University of the West of Scotland

School of Computing, Engineering and Physical Sciences

MSc Masters Project Specification

Student name:

Banner ID:

Email:

Project being undertaken on part-time or full-time basis:

MSc Programme (specify the specialist pathway, if any):

MSc Programme Leader:

Project Title:

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| **Impact of Project Management Methodologies on IT Project Performance** |

Research Question to be answered:

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| * How do Agile, Waterfall, and Hybrid project management methodologies impact IT project performance in terms of cost, timeline, and success rate? * Which project management methodology results in better cost efficiency and timeline adherence? * Does project complexity influence the effectiveness of a specific project management methodology? * What are the key factors that determine the most suitable methodology for a given IT project? |

Overview, Justification and overall aim of project:

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| **1. Overview**  Project management methodologies create step-by-step procedures to guide IT project planning execution and monitoring. Within the business industry three main methodologies known as Agile and Waterfall and Hybrid stand out as widespread frameworks which demonstrate specific strengths and limitations (Baby, 2024). The agile framework works iteratively to provide flexibility along with persistent feedback yet waterfall projects complete basic steps sequentially for thorough documentation and initial planning strategy development. Hybrid project methodologies try to find middle ground between formal waterfall models and agile practices so teams can choose execution methods which suit their particular requirements (Diem, 2021). Organizations who want optimal efficiency with successful project outcomes need to understand the effects of these project management approaches.  IT projects for many years have dealt with multiple performance issues that involved budgetary problems as well as deadline delays and unfulfilled stakeholder expectations. Project management methodology selection acts as a crucial determinant for many of these difficulties that projects face. Agile methodology works best for flexible organizations while Waterfall protects structured projects yet organizations often seek a combination of both approaches (Mahadevan et al., 2015). Using historical project data this research establishes empirical evidence about methodology success rates to guide organizations throughout their project development process.  **2. Justification**  An increasing level of IT project complexity requires critical evaluation of project management methodologies through data-driven assessment methods. The process to identify optimal methodology for business projects results in numerous organizational difficulties that create both inefficiencies and expense growth along with intensified project failure rates (Kirpitsas and Pachidis, 2022). Understanding how project methodologies match project features like scope and timeline is essential because each project needs unique support. This study addresses a major research void through statistical evaluations of project performance data that yields comparative analytic findings.  Businesses are always exploring new approaches to deliver better project results by applying proven project management best practices. Studies of traditional project management rely on subjective project manager judgments to evaluate methodologies by performing qualitative methodology examinations (Cicmil et al., 2006). The research adopts a quantitative assessment which bases its findings on statistical tests that validate hypotheses to attain objective outcomes. The findings of these results offer a valuable insight to IT managers, policy makers and researches through which they can gain knowledge about which project technique delivers the best outcomes in terms of the particular project scenario.  **3. Overall Aim of Project**  This research investigates the IT project performance based upon the performance of Agile project management when compared to Waterfall project management and Hybrid project management systems. According to Musawir et al. (2017), this research examines success parameters of key project, such as cost effectiveness and timeline adherence; stakeholder satisfaction and governance efficiency to determine the method that yields the best results. In this study through detailed statistical examination this current understanding about method of selection will be reformed to allow project managers to adopt data-based solutions to suit their individual project requirements.  This paper tries to enable, through the development of an analytical framework to consolidate the field of IT project management with a standardised assessment method of project methodologies (Joslin and Müller, 2016). The result of this research give IT professionals some strategies of how to make their project execution strategies more effective in terms to reduce risks but increase project success rates. Using the Python based statistical methods, the study produces robust results to improve industrial project excellence, as well as academic exploration. |

Objectives:

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| **Objectives:**   * To examine the relationship between project management methodologies and key performance metrics such as cost, timeline, and success rate. * To identify which methodology is most effective for different types of IT projects based on complexity and other influencing factors. * To conduct statistical hypothesis testing to determine whether the differences between methodologies are significant. * To provide actionable recommendations for IT project managers and organizations to improve project success rates. |

