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Exploring the extent to which project scope management processes influence the implementation of telecommunication projects [1]

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Abstract

This paper attempts to fill a significant knowledge gap by exploring the extent to which project scope management processes influence the implementation of telecommunication projects in Somaliland. Using a questionnaire survey design with the six aspects of project scope management, data were acquired from 59 stakeholders chosen based on simple random sampling from the Somaliland telecommunication industry. SPSS Statistics Software and Microsoft Excel Packages was then used to analyze the collected data. This was achieved by computing the Cronbach's Alpha, mean values and Relative Importance Index (RII), respectively, for reliability check and ranking purposes. The results from the analysis indicate that project scope control (RII = 0.672), project scope validation (RII = 0.660) and project scope verification (RII = 0.636) are the three most preferred project scope management processes, in terms of their level of significance to the implementation of telecommunication projects, respectively. The implications of the results obtained in this study are quite essential to impending telecommunication projects as they provide new insights that could guide the development of strategies required for future implementation of project scope management in the telecommunication industry. Consequently, telecommunication companies are recommended to mandate scope management practices when implementing future telecommunication projects with the task to continuously organize project management training activities for their staffs.

Keywords: Project Management, Project Scope Management Processes, Application of Scope Management, Telecommunication Projects, Low-income Countries, Somaliland

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Introduction

With a huge competitiveness in the global telecommunication industry in recent years, telecommunication companies are now faced with the task of effectively implementing telecommunication projects based on a definite project scope that can help achieve the complete projects objectives (Fashina, Abdilahi, & Fakunle, 2020; Khan, 2006). Consequently, the failure or success of projects such as building and construction projects (Fakunle, Opiti, Sheikh, & Fashina, 2020), telecommunication projects (Fashina et al., 2020) depends on how effective the project scope is managed. This is one of the reasons why scope management ensures that a project's scope is correctly defined and mapped, which in turn allows the project managers to properly allocate the required labor and costs needed to complete any project (Nath & Momin, 2014).

More importantly, project scope management focuses on planning and controlling (Dumont, Gibson, & Fish, 1997) and that is why the management of clients' or stakeholders' expectations can be quite taskings for a project manager (Fashina, Fakunle, & Opiti, 2020). Essentially, a discrete scope helps stakeholders involved in a project to stay on the same page all through the project's lifespan (Sheikh, Fakunle, & Fashina, 2020). So, when a project scope is clearly defined, effectively managed and communicated to the stakeholders involved in the project, it can safeguard such projects from potential issues or challenges (Fashina et al., 2020; Ogunberu, Olaposi, & Akintelu, 2016). Project scope can therefore help differentiate between what is and what is not involved in a project and controls what is to be allowed or removed as it is implemented (Bingham & Gibson, 2017; Cho & Gibson, 2001; Dumont et al., 1997). Scope management also generates control factors, that can be applied when tackling issues that are the consequences of changes during the different phases of the project. One can thus argue that project scope is critical, and without it, project managers would have no clue of timeline, cost or labor involved in a project (Fakunle & Fashina, 2020). This implies that scope management serves as the foundation for the decision-making of a project manager during the course of any project (Bingham & Gibson, 2017; Cho & Gibson, 2001; Dumont et al., 1997).

Furthermore, project scope management is basically used to support the management of projects to succeed. This includes ICT and telecommunication projects that are introduced by telecommunication companies (Beldi, Cheffi, & Dey, 2010; Kapsali, 2011). Prior studies also confirmed that the core aspects of project scope management used by telecommunication sector include project scope plan, scope control, scope verification and work breakdown structure, respectively (Ogunberu et al., 2016; Ogunberu, Olufemi, & Olaposi, 2018). Studies by (Eckerson, 2011; Ogunberu et al., 2018) have also shown that the implementation of project scope management to manage projects like IT projects normally goes a long way to improve the project delivery success.

