a supermarket. This supermarket operates 24 hrs.

The management of the supermarket is trying to optimize the staff at the cash counters. Their objective is also to minimize the waiting time for the customers at the cash counters (both manual and self-checkout). In trying to provide the solution, you are to propose a better alternative (scenario 2/ "to-be" scenario).

You are required to compare the results of the two scenarios; 1) "as-is" scenario based on the description above and 2) "to-be" scenario, your

proposed alternative solution using the confidence interval test/analysis. To do this, run the corresponding simulation models for 30 days and 20 replications in Arena. It would help if you collected relevant statistics from the simulation models.
(You need to clearly state your assumptions in the report)

Module Learning Outcomes Assessed:

1. Evaluate the technique of simulation modelling to a business problem.
2. Analyse the characteristics of a business system and build a conceptual model of that system.
3. Design a simulation study including data collection, modelling input data, building a computer model and output analysis.
4. An appraisal of statistical and model building software in order to provide information for decision making.

Presentation Requirements:

Word Count: 3000 words (+/- 10%), Font Size: 10-12pt, Line Spacing: 1.0 – 1.5

Submission Date & Time:

04 July 2025, 12.00 noon

Assessment Weighting for the Module: 100%

Assessment Criteria

This assessment will be assessed on the working Arena model and the written report, which will be assessed on the inclusion of the following:

- A brief introduction, including a description of the problem area you are focusing on.
- A clear description of the conceptual model, including a clear statement of objective(s), suitable diagram(s), inputs, outputs, model content: scope and detail, assumptions and simplifications. You should also include all necessary justifications and explanations for the modelling decisions made.
- Clear details of the verification and validation (V&V) processes carried out (including any results of these V&V processes, appropriate interpretation and details of any action taken).
- A brief documentation of your model (this can include a description in an appendix, so it is clear how it works).
- An investigation of the supermarket's operations as set out in the task details/description, using your Arena model. You should clearly explain the steps you have taken to ensure accurate results. You should also perform statistical tests that you think are appropriate.
- A clear and appropriate display, discussion and interpretation of your results. An explanation of their implications in terms of the problem and the objectives and thus a clear and appropriate presentation of your recommendations for the management.

The main body of the report should not be more than 3000 words (+/- 10%). In addition, an Appendix of no more than 10 pages may be included. The appendix and references are not included in the total word count. The appendix may include supporting material such as model documentation and relevant data analysis. Marks will be deducted for exceeding the word limit. Marks will be given for good report structure and the appropriate use of appendices.

The following is an explanation as to how marking criteria is applied to the subject specific assessment criteria used for this assignment.

80%+	Excellent understanding of the problem. You will have to put additional effort into doing independent research relevant to the assignment. The assumptions made in developing the simulation models are aligned with the research. You will have demonstrated comprehension of the chosen system issues about conducting the different aspects of the DES project. Any modelling decisions are correct, appropriate, and clearly explained and justified with the use of appropriate method(s). The presented work is of excellent to exceptional quality.
70%-79%	Provides all the assessment criteria material as specified and demonstrates excellent to complete understanding and comprehension of the chosen system issues in relation to conducting the different aspects of the DES project. The assumptions made in developing the simulation models are justified with relevant resources. Any modelling decisions are correct, appropriate, and clearly explained and justified with the use of appropriate method(s). The presented work is of excellent to exceptional quality.
60%-69%	Provides most of the assessment criteria material as specified and demonstrates good to very good understanding and comprehension of the chosen system issues in relation to conducting the different aspects of the DES project. The assumptions made in developing the simulation models are acceptable. There are only a few minor omissions or errors. Modelling decisions are mostly correct, appropriate, and mostly clearly explained and justified. Generally good

	appropriate structure, well presented, clearly written with good (or minor errors in) spelling/ grammar.
50%-59%	Provides some of the assessment criteria material as specified and demonstrates a basic/reasonable understanding and comprehension of the chosen system issues in relation to conducting the different aspects of the DES project. The assumptions made in developing the simulation models do not make any sense. Some minor omissions or errors. Most modelling decisions are made appropriately with reasonable clear explanations and justifications. Basic structure and generally clear presentation. Some spelling/ grammar errors, but do not significantly impede clarity of meaning.
Fail mark	Demonstrates little to almost no understanding and comprehension of the issues in relation to conducting different aspects of the DES project. The inputs in developing the simulation models are random and no thoughts are provided whatsoever. There are significant omissions or errors. Many incorrect modelling decisions without appropriate justifications/explanations. Poorly structured report, not clearly written with significant spelling/ grammar errors that impede clarity of meaning.

Ethical Requirements

No primary data collection is needed.

Essential Reading for Coursework Task
(if in addition to reading provided in the module outline):

You will find some relevant references on the module outline which you can use to start the project. However, you need to do your own research and look for more evidence to use for the project.