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Critical evaluation of waterfall project management methodology: A case study of digital management conference project

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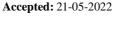Corresponding Author: **Taiwo Samuel Aina**

Abstract

The aim of this research is to demonstrate understanding of waterfall methodology project management and critically evaluate it in a digital management conference project. There are five steps to waterfall methodology which include requirement, design, execution, verification and deployment. The project mandate from the digital delivery magazine was used to identify the requirement for a Digital Management conference, after which logical and physical design was completed before the project was executed and verified. The deployment phase will take place on October 18, 2022, the opening day of the conference. Through a detailed definition of the project quality at the start of the project, the Waterfall approach assisted in achieving the goal of enhancing the prominence of digital delivery magazine through the Digital Management Conference project. However, waterfall methodology still has some gaps such as unforeseen errors during the course of drafting the requirements which could change the methodology's dynamic whereas software-based methodologies, such as agile, have all the details embedded in the software. The author recommends that future work include an Agile approach-based methodology. This would enable for comparison and investigation of the consequences of an agile approach.

1. Introduction

Project management is the most significant aspect for the success of any project, and one of the most important considerations for managing this project is that the methodology employed must be in accordance with the project so that we may have a successful outcome. It is paramount that objective of delivering a hybrid digital management conference that will attract participants from a wide range of industrial backgrounds is met in the Digital management conference project. An appropriate project methodology is necessary to achieve this. The waterfall methodology (Ward and Legorreta, 2009) [12] was adopted in the digital management conference project after reviewing different alternatives. The use of waterfall methodology is justified by the fact that the project has well-defined requirement (Almeida, 2017) [1] that will not change as specified in the project mandate, such as fixed Project Budget of £350,000, the project scheduled to begin in April 2022 with the conference taking place on the 18th, 19th, and 20th of October 2022. Since there are no changes in requirement this will enhance consistent quality because this has been defined from the beginning and hence it will help to get desired outcome. In contrast to Agile, which requires continual changes in requirements, Agile does not provide the ability to plan quality, quality control, or quality assurance because requirements change over time. Project management under Agile methodology is not linear in stages likethe traditional waterfall technique (Cubric, 2013) [4] rather several iterations might be utilised to test-driven approach the desired conclusion. Agile technique gives room for flexibility in the face of unknown requirements (Thesing, Feldman and Burchardt, 2021) [11]. Despite initial team success, some company find it challenging to extend Agile beyond specific projects and incorporate Agile into Waterfall-oriented top-down systems development organisations (Mahadevan, Kettinger and Meservy, 2015) [10]. As a result, waterfall approach is used in this project.

Some of the differences between Waterfall and Agile methodologies (Kothandaraman and Srinivasan, 2021) [9] are:

Waterfall	
Pros	**Cons**
Works best when there are defined requirements	Requires investment to define scope and schedule before work begins
Best for stable environment	Scope changes can be slow and the adverse impact increases over the life cycle
The team is distributed and hence control can be managed by defined deliverables, milestones and dependencies	Risk of nothing to show for the money until the end
Best if scarce skills or resources have limited availability	Change adds effort and risk, so a strict change control process must be in place to avoid 'scope creep'
Plans are repeatable for similar projects	

Agile	
Pros	**Cons**
Works well when the detailed requirements are unknown or subject to change	No advantage for projects where the scope and detailed requirements are well understood and change can be controlled
Give flexibility to 'course correct'	Uncertainty around scope and schedules can make stakeholders nervous
Needs regular stakeholder feedback	Less effective if the 'team' is distributed
The team is co-located, multi-functional and enables to work in a collaborative way	Demands management and prioritisation of the backlog
Early return on investment by regular delivery	

Source: (Difference between agile and waterfall approaches | APM, 2022)

Waterfall methodology helped to achieve the objective of raising the profile of digital delivery magazine through Digital Management Conference project through detail description of the project quality at the beginning of the project. Hence, there is no need to change anything the quality is known already at start. In addition, this methodology support communication with the various stakeholders by detailing the specification at the beginning of the project through a well-defined communication plan and there is no need to collaborate with stakeholders throughout the project.

