

ASSIGNMENT: Individual Report 2500 words

Module Code:	BMD0001
Module Title:	<i>Management Science Modelling</i>
Assessment Type (Initial)	<i>Individual report</i>
Academic Year	<i>2022-23 Autumn (Term 1 - Block 3)</i>

Assessment Task

Scenario:

Following your course completion, you have secured the role of Logistics Analyst in a leading manufacturing company, which owns four (4) manufacturing facilities (factories). These factories distribute three (3) products to their key customers (6 customers) directly as well as through four (4) warehouses. During initial meetings with your line manager, you have noticed that the company is struggling to manage its transportation network operations efficiently.

Your line manager has asked you to produce an executive report, which may help the company to understand the complexity of business operations and the significance of modelling techniques to reach to an optimal solution. The company is also interested to know more about benefits of using software solutions in this regard. In addition, your line manager has requested you to include an analysis from a linear programming model for the data set (given in a separate Excel file) to produce the optimal distribution of the product.

The following structure has been proposed for the executive report:

1. Introduction [500 words]

Using a review of academic literature, explain why the manufacturing company should consider using optimisation modelling in their business operations. (15 marks)

2. Linear programming model [1250 words]

Provide the mathematical model that would lead to an optimised delivery cost. Discuss in detail the approach used to develop the optimisation model using a dedicated computer software (Excel). (40 marks)

3. Result discussion [500 words]

Provide a critical evaluation of the model and the results obtained. (30 marks)

4. Benefits of Transportation Planning and Optimization software [250 words]

Explain the utility of EXCEL based Linear Programming optimisation models when compared with commercial software packages. (15 marks)

The abovementioned marking includes quality of the report, including structure, suitable tone and the use of references.

You are required to submit Excel file with the indicated solution on Brightspace along with your report.

Task specific guidance:

For task 1, you are expected to explain the purpose and application of optimisation modelling in any two relevant operational areas (for example, manufacturing and transportation planning etc.) given the nature of their complexities. You can make use of 4-6 academic references (literature) for this task.

For task 2, a mathematical model is required in this case. Explain the way in which the mathematical model is developed and implemented using a dedicated computer software (Excel). This model can be presented in relation to the transshipment model. Clear identification of variables, objective function and constraints are expected in this case. It is useful to paste Excel snapshots to your report.

For task 3, critical insights on your developed model and a dedicated discussion on the results obtained are expected in this case. The results refer to the final delivery cost, delivery plan and meeting the required constraints. The discussion should incorporate sensitivity analysis. It is useful to paste Excel snapshots to your report.

For task 4, you are expected to compare the merits and drawbacks of Excel with other commercially available optimisation software packages (Compare with at least two packages).

The assignment should be written in report format. Section headings may be added.

You are also required to submit the Excel solution file along with your report (Word document).

Aim to meet the overall word count. The word count does not include table of contents, abstract, list of references and appendices.

General study guidance:

- Cite all information used in your work which is clearly from a source. Try to ensure that all sources in your reference list are seen as citations in your work, and all names cited in the work appear in your reference list.
- Reference and cite your work in accordance with the APA 7th system – the University's chosen referencing style. For specific advice, you can talk to your Business librarians or go to the library help desk, or you can access library guidance via the following link:
 - APA 7th referencing: <https://library.hud.ac.uk/pages/apareferencing/>

- The University has regulations relating to academic misconduct, including **plagiarism**. The Learning Innovation and Development Centre can advise and help you with how to avoid 'poor scholarship' and potential academic misconduct. You can contact them at busstudenthub@hud.ac.uk.
- If you have any concerns about your writing, referencing, research or presentation skills, you are welcome to consult the Learning Innovation Development Centre team busstudenthub@hud.ac.uk. It is possible to arrange 1:1 consultation with a LIDC tutor once you have planned or written a section of your work, so that they can advise you on areas to develop.
- Do not exceed the word limit / time / other limit.