Methodology:

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| Research employs a quantitative approach that combines data collection, statistical analysis and graphic representation of Python in order to study methodologies of project management. The structured dataset consists of project performance indicators for time on schedule (including length and allocation of cost) and stakeholder interaction and governance metrics. Hypothesis testing including ANOVA and t tests as well as regression modelling are used as consideration to the research in order to discover important analysis patterns and statistical connections. Data preprocessing methods such as feature selection, data normalization handling of missing values etc. will help in preprocessing databases which will remove missing points and normalize the distribution of data to assure of data reliability. To create visualizations which provide certain insights about the performance measurements of Agile and Waterfall and Hybri project development approaches, the research uses Python libraries Matplotlib, Seaborn, and Plotly.   * **Data Collection:**   + A dataset including project performance results from both Agile and Waterfall and Hybrid methodologies serves as the basis for this analysis.   + Project execution variables consist of timeline aspects alongside budget totals and success measurement metrics in addition to stakeholder relationships governance procedures and operational performance measurements. * **Data Preprocessing:**   + Prior to running statistical analysis, normalize the data then resolve any inconsistencies and address missing values across the dataset. * **Data Analysis:**   + Perform **descriptive statistics** to summarize key trends.   + Hypothesis testing with ANOVA and t-tests identifies what statistical differences exist among different project management methodologies.   + A regression analysis to be conducted for examining associations between research methodologies and organizational success elements. * **Visualization:**   + Utilize Python libraries such as Matplotlib, Seaborn, and Plotly to create interactive visualizations that illustrate key findings. |

Work Plan:

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Relationship of proposed project to MSc programme/stream

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| The MSc IT (Project Management) program supports this project through data analytics which help evaluate project management strategies. The research combines core principles of IT project management alongside statistical methods and data visualization tools to measure Agile and Waterfall and Hybrid project methodologies. Behavioral testing and real-world evaluations of project metrics help improve knowledge about how projects meet financial goals along with timing demands and how well they fulfill stakeholder needs. The study will produce evidence-based results that lead to actionable recommendations for project management professionals and organizations interested in optimizing their approaches while achieving improved project success. |

Indicative reading list (references to be correctly presented) and resources (hardware, software, etc.)