2. Limitation of waterfall methodology in digital management conference project
1. In digital management conference, waterfall methodology does not allow for changes in attendance once 500 paying attendee and 200 virtual attendances has been completed has defined in the requirement stage.
2. The timescale of April 2022 starting date, with the conference taking place on the 18th, 19th, and 20th of October 2022 as well as £350,000 fixed budget are the two major constraint to this project from the project mandate, hence the limitation here is that the project cannot accommodate new requirement. Hence, there will be issue with the output because this will affect the quality of the project.
3. Waterfall methodology still have some gaps for this project which is not so in software-based methodology just as agile where all the details are to be embedded in the software which will prevent any unforeseen error during the course of drafting the requirement which might change the dynamic of the methodology, considering the fact that nothing is changing from April to October, 2022.

3. Critical evaluation of the use of waterfall methodology in the digital management conference
The implementation of digital management conference is based on five steps that make up a typical Waterfall project. According to (IBM Developer, 2022; Jurison, 1999; Herawati, Negara, Febriansyah and Fatah, 2021) [5, 7, 6] waterfall methodology steps are Requirements, Design, Execution, Verification and Deployment. The analytical results, as well as the system design derived from the planning results and research data, will be explained in this section. The following are phases that followed:

3.1 Requirements Definition stage
The project mandate from digital delivery magazine was used to identify the requirement (Aldi, 2022) [2] for Digital Management conference. The requirements are:
- **Project Budget**

Fixed Project Budget: £350,000

Students will need to determine how to allocate this budget against the different project stages and primary activities e.g., requirements, design, build (preparation) and testing (verification and inspection) and must include costs for marketing and salaries.
- **Timescale of Project**

The project is scheduled to begin in April 2022, with the conference taking place on the 18th, 19th, and 20th of October 2022.
- **Topics to be covered**
1. Data Analytics and reporting
2. AI
3. Cyber Security
4. Online Commerce
5. Customer Service

▪ **Conference location**

The conference will take place in Birmingham, England. Specification of location are:

an exhibition floor, a canteen, accommodate 500 paying attendees, two big theatre / lecture rooms and breakout rooms.

Targeted Audience

There will be 500 in-person participants and 200 virtual participants.

▪ **Speakers and exhibitors**

Speakers, relevant software and consultancy exhibitors.

▪ **Security and catering**

Appropriate security, health and safety, and catering arrangements

▪ **Workers needed**

The project manager is the student who is doing the task. Two full-time event personnel and one project office resource support full-time staff for the project manager. All other resources required, other from those specified in the project mandate, are presumed to be part-time.

3.2 Design Stage

In digital management conference logical and physical design are used to design a prototype design for the conference. The table below shows the logical design for time planning and the physical layout. This covers the time that each activity is expected to have been completed in order to achieve the output of the project which is the conference itself.