Assessment criteria

- The Assessment Criteria are shown the end of this document. Your tutor will discuss how your work will be assessed/marked and will explain how the assessment criteria apply to this piece of work. These criteria have been designed for your level of study.
- These criteria will be used to mark your work and will be used to support the electronic feedback you receive on your marked assignment. Before submission, check that you have tried to meet the requirements of the higher-grade bands to the best of your ability. Please note that the marking process involves academic judgement and interpretation within the marking criteria.
- The Learning Innovation Development Centre can help you to understand and use the assessment criteria. To book an appointment, either visit them on The Street in the Charles Sikes Building or email them on busstudenthub@hud.ac.uk

Learning Outcomes

This section is for information only.

The assessment task outlined above has been designed to address specific validated learning outcomes for this module. It is useful to keep in mind that these are the things you need to **show** in this piece of work.

On completion of this module, students will need to demonstrate:

1. Demonstrate a conceptual understanding of modelling and systems theories, principles of developing a business-related model and practices of management science modelling techniques using data.

2. Critically evaluate merits and drawbacks of different analytical approaches to modelling business systems
3. Formulate, verify and validate an appropriate modelling and optimisation methodology for the interrogation and utilisation of data in management science modelling.
4. Communicate analytical findings appropriately and
5. Utilise a range of software and datasets to develop and operationalise an appropriate methodology for the investigation of a problem in the field of management science modelling.

Please note these learning outcomes are **not** additional questions.

Submission information

Word Limit:	2500 words
Submission Date:	16 December 2022
Feedback Date:	30 January 2023
Submission Time:	15:00 UK time
Submission Method:	Electronically via module site in Brightspace. Paper/hard copy submissions are not required. For technical support, please contact: busvle@hud.ac.uk

Appendix 1 Assessment criteria

These criteria are intended to help you understand how your work will be assessed. They describe different levels of performance of a given criteria.

Criteria are not weighted equally, and the marking process involves academic judgement and interpretation within the marking criteria.

The grades between Pass and Merit should be considered as different levels of performance within the normal bounds of the module. The higher-level categories allow for students who, in addition to fulfilling the basic requirement, perform at a superior level beyond the normal boundaries of the module and demonstrate intellectual creativity, originality and innovation.

	Unacceptable			Unsatisfactory	Pass	Merit	Distinction		
	0 – 9	10-19	20-34	35-49	50-59	60-69	70-79	80-89	90-100
Fulfilment of relevant learning outcomes	Not met or minimal	Not met or minimal	Not met or partially met	Not met or partially met	Pass	Pass	Pass	Pass	Pass
Response to the question /task	No response	Little response	Insufficient response	Adequate response, but with limitations	Adequate response	Secure response to assessment task	Very good response to topic; elements of sophistication	Clear command of assessment task; sophisticated approach	Full command of assessment task; imaginative approach demonstrating flair and creativity

	Unacceptable A superficial answer with only peripheral knowledge of core material and very little critical ability			Unsatisfactory Some knowledge of core material but limited.	Pass A coherent and logical answer which shows understanding of the basic principles	Merit A coherent answer that demonstrates critical evaluation	Distinction An exceptional answer that reflects outstanding knowledge of material and critical ability		
	0-9	10-19	20-34	35-49	50-59	60-69	70-79	80-89	90-100
Conceptual and critical understanding of contemporary	Entirely lacking in evidence of knowledge and understanding	Typically, only able to deal with terminology,	Knowledge of concepts falls short of prescribed range	Marginally insufficient. Adequate knowledge of concepts within	A systematic understanding of knowledge; critical awareness of	Approaching excellence in some areas with evidence of	Excellent. Displays (for example): high levels of accuracy;	Insightful. Displays (for example): excellent research	Striking and insightful. Displays (for example): publishable

