Assignment Brief and Front Sheet PGT

This front sheet for assignments is designed to contain the brief, the submission instructions, and the actual student submission for any WMG assignment. As a result the sheet is completed by several people over time, and is therefore split up into sections explaining who completes what information and when. Yellow highlighted text indicates examples or further explanation of what is requested, and the highlight and instructions should be removed as you populate 'your' section.

This sheet is only to be used for components of assessment worth more than 3 CATS (e.g. for a 15 credit module, weighted more than 20%; or for a 10 credit module, weighted more than 30%).

To be <u>completed</u> by the <u>student(s)</u> prior to final submission:
Your actual submission should be written at the end of this cover sheet file, or attached with the cover sheet at the front if drafted in a separate file, program or application.

| **Student ID or IDs for group work** | 5569029 |

To be <u>completed</u> (highlighted parts only) by the <u>programme administration</u> after approval and prior to issuing of the assessment; to be <u>consulted</u> by the <u>student(s)</u> so that you know how and when to submit:

Date set	14th October 2024
Submission date (excluding extensions)	16th December 2024 @ 12.00 noon (UK Time)
Submission guidance	Submission via link on Tabula
Marks return date (excluding extensions)	22nd January 2025
Late submission policy	If work is submitted late, penalties will be applied at the rate of **5 marks per University working day** after the due date, up to a **maximum of 10 working days** late. After this period the mark for the work will be reduced to 0 (which is the maximum penalty). "Late" means **after the submission deadline time as well as the date** – work submitted after the given time even on the same day is counted as 1 day late. For **Postgraduate** students only, who started their **current course before 1 August 2019**, the daily penalty is **3 marks** rather than 5.
Resit policy	If you fail this module and/or component, the University allows students to remedy failure (within certain limits). Decisions to authorise resits are made by Exam Boards. These will be issued at specific times of the year, depending on your programme of study. More information can be found from your programme office if you are concerned. If this is **already a resit** attempt, this means you will not be eligible for an additional attempt. The University allows as standard a maximum of two attempts on any assessment (i.e. only one resit). Students can

| | only have a third attempt under exceptional circumstances via a Mitigating Circumstances Panel decision. |

To be <u>completed</u> by the <u>module leader/tutor</u> prior to approval and issuing of the assessment; to be <u>consulted</u> by the <u>student(s)</u> so that you understand the assignment brief, its context within the module, and any specific criteria and advice from the tutor:

Module title & code	WM999-15 SPA 24/25 A1FT
Module leader	Dr Maryam Masood
Module tutor	Dr Maryam Masood Dr Asima Iqbal Ninna Makrinov Dr Lauren Schrock Dr Poonam Aulak
Assessment type	Essay
Weighting of mark	30%

Assignment brief
You are required to write a 1200-word mini literature review on one of the three provided topics from your discipline. You can view the list of topics on SPA Moodle via this link: https://moodle.warwick.ac.uk/course/view.php?id=64727 (under the section Assessments) For your mini literature review on your selected topic, you must select **at least** three research articles published in non-predatory journals that are relevant to your selected topic. Your mini literature review must contain: • An **introduction** to your review that contains a justification for the selected topic and an aim of the research/review • The **main body** should be organized in a coherent way that includes a synthesis and critical evaluation of existing research (i.e. the research articles you have selected). You should aim to provide a critical analysis of key themes, and findings of the articles selected. Your literature review will be assessed on relevance of selected articles, depth of synthesis and critical analysis, and evaluation of credibility of your selected sources. • A **conclusion** to your review that summarises the key points, restates the significance of your research aim, and proposes directions for advancing the research on your selected topic Note that academic writing and academic integrity of this assignment are assessed. At Master's level, academic integrity is a requirement for all of your work, including this assignment. Therefore, you need to consistently apply the Harvard referencing style throughout your assignment, including citations and reference list. You may use additional academic literature to support your arguments. Remember you can review the Academic Integrity guidance in Study

Skills on the SPA Moodle site if you have any concerns about how to correctly use the Harvard style.

Academic writing and presentation are also important qualities of a successful assignment. Review the Academic Writing guidance in Study Skills and Communication in Professional Skills to ensure you are presenting your work in a high quality, clear, and structured way that can be appreciated in the first reading.

To maintain the academic integrity of your work, for the purpose of this assignment, you must not use any GAIT (Generative Artificial Intelligence Tools) in the preparation, composition, or checking of this assignment.