Table 1: Physical Layout

S. No	Activity	Date / Time of set up commencement	End date / Core topic
1	Assessment, Selection and Booking of venue	2nd April 2022 to 29th April 2022	2nd April 2022 to 29th May 2022
2	Facilitating meeting on selected topics and Briefing of Speakers and Exhibitors	2nd May ,2022 to 29th May 2022	2nd May ,2022 to 29th June2022
3	Speaker 1: John Charlotte	18/10/22(10:00 a.m. -11:00 a.m.) @ lecture room 1	AI
4	Exhibitor 1: Adebayo Salam	18/10/22(2:00 p.m. -3:00 p.m.) @Exhibition floor	Cyber Security
5	Speaker 2: Kieran Abraham	19/10/22(10:00 a.m. -11:00 a.m.) @ lecture room 2	Online Commerce
6	Speaker 3: Alexander Rebecca	19/10/22(2:00 p.m. -3:00 p.m.) @ lecture room 1	Customer Service
7	Exhibitor 2: Ikpefan Luke	20/10/22(10:00 a.m. -11:00 a.m.) @Exhibition floor	Data Analytics and reporting
8	Spring Conference and Event Centre, Birmingham, England will be used	9:00 a.m. 11/10/22 to 5:00 p.m. 17/10/22.	20/10/22 18:00
9	Hellen Catering Limited, Birmingham, England will be used	9:00 a.m. 11/10/22 to 5:00 p.m. 17/10/22	20/10/22 18:00
10	Alpha and Omega Security, Birmingham will take care of security during the conference	7:00a.m. 18/10/22	20/10/22 18:00
11	Two full-time event personnel Sandra Edit and Keiran Jackson will be in charge of registration	1st week in August,2022	20/10/22 18:00
12	Digital Management Conference Day 1	18/10/22	
13	Digital Management Conference Day 2	19/10/22	
14	Digital Management Conference Day 3	20/10/22	

3.3 Execution

The actual implementation of the design is at the centre of this project's execution which shows several activities to be achieved in each month before the next activity. The venue must be evaluated and hired by April 2nd, 2022, and the work must be done by May 29th, 2022.A facilitating meeting on selected issues topics will be place between May2nd and May 29th, 2022, with speakers and exhibitors briefed. In addition, the Birmingham, England-based Spring Conference and Event Centre, Helen Catering Limited, and Alpha and Omega Security will be contacted.

3.4 Verification

At this stage, the results of each phase of the project were immediately compared and verified with the previously prepared documents. After securing a venue, it was checked to see if it could accommodate 500 paying guests, if it had two large theatre/lecture rooms, breakout rooms, an exhibition floor, and a cafeteria, and if it met all of the previously defined requirements. The team also book the venue as soon as April start, request for update on weekly basis from the about the venue and assurance was given that

there will be no cancelation of the venue for any reason. Verification of registration was also done to get the number of people expected. The team members Kept the digital delivery magazine website up to date by posting updates about the event. The registration unit sent reminder to all the attendee and others that showed interest during the marketing.

Speakers and Exhibitors were properly briefed on the core topics and what is expected of them. To enhance correct introduction of speakers which include keynote titles and their presentation slides were collected a week before the conference. During the course of verification, the email account created for speakers and exhibitors to send their enquiry was checked on daily basis to ensure that all the expected facilitators will be available. Speakers and exhibitors were told to give at least 24 hours' notice if they are ill. Security and catering, number of workers needed and other requirement were also compared with defined requirements before the conference day.

3.5 Deployment

Deployment phase is 18th October, 2022 the first day of the

conference itself. Following the communication plan, the project manager had a communication with all stakeholder which them mobilize their team which include security agency, caterer, Speakers, relevant software and consultancy exhibitors, targeted audience, two full-time event personnel and one project office resource support full-time staff of the project manager. The registration team deployed their team to the conference centre, registered those attendees that paid for the ticket, allocate registered attendee with hashtag and update them on adequate information about all breaks, meals, receptions, parking system. The security teamensured they maintain orderliness and park all cars caterer also carried out their task effectively After last day of the conference which is 20th October,2022 the team held a meeting and the event was closed. The project managerthereafter sent the final report to the director of the digital delivery magazine.

4. Conclusion and recommendation
The waterfall methodology was used in this project to apply a linear step-by-step approach in the digital management conference. The project manager developed a clear work structure using its five sets of stages, which comprise requirements definition, design, execution, verification, and deployment. Because it has a clear requirement, it helps to ensure consistent quality because it has been defined from the start. This methodology focused on the conference's goalof raising the profile of the digital delivery magazine since the beginning of the project. As a result, the team is more focused on the task at hand, and communication is more accurate and efficient. Meanwhile, the chosen strategy has the limitation which has been identified in relation to digital management conference. The author recommends that futurework include an Agile approach-based methodology. This would enable for comparison and investigation of the consequences of an agile approach.

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