/ seminal knowledge in the subject		basic facts and concepts	Typically only able to deal with terminology, basic facts and concepts	prescribed range but fails to adequately solve problems posed by assessment	current problems and/or new insights; can evaluate critically current research and can evaluate methodologies	the potential to undertake Research. Well-developed relevant argument, good degree of accuracy and technical competence	evidence of the potential to undertake research; the ability to analyse primary sources critically.	potential; flexibility of thought; possibly of publishable quality.	quality; outstanding research potential; originality and independent thought; ability to make informed judgements.
Presentation	Length requirements may not be observed; does not follow academic conventions; language errors impact on intelligibility	Length requirements may not be observed; does not follow academic conventions; language errors impact on intelligibility	Length requirements may not be observed; does not follow academic conventions; language errors impact on intelligibility	Length requirement met and academic conventions mostly followed. Minor errors in language	Length requirement met and academic conventions mostly followed. Possibly very minor errors in language	Good standard of presentation ; length requirement met, and academic conventions followed	Very good standards of presentation	Professional standards of presentation	Highest professional standards of presentation
Understanding	Limited insight into the problem or topic	Limited insight into the problem or topic	Limited insight into the problem or topic	Some insight into the problem or topic	Practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in the discipline	Independent , critical evaluation of full range of theories with some evidence of originality	Authoritative, full understanding of all the issues with originality in analysis	Authoritative, full understanding of all the issues with originality in analysis	Authoritative, full understanding of all the issues with originality in analysis
Use of evidence and sources to support task	Some irrelevant and/or out of date Sources	Some irrelevant and/or out of date Sources	Some irrelevant and/or out of date Sources	Limited sources	Comprehensive understanding of techniques applicable to own research or advanced scholarship	Complex work and concepts presented, key texts used effectively	Full range of sources used selectively to support argument	Full range of sources used selectively to support argument	Full range of sources used selectively to support argument

Development of ideas	Argument not developed and may be confused and incoherent	Argument not developed and may be confused and incoherent	Argument not developed and may be confused and incoherent	Argument not fully developed and may lack structure	The argument is developed but may lack fluency	Argument concise and explicit	Coherent and compelling argument well presented	Coherent and compelling argument well presented	Coherent and compelling argument well presented
Depth of Reflection	Response demonstrates a lack of reflection on, or personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are missing, inappropriate, and/or unsupported. Examples, when applicable, are not provided.	Response demonstrates a lack of reflection on, or personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are missing, inappropriate, and/or unsupported. Examples, when applicable, are not provided.	Response demonstrates a lack of reflection on, or personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are missing, inappropriate, and/or unsupported. Examples, when applicable, are not provided.	Response demonstrates a minimal reflection on, and personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are unsupported or supported with flawed arguments. Examples, when applicable, are not provided or are irrelevant to the assignment.	Response demonstrates reflection on, and personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are generally supported. Some relevant examples, when applicable, are provided.	Response demonstrates a general reflection on, and personalization of, the theories, concepts, and/or strategies presented in the course materials to date. Viewpoints and interpretations are supported. Appropriate examples are provided, as applicable	In-depth reflection on, and personalization of, the theories, concepts, and/or strategies presented. Extensive evidence of analysis through questioning and challenging of assumptions leading to transformation of personal insight. Some evidence of reflexivity and self-development. Well supported by clear, detailed examples as applicable.	In-depth reflection on, and personalization of, the theories, concepts, and/or strategies presented. Extensive evidence of analysis through questioning and challenging of assumptions leading to transformation of personal insight. Evidence of reflexivity and self-development. Well supported by clear, detailed examples as applicable.	In-depth reflection on, and personalization of, the theories, concepts, and/or strategies presented. Extensive evidence of analysis through questioning and challenging of assumptions leading to transformation of personal insight. Substantial evidence of reflexivity and self-development. Well supported by clear, detailed examples as applicable.