Word count	This essay is limited to 1200 words. You are allowed to go above or below the word count by 10%. The marker will stop reading your essay after 1320 words. Tables, figures, and mind maps are not included in the word count. The reference list is not included in the word count.
Module learning outcomes (numbered)	1. Critically evaluate a research problem and draw conclusions from it using literature 2. Communicate critical analysis and evaluation of research effectively in verbal and written format 3. Select appropriate research design and methodologies for complex problems providing clear rationale for selected approaches 4. Analyse ethical issues involved in a research design 5. Design a feasible research project to be completed in limited time and resources
Learning outcomes assessed in this assessment (numbered)	1. Critically evaluate a research problem and draw conclusions from it using literature 2. Communicate critical analysis and evaluation of research effectively in verbal and written format
Marking guidelines	Please see grid at the end of the document
Academic guidance resources	The SPA Moodle site contains information on Study and Professional Skills that will help you to complete this assignment. See the SPA reading list for recommended sources.

	To help you achieve your potential, remember you can review additional guidance on this assignment in the 'Assessment' block of the SPA Moodle site.

Where to get help:

1. Talk to your module tutor if you don't understand the question or are unsure as to exactly what is required.
2. Study, Professional and Analytical Skills (SPA) Moodle site – we have a lot of resources on this website with workbooks, links and other helpful tools. https://moodle.warwick.ac.uk/
3. There are also numerous online courses provided by the University library to help in academic referencing, writing, avoiding plagiarism and a number of other useful resources. https://warwick.ac.uk/services/library/students/your-library-online/
4. If you have a problem with your wellbeing, it is important that you contact your personal tutor or wellbeing support services https://warwick.ac.uk/services/wss

Criteria	80 and above	79-70	69-60	59-50	49-40	39 and below
Justification for the selected topic and aim of the research (25%)	The topic is **justified exceptionally well**, demonstrating a **deep understanding** of its significance within the discipline. The aim of the research is **extremely clear**, **precise, and well-formulated**. The introduction is engaging and sets **an excellent foundation** for the review.	The topic is **well-justified** demonstrating a **strong understanding** of its relevance within the discipline. The aim of the research is **clear**, **precise and well-defined**. The introduction is well-written and provides a **strong foundation** for the review.	The topic **is justified** demonstrating a **good understanding** of its relevance within the discipline. The aim of the research **is clear but may lack precision**. The introduction is clear and provides a **good foundation** for the review.	The topic **is justified but may not clearly demonstrate** relevance within the discipline. The aim of the research i**s stated but lacks clarity** or precision. The introduction is adequate but **does not present a solid foundation** for the review.	The topic is **poorly justified** with limited relevance within the discipline. The aim of the research **is unclear or poorly formulated**. The introduction is weak and **does not fully provide a foundation for the review.**	The topic **is not justified** for its relevance within the discipline. The aim of the research i**s vague and poorly defined**. The introduction is confusing and **fails to set up the review**.

Credibility of selected articles and critical evaluation of existing research to identify key themes and findings of the selected articles (50%)	An **exceptional synthesis and critical evaluation** of the selected research articles is presented. There is **excellent identification and analyses** of key themes and findings are presented with **exceptional depth**. The review demonstrates **originality in thought and a thorough understanding** of existing research. All arguments are **exceptionally well-structured and articulated**.	A **well-developed synthesis and critical evaluation** of the selected research articles is presented. There is a **strong identification, and analyses** of key themes and findings are clearly presented. The review demonstrates a **clear understanding** of existing research with **some originality in thought**. Arguments are **well-structured and clearly presented**.	A **good synthesis and critical evaluation** of the selected research articles is presented. There is **good identification and analysis** of key themes and findings that **may be presented with reasonable** depth. The review demonstrates a **good understanding** of existing research. Arguments are **mostly well-structured and clear**.	A **satisfactory synthesis and evaluation** of the selected research articles is presented. There is **identification of key themes and findings, but it lacks depth or critical analysis**. The review demonstrates a **satisfactory understanding of existing research**. Arguments are **adequately structured but may lack clarity**.	A **weak synthesis and limited evaluation** of the selected research articles is presented. There is **limited identification of some themes and findings** with **weak analysis**. The review demonstra**tes limited understanding of existing research**. Arguments are **poorly structured and lack clarity**.	No or limited **synthesis or evaluation** of the selected research articles is presented. There is **no identification of themes and minimal analysis**. The review demonstrates a **poor understanding of existing research**. Arguments are **difficult to understand**.

Summary of key findings and proposal for further research on this topic (15%)	An **exceptional summary** of key point is presented. The **proposal for further research is excellent** and very **relevant** to the topic.	A **strong summary** of key point is presented. The **proposal for further research is strong** and **relevant to the topic.**	A **good summary** of key point is presented. The **proposal for further research is good** and **may be relevant to the topic**.	A **satisfactory summary** of key point may be presented. A **proposal for further research maybe presented** with **some relevance to the topic.**	A **weak summary** of key points may be presented. There is **limited direction for further research**.	**No summary** of key points is presented. There is **no proposal for further research**.