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| **References:**  Abdulla, H. and Al-Hashimi, M., 2019. The impact of project management methodologies on project success: A case study of the oil and gas industry. *Journal of Engineering, Project, and Production Management*, *9*(2), pp.115-125.  Al-Hajj, A. and Zraunig, M., 2018. The impact of project management implementation on the successful completion of projects in construction. *International Journal of Innovation, Management and Technology*, *9*(1), pp.21-27.  Baby, M., 2024. Hybrid agile in software engineering: a systematic literature review.  Badewi, A., 2016. The impact of project management (PM) and benefits management (BM) practices on project success: Towards developing a project benefits governance framework. *International journal of project management*, *34*(4), pp.761-778.  Brown, A. and Adams, J., 2000. Measuring the effect of project management on construction outputs: a new approach. *International Journal of project management*, *18*(5), pp.327-335.  Cicmil, S., Williams, T., Thomas, J. and Hodgson, D., 2006. Rethinking project management: researching the actuality of projects. International journal of project management, 24(8), pp.675-686.  Ciric Lalic, D., Lalic, B., Delić, M., Gracanin, D. and Stefanovic, D., 2022. How project management approach impact project success? From traditional to agile. *International Journal of Managing Projects in Business*, *15*(3), pp.494-521.  de Carvalho, M.M., Patah, L.A. and de Souza Bido, D., 2015. Project management and its effects on project success: Cross-country and cross-industry comparisons. *International journal of project management*, *33*(7), pp.1509-1522.  Diem, G., 2021. Agile and traditional project management: comparing agile, traditional and hybrid project management practices (Doctoral dissertation, Heriot-Watt University).  Joslin, R. and Müller, R., 2015. Relationships between a project management methodology and project success in different project governance contexts. *International journal of project management*, *33*(6), pp.1377-1392.  Joslin, R. and Müller, R., 2016. The impact of project methodologies on project success in different project environments. International journal of managing projects in business, 9(2), pp.364-388.  Joslin, R. and Müller, R., 2016. The impact of project methodologies on project success in different project environments. *International journal of managing projects in business*, *9*(2), pp.364-388.  Kirpitsas, I.K. and Pachidis, T.P., 2022. Evolution towards hybrid software development methods and information systems audit challenges. Software, 1(3), pp.316-363.  Mahadevan, L., Kettinger, W.J. and Meservy, T.O., 2015. Running on hybrid: Control changes when introducing an agile methodology in a traditional “waterfall” system development environment. Communications of the Association for Information Systems, 36(1), p.5.  Pace, M., 2019. A correlational study on project management methodology and project success. *Journal of engineering, project, and production management*, *9*(2), p.56.  Patanakul, P., Iewwongcharoen, B. and Milosevic, D., 2010. An empirical study on the use of project management tools and techniques across project life-cycle and their impact on project success. *Journal of General management*, *35*(3), pp.41-66.  Rozenes, S., 2013. The impact of project management methodologies on project performance. In *Perspectives and Techniques for Improving Information Technology Project Management* (pp. 14-23). IGI Global.  Ul Musawir, A., Serra, C.E.M., Zwikael, O. and Ali, I., 2017. Project governance, benefit management, and project success: Towards a framework for supporting organizational strategy implementation. International Journal of Project Management, 35(8), pp.1658-1672.  **Software & Tools:**   * **Python** (Pandas, NumPy, Matplotlib, Seaborn, SciPy, Statsmodels) * **Jupyter Notebook/PyCharm** for coding and data analysis * **Excel** for preliminary data review * **Google Scholar, IEEE Xplore** for literature review |

Marking scheme

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| * **Introduction:** 10% * **Literature Review:** 20% * **Research Design:** 15% * **Data collection and analysis (practical work):** 35% * **Conclusions and Recommendations:** 10% * **Critical Self-Evaluation:** 10% |

Supervisor

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Moderator

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Programme Leader

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Date specification submitted

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Please complete the ‘ethics’ & pathway confirmation form below for all projects.

**School of Computing, Engineering and Physical Sciences**

**MSc Masters PROJECT – REQUIREMENT FOR ETHICAL APPROVAL & PATHWAY CONFIRMATION**

**SECTION 1: TO BE COMPLETED BY THE STUDENT**

Does your proposed research involve: research with human subjects (including requirements gathering and product/software testing), access to company documents/records, questionnaires, surveys, focus groups and/or other interview techniques? Does your research entail any process which requires ethical approval? (please enter √ in the appropriate box)

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| YES |  | **You must submit an application for approval to the Ethics Review Manager** |
| NO | **√** | You do not need to submit an application to the Ethics Review Manager |

I confirm that the above project specification aligns with my MSc programme specialist pathway. (please enter √ in the box)

**√**

**Name of Student (Print name):**

**Signature:**

**Date:**

**SECTION 2: TO BE COMPLETED BY THE PROJECT SUPERVISOR**

I understand that the above project requires/does not require\* ethical approval (\*please delete as appropriate).

I confirm that the above project aligns with the MSc programme specialist pathway the

student is enrolled in. (please enter √ in the box)

**Supervisor (print name):**

**Signature**:

**Date:**

**IMPORTANT: please note that by signing this form all signatories are confirming that any potential ethical issues have been considered and, where necessary, an application for ethical approval has been/will be made via the Ethical Review Manager software.**

**Any project requiring ethical approval but which has not been given approval will not be accepted for marking.**

**Ethical approval cannot be sought in retrospect.**