	Lacking evidence of having addressed the issue of innovative solutions	Lacking evidence of the provision of any innovative solutions	Lacking evidence of the provision of any feasible innovative solutions	Minimal Evidence of the provision of innovative solutions	Evidence of the provision of innovative solutions	Evidence of the provision of innovative solutions which demonstrate assessment of situation and effectiveness of solutions	Evidence of the provision of innovative solutions which demonstrate assessment of situation and effectiveness of solutions	Extensive evidence of the provision of imaginative innovative solutions which demonstrate assessment of situation and critical evaluation of effectiveness of solutions	Extensive evidence of the provision of imaginative innovative solutions which demonstrate full assessment of situation and critical evaluation of effectiveness of solutions
Innovation	Lacking evidence of having addressed the issue of innovative solutions	Lacking evidence of the provision of any innovative solutions	Lacking evidence of the provision of any feasible innovative solutions	Minimal Evidence of the provision of innovative solutions	Evidence of the provision of innovative solutions	Evidence of the provision of innovative solutions which demonstrate assessment of situation and effectiveness of solutions	Evidence of the provision of innovative solutions which demonstrate assessment of situation and effectiveness of solutions	Extensive evidence of the provision of imaginative innovative solutions which demonstrate assessment of situation and critical evaluation of effectiveness of solutions	Extensive evidence of the provision of imaginative innovative solutions which demonstrate full assessment of situation and critical evaluation of effectiveness of solutions
Personal perspective	No evidence of any attempt or consideration of a personal perspective.	Attempts to express a personal perspective lack any relevance.	Attempts to express a personal perspective are only loosely relevant	Personal perspective is expressed and has some relevance.	Personal perspective expressed is clearly relevant and some justification is provided.	Personal perspective expressed is clearly relevant and justified with critical reasoning.	Personal perspective expressed is clearly relevant and justified with critical reasoning which provides clear assumptions and strength of position in	Personal perspective expressed is clearly relevant and justified with critical reasoning which provides clear assumptions and strength of position in	Personal perspective expressed is clearly relevant and justified with critical reasoning.

							relation to others.	relation to others.	
Autonomy	No evidence of any autonomous action considered or taken	Evidence of autonomous action considered but not implemented	Evidence of autonomous action uncritically or superficially implemented	Evidence of some relevant autonomous action	Demonstrates ability to implement tasks autonomously	Demonstrates ability to implement tasks autonomously	Demonstrates ability to use initiative, implement tasks autonomously and sustain actions to a conclusion.	Demonstrates ability to use initiative, develop creative solutions, implement tasks autonomously and sustain actions to a conclusion.	Demonstrates ability independently innovate, to use initiative, develop creative solutions, implement tasks autonomously and sustain actions to a conclusion.
Ethics, sustainability & Responsibility (subject area)	Not considered or no relevance	Consideration at a superficial level with minimal relevance to subject.	Considered with relevant solutions identified but no detail relevant to the subject.	Considered with relevant solutions identified but little detail relevant to the subject.	Considered with relevant solutions identified and adequate detail relevant to the subject.	Wide consideration relevant solutions identified and appropriate detail relevant to the subject.	Full consideration of implications for subject with range of solutions discussed in detail.	Full consideration of implications for subject with extensive range of solutions discussed in detail.	Full consideration of implications for subject with full range of solutions discussed in detail.
Ethics, sustainability & Responsibility (professional practice)	Not considered or no relevance	Consideration at a superficial level with minimal relevance shown to professional practice.	Considered with relevant solutions identified but no detail relevant to professional practice.	Considered with relevant solutions identified but little detail relevant to professional practice.	Considered with relevant solutions identified and adequate detail relevant to professional practice.	Wide consideration relevant solutions identified and appropriate detail relevant to professional practice.	Full consideration of implications for professional practice with range of solutions discussed in detail.	Full consideration of implications for professional practice with extensive range of solutions discussed in detail.	Full consideration of implications for professional practice with full range of solutions discussed in detail.