Academic Integrity (5%)	A **variety of credible sources** are used throughout the document. There are **no errors in the referencing** of sources in the Harvard style. This is **an exceptional example** of academic integrity.	**Credible sources are used** throughout the document. There are **no errors in the referencing** of sources in the Harvard style. This is a **strong example** of academic integrity.	**Credible sources** are used throughout the document. There are **minor errors in the referencing** of sources in the Harvard style. This is **a good example** of academic integrity.	Sources appear on the document, and **majority are credible**. There **may be some errors** in the referencing of sources in the Harvard style. This is a **fair example** of academic integrity.	**Few credible sources** are used in the document, and other sources **may be of questionable quality**. There **may be major errors** in the referencing of sources in the Harvard style and/or a **few sources are missing.**	**Limited or no credible sources** are used in the document, or **all sources are of questionable quality**. Sources are **consistently not referenced correctly** in the Harvard style and/or missing

Academic Writing (5%)	Exceptional **communication skills** evident throughout the document. The document is **well-structured** and all points can be appreciated in the first reading.	Strong **communication skills** evident throughout the document. The document is **well-structured** and most points can be appreciated in the first reading.	Good **communication skills** evident throughout the document though there **may be minor issues**. The document is **well-structured** and main points can be appreciated in the first reading.	Fair **communication skills** evident throughout the document though there **may be issues that cause some confusion**. The document is **structured though some points may be difficult to follow** at times. The document may require some re-reading.	Poor **communication skills** evident throughout the document that **cause serious confusion**. The document **lacks structure and is difficult to follow** majority of the time. The document may require serious re-reading	Poor **communication skills** evident throughout the document that **prevent understanding**. The **document is unstructured** and is overall difficult to follow

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List of Figures

Abbreviations –

1. LSS – Lean Six Sigma
2. VSM – Value Stream Mapping
3. DMAIC – Define Measure Analyze Improve Control

Applications of Lean Six Sigma for Sustainability

1.0 Introduction –

As the environmental challenges and global competition is rapidly increasing, sustainability has now become a key priority for the industries around the world. Sustainability mainly focuses on reducing environmental impact while improving the efficiency and leading to various improvement methods. One of these methods used to achieve the sustainability target is Lean Six Sigma. LSS is a combination two different terms, Lean and Six Sigma where Six Sigma was developed by a Motorola Engineer 'Bill Smith' whilst Lean was introduced by Toyota Production System (Kalkar and Chitanand 2018). Lean philosophy focuses on producing products of highest quality at lowest cost and in shortest time whereas Six Sigma aims to reduce the defects using statistical tools (Patel and Patel 2021). However, there are few limitations to this approach as well, there's still a lack of balance within the triple bottom line approach. Also, the organizational support and resistance to change can also be the major barriers (Erdil, Aktas et al. 2018).

This review will outline four key resources on how LSS is applied to promote sustainability. It discusses how LSS has been adapted and applied in support of sustainable practices, shares a practice example of successful case study and identifies limitations and critiques faced when trying to integrate LSS with Sustainability.

2.0 Main Body –

Lean Six Sigma (LSS) has now being well recognized as a strategic tool for addressing sustainability challenges in modern industries. By combining Lean principles, which focus on waste reduction with Six Sigma's significance on minimizing process variability, LSS helps to improves operational efficiency while aligning with sustainability goals. The framework, particularly the *DMAIC* cycle *Define, Measure, Analyse, Improve, Control*, and tools such as the **Sustainability Goal Tree** and **Cause and Effect Matrix**, offer structured methods to achieve long term profitability and sustainability. Increasing sigma levels significantly reduces defects, with a Six sigma level 6 achieving 99.9997% defect free products, which can be said **3.4 defects per million** opportunities, minimizing waste and boosting efficiency (Kalkar and Chitanand 2018). Additionally, according to (Erdil, Aktas et al. 2018) LSS can deliver major sustainability benefits including improved efficiency, reduced emissions and enhanced economic performance by integrating sustainability objectives into operational improvements. The below mentioned image displays the 5 Phases of LSS often referred as DMAIC.

Figure. 1 DMAIC Process {Rodriguez, 2024 #80}.