In spite of this fundamental understanding of scope management and the increasing implementation and development of ICT and telecommunication projects in low-income countries (Fashina et al., 2020; Ogunberu et al., 2018), a huge number of these projects have experienced huge failure rates, possibly, due to poor project scope, design and management (Fashina et al., 2020; Gutierrez & Berg, 2000). This is why the telecommunication industry and their project management teams are examining procedures and processes involved in managing projects in an effort to increase the project success rates (Gutierrez & Berg, 2000). Within this context, the

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telecommunication companies in low-income countries need to give extra attention to project scope management practice in order to safeguard return on investment and sustain market share. There is therefore a need to explore the extent to which project scope management processes influence the implementation of telecommunication projects in Somaliland.

This paper thus seeks to provide new insights on the extent to which the features of project scope management influence the implementation of telecommunication projects in Somaliland. The research work fills a significant knowledge gap between theory and practice regarding the use of project management knowledge areas in the telecommunication industry. This will thus assist upcoming researchers that might want to conduct research work related to the current study in Somaliland or elsewhere. Moreover, the current study provides evidence-based insights that could guide key telecommunication stakeholders, policy-makers and decision-makers in the development and formulation of novel measures required for the application of project scope management or project management in future telecommunication projects.

The first part of this paper presents the background introduction to the application of scope management in ICT and telecommunication projects. The second part reviews the five aspects of project scope management and their importance. Furthermore, the methodology adopted in this study is presented in the third part before elucidating on the findings and implications of the study in the fourth part. The last part of this paper presents the conclusions and noteworthy recommendations that could guild the successful implementation of future telecommunication projects.

Theory

Aspects of project scope management

Project scope management basically comprises of all practices that are essential as it ensures that a project is efficient enough to only effect the required work in order to accomplish the targeted product, service or outcome (Nath & Momin, 2014). Scope simply signifies what is required to be done while scope management can be seen as the management of what is required to be done (Khan, 2006; Nath & Momin, 2014). Project scope management is the process of defining what work is to be done and then making sure that all of that work and only that work are done. Furthermore, project scope management includes the procedures required to ensure that a project strictly embraces only the critical works in order to successfully complete the project and achieve its goals and objectives (Khan, 2006; Nath & Momin, 2014; Young, 2007). Project scope management involves planning, creation of work breakdown structure, validation, verification and control of project scope. These components are discussed below.

Scope management plan

Project scope planning begins with the initial inputs of product description, the project charter, and the initial definition of restrictions and assumptions (Khan, 2006). The outputs of scope planning are the scope statement and scope management plan, with the supporting details (Nath & Momin, 2014). On one hand, the scope statement forms the platform for an agreement between the project and the project customer by identifying both the project objectives and the project deliverables (Khan, 2006; Nath & Momin, 2014). On the other hand, scope management plan is the collection of processes which ensure that the project includes all the work required to its

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completion while excluding all work which is not necessary to complete it. Scope management plan details how the project scope will be defined, developed, and verified (Thamhain, 2013). It is the responsibility of the project team to develop numerous scope statements that are suitable for the level of project work breakdown (Khan, 2006; A. Lester, 2007a).

Project scope definition statement

Scope definition involves sectioning into smaller and more manageable components, the main project deliverables as identified in the scope statement. This is geared towards improving the accuracy of the cost, duration and resource estimates. It also defines the baseline for performance measurement and control (Khan, 2006; Nath & Momin, 2014). Furthermore, proper scope definition is critical to project success. This implies that whenever there is poor scope definition, the final project costs can be expected to be higher. This is because of the unavoidable changes that can interrupt project rhythm, cause rework, increase project time, and reduce the productivity and motivation of the project personnel (Mir & Pinnington, 2014; Munns & Bjeirmi, 1996; Radujković & Sjekavica, 2017).

Work breakdown structure

Work Breakdown Structure (WBS) is simply the practice of project scope management i.e. subdividing the project goals and deliverable, and work to be done into smaller, more manageable units (Globerson, 1994; A. Lester, 2007b). Creation of the WBS requires the scope statement, requirement documentation and organizational culture, practices and procedures. The technique utilized in the breaking down and subdividing task and deliverables into smaller units is referred to as decomposition (Brotherton, Fried, & Norman, 2008; Globerson, 1994; E. I. A. Lester, 2017). The resulting outcome of this process is what is termed as WBS. Basically, WBS effectively divides goals and tasks by setting milestones, cost estimates and schedule activities among others (Brotherton et al., 2008).

Project scope validation

Project scope validation can be seen as the process of validating the acceptance of the completed project deliverables (Khan, 2006; Nath & Momin, 2014). It is a project management process that is utilized to officially accept completed project deliverable (Brotherton et al., 2008; Khan, 2006). The main advantage of this process is that it brings independence to the getting process and increases the chance of final product, service, or result acceptance by validating each deliverable (Nath & Momin, 2014). In addition, it is beneficial to the advancement of the finished project and necessary for forming diverse documents such as document updates, work performance information, accepted deliverable and change request (Khan, 2006). Moreover, the verified deliverables are accomplished on the basis of control quality, since this emphases on the deliverables. Afterwards they are reviewed with the customer to ensure that they have been agreeably completed before it is received officially by the customer. However, the premises for the final acceptance of the deliverables is based on various outputs of the project scope management knowledge area like scope baseline and work performance data (Brotherton et al., 2008; Khan, 2006; Nath & Momin, 2014).

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Project scope verification

Although project scope verification seems very similar to project scope validation and sometimes it is quite easy to get them confused, they are two different processes. On one side project scope validation is a subjective process that is performed by the client or customer while on the other side, project verification is an objective process that is performed by the project management team (Khan, 2006; Nath & Momin, 2014). The scope verification process is to some extent straightforward and comprises a procedural review of both the project scope statement and the WBS (Nath & Momin, 2014). This is why organizations such as the telecommunication companies are now adopting inspection and document review as verification tools that help facilitates the verification activities. Verifying the scope of a project before and during the project cycle is thus vital. Depending on the size or type of project, scope verification can be carried out after the completion of each major task or phase or after the project has been completed as in the case of a smaller project (Nath & Momin, 2014). So, basically, project scope verification ensures that projects or products meet the required specifications.

Project scope control

Project scope control is the process of influencing the factors that brings about project scope changes by way of controlling the impact of those factors (A. Lester, 2007a). It can also be seen as the process of monitoring and controlling the status of the project and product scope. Project scope control is used to monitor the real changes as they occur and integrated into the change control process, and controlling scope (Brotherton et al., 2008; A. Lester, 2007a). Control Scope can also be referred to as the process of monitoring the status of the project and product scope or managing changes to the scope baseline. The main benefit of this process is that it allows the scope baseline to be maintained throughout the project. In addition, scope control is both: avoiding of unaccepted new work packages and integrating accepted new work packages into the project scope statement and into the WBS (Brotherton et al., 2008).

Research methodology

This study explores the extent to which project scope management processes influence the implementation of telecommunication projects by adopting a questionnaire survey method. A quantitative research was utilized to acquire information from the target population through field sources. The sample size of 75 respondents from a population of 90 was used in the study. This was achieved by adopting the Krejcie and Morgan's table as depicted in (Krejcie & Morgan, 1970). In an effort to obtain real information directly from the respondents, structured questionnaires were employed to acquire primary data in this study through self-administration. A total of six features of project scope management were investigated in this study. Also, these features were rated in this study based on the Likert's scale of 5 ordinal measures from 1 to 5 according to the level of contribution (Allen & Seaman, 2007).

In an effort to check the quality of the research instrument in terms of its consistency, a pilot survey was carried out. This was accomplished by the use of a convenience sample of experts in the telecommunication industry to individually review the questionnaire. Three soft copies of the questionnaire were sent to three telecommunication practicing experts to validate the contents of the questionnaire prior to the questionnaire distribution and data collection.

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The reliability of the data obtained from the questionnaire survey was tested using the Cronbach's Alpha method (Cronbach, 1951). This was accomplished by using SPSS Statistics Software (version 25) to compute the Cronbach's Alpha, and the reliability coefficient was determined to show the internal consistency of the data using Equation 1 (Cronbach, 1951):

$$\text{Cronbach's alpha, } \alpha = \frac{K}{K-1}\left[1 - \frac{\sum V_i^2}{V_x^2}\right] \tag{1}$$

where K, represents the number of items; V_i represents the variance of scores on each item; and V_x, represents the variance of the observed total test scores.

Relative Importance Index (RII) was selected as an appropriate analytical method (Doloi, Sawhney, Iyer, & Rentala, 2012) used to analyze the ratings received through the questionnaires and to establish a mean rating point. Each calculation was carried out using RII formula in Equation 2 (Doloi et al., 2012):

$$\text{Relative importance index, RII} = \frac{\sum W}{A \times N} \tag{2}$$

where W, represents the rating given to each factor by the respondents. For instance, 5 represents very large extent, 4 represents large extent, 3 represents moderate extent, 2 represents little extent and 1 represents no extent factor. A is the highest weight (5 for this study) and N represents the total number of samples (50 for this study).

In addition, the study was carried out according to standard ethical practices required of any reputable academic research. Respondents were informed both orally and in writing regarding the goal of the study and their consents was established before filling out the questionnaires. Respondents were also assured of confidentiality.

Results and data analysis

Survey results

Of the 75 questionnaires distributed randomly among the target respondents, 59 questionnaires were returned, 16 respondents were unable to make available the questionnaires. However, of the 78.7% responses that were received from the participating practitioners, 9 questionnaires were recorded invalid, and 50 questionnaires were deemed valid (See Table 1).

Figure 1 presents the percentage distribution of the respondents' role/position in the company. As shown in Figure 1, both the middle and junior management staff have the highest percentage (34% each). The administrative staffs are the second highest respondents that participated in the research survey with a percentage of 10%. The third highest group of respondents involved in this survey are the top management staff and support staff with a percentage of 8% each. However, the least group of respondents are the consultant (4%) and intern (2%), respectively.

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Table 1: Summary of the total numbers of questionnaires distributed and returned, excluded, and valid questionnaires

S/N	Number of questionnaires distributed	Number of returned	Not returned	Valid	Invalid
1	75	59	16	50	9
2	100%	78.7%	21.3%	84.7.%	15.3%

It can be observed from Figure 3 that the respondents' experience in telecommunication projects are not evenly distributed. This is because 80 % of the respondents have been involved in 1 to 6 telecommunication projects i.e. 40% have experience with 1-3 projects and another 40% have been involved in 4 to 6 telecommunication projects. Nevertheless, the other 20% of the respondents have been involved in 7-10 projects (4%) or over 10 projects (16%).
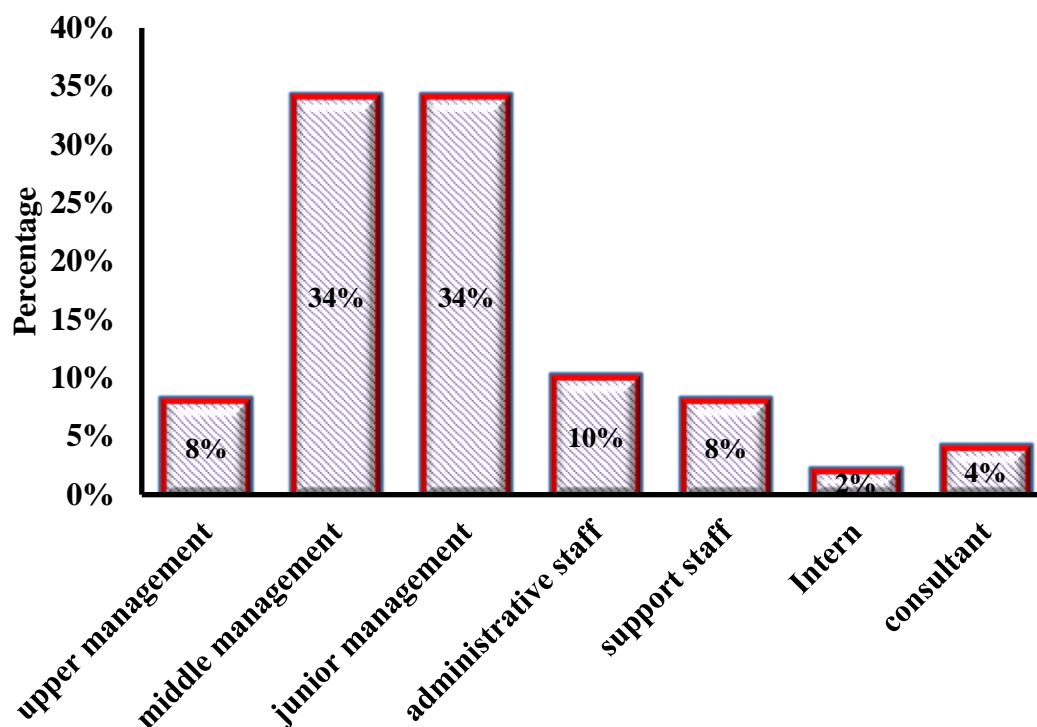

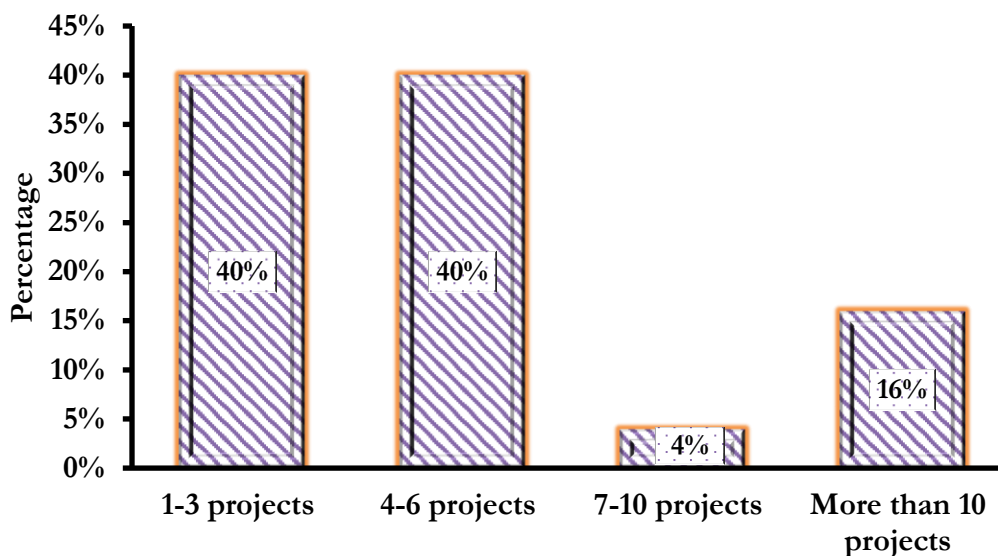**Figure 1:** The percentage distribution of respondents' role/position in the company

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Figure 2: The number of telecommunication projects that the respondents have been involved in

Cronbach's alpha data reliability test

In order to measure the internal consistency of the answers provided by the respondents, the results of the Cronbach's Alpha data reliability test were obtained using the Likert's scale before the data analysis. Moreover, the internal consistency of the answers provided by respondents was determined based on the Cronbach coefficient obtained, using Table 2 (Gliem & Gliem, 2003).

The results of the Cronbach's Alpha reliability test carried out for the answers received with respect to the six features of project scope management examined in this study show that the Cronbach's Alpha values is 0.823, indicating that the internal consistency of the responds received in this study is excellent. This means that the answers provided by the respondents, concerning the influence of the six features of project scope management has an excellent reliability of 82.3%.

Table 2: Internal consistency of Cronbach's Alpha

S/N	Cronbach's alpha, α	Internal consistency
1	$\alpha \geq 0.8$	Excellent
2	$0.8 > \alpha \geq 0.7$	Good
3	$0.7 > \alpha \geq 0.5$	Satisfactory
4	$\alpha < 0.5$	Poor

Analysis of the extent to which project scope management processes influence the implementation of telecommunication projects

The six features of project scope management have been ranked based on Relative Importance Index (RII) and Mean Value. To establish the level of significance of the six features of project scope management to the implementation of telecommunication projects, the RII and Mean Value rankings are classified based on the RII classification table presented in Table 3.

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Table 3: Classification of RII

Scale	Extent of significance	RII
1	No extent	$0.0 \leq RII \leq 0.2$
2	Little extent	$0.2 < RII \leq 0.4$
3	Moderate extent	$0.4 < RII \leq 0.6$
4	Large extent	$0.6 < RII \leq 0.8$
5	Very large extent	$0.8 < RII \leq 1.0$

The analysis of the extent to which project scope management process influence the implementation of telecommunication projects is presented in Table 4. Concerning the most significant feature of project scope management, Table 4 indicates that project scope control (RII = 0.672) is the most preferred project scope management process, in terms of the extent of significance to the implementation of telecommunication projects. In addition, project scope validation (RII = 0.660), project scope verification (RII = 0.636), and work breakdown structure (RII = 0.608) are ranked second, third and fourth, respectively. The project scope management processes with the least significance are scope management plan (RII = 0.548) and project scope definition statement (RII = 0.580), respectively.

Table 4: The mean score value and RII ranking of the features of project scope management and the extent to which they influence the implementation of telecommunication projects

S/N	The Features of Project Scope Management and their Influence on the Implementation of Telecommunication Projects	RII	Mean Value	RII & Mean Value Ranking	Level of Significance
1	Scope management plan	0.548	2.740	6	Moderate extent
2	Project scope definition statement	0.580	2.900	5	Moderate extent
3	Work breakdown structure	0.608	3.040	4	Large extent
4	Project scope verification	0.636	3.180	3	Large extent
5	Project scope validation	0.660	3.300	2	Large extent
6	Project scope control	0.672	3.360	1	Large extent

Discussion and implications of the study

The implications of the results obtained in this research study are of high significance. First, the results validate the study by (Dekkers & Forselius, 2007), where the authors indicated that scope management plays a central role in information technology projects like in the telecommunication industry, in terms of needed skills, quantity, and experience. And as suggested by authors the current study further signifies that scope management is more important than any other of the individual areas and processes in projects (Dekkers & Forselius, 2007).

As expected, the most significant project scope management process that influence the implementation of telecommunication projects is found to be project scope control, as exemplified in the book by (A. Lester, 2007a). The author in his book stated that project scope control is the

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process of influencing the factors that brings about project scope changes by way of controlling the impact of those factors (A. Lester, 2007a). Interestingly, since project scope control ensures that the scope baseline is maintained throughout the project, avoiding new work packages that are unacceptable and integrating those that are acceptable into the project scope statement and into the WBS is mostly facilitated by scope control in telecommunication projects (Fashina et al., 2020; Ogunberu et al., 2018). This is why managing project scope is largely concerned with controlling what is and is not included in the project. The choice of the respondents in the current work regarding project scope control as the most significant of project scope management process is thus justifiable.

In addition, the results of the current work disclose that the respondents ranked project scope validation as the second most significant project scope management process that influence the implementation of telecommunication projects. Since project scope validation emphases on the project deliverables, the choice of the respondents here is quite crucial because the verified deliverables are accomplished on the basis of control quality (Khan, 