In addition to that, (Titmarsh, Assad et al. 2020) also praise the adaptability of LSS in order to achieve sustainability due to its structured DMAIC framework. According to him, this framework can incorporate with sustainability matric into improvement projects and allows organization to identify environmental concerns while maintaining operational efficiency. Furthermore, he adds the integration of industry 4.0 technologies, such as IoT and predictive analytics with LSS provides real time monitoring and adaptive process control further enhancing the sustainability initiatives. Moreover, (Erdil, Aktas et al. 2018) talks about one of the LSS tools **Value Stream Mapping** (VSM). Further says, VSM has been highlighted for their ability to identify and reduce waste in process, making it a valuable addition for achieving sustainability goals. For instance, VSM enables organizations to identify inefficiencies and areas where time, energy or material are being wasted. By addressing these inefficiencies, companies can further improve their efficiency while supporting their sustainability goal.

2.1 Practical Example of LSS for Sustainability -

A practical example of an automotive company which has been using LSS from past 15 years is mentioned by Kowang, Yong et al. (2016). According to their case study, an automotive company successfully implemented LSS for over 15 years to drive sustainable business improvements. To maintain their competitive advantage, the company utilized LSS as its primary business improvement tool. The study says that the company sustained its LSS initiatives by implementing sustainability into their operations and were mainly focusing on continuous improvements and innovative culture. Furthermore, they highlighted **5** critical factors which helped LSS to become

an option for sustainability**. Continuous Improvement, Innovative Culture, Management Team's Approach, Employee Knowledge about LSS** and **Clear Communication**. The study concludes that the successful application of LSS for a long period shows its potential as tool for achieving sustainability in a competitive business environment. By integrating economic, social and environmental objectives into core operations, the company not only maintained but improved its performance and market position.

2.3 Limitations and critiques of LSS for Sustainability –

Despite of having such massive potential for sustainability, LSS has some notable limitations when applied to sustainability approaches. One major and significant critique made by Titmarsh, Assad et al. (2020) is that LSS was originally developed for optimizing productivity, reduce cost and operational efficiency rather than to be used directly to address environmental concerns which surely restricts the ability of LSS to fully integrate with sustainability goals. Furthermore, the focus of most research remains on product life cycle and not on the system life cycle which again limits the applicability of Lean Six Sigma for Sustainability.

In addition to that critique, (Erdil, Aktas et al. 2018) also uncovers some limitations to this approach. He adds, one more key critique of LSS in order to achieve sustainability. Its tendency is to focus primarily on environmental and economic dimensions but still it misses out on social aspect of triple bottom line. This major aspect limits the impact of LSS to be used for sustainability. Furthermore, the insufficient organizational support, limited funding and resources and resistance to change within companies all of these aspects cannot be looked over. According to him, these can be some major barriers to consider LSS for long term sustainability.

3.0 Conclusion –

In conclusion, LSS has shown huge potential to contribute in sustainability program as it helps to offer better efficiency resources, better waste reduction and alignment with operation processes. Tools such as Value Stream Mapping and the DMAIC framework provide structured approaches to sustainability and further integration with IoT and Artificial Intelligence to improve its adaptability. However, its traditional focus on productivity and cost reduction orientation it has limited application to social dimension of triple bottom line which reduces its overall impact. Additionally, challenges such as resistance to change, lack of organizational support and difficulties in integrating sustainability requirements work as a barrier. Despite these barriers, LSS remains a valuable methodology and further research into frameworks like Green Lean Six Sigma (GLSS) is necessary to fill these gaps and make it even more effective for sustainability.

3.1 Future Direction –

Although there has been limited research done to combine the two different terms of Lean Six Sigma and sustainability, Still there are areas where improvement can be done. Future directions of research on LSS for sustainability should be directed more towards developing integrated frameworks such as Green Lean Six Sigma to maintain the balance between environmental, social and economic dimension. Also, integration of LSS with IoT and AI will potentially improve real time monitoring and predictability of sustainability. Moreover, the neglected social dimension of triple bottom line will further need major attention.

4.0 References

Erdil, N. O., et al. (2018). "Embedding sustainability in lean six sigma efforts." Journal of Cleaner Production **198**: 520-529.

Kalkar, P. and A. Chitanand (2018). "Dealing the sustainability challenges with Lean Six Sigma framework." International Journal of Management **9**(3).

Kowang, T., et al. (2016). "Lean six sigma sustainability framework: a case study on an automotive company." Asian Journal of Scientific Research **9**(5): 279-283.

Patel, A. S. and K. M. Patel (2021). "Critical review of literature on Lean Six Sigma methodology." International Journal of Lean Six Sigma **12**(3): 627-674.

Titmarsh, R., et al. (2020). "Contributions of lean six sigma to sustainable manufacturing requirements: an Industry 4.0 perspective." Procedia Cirp **90**: 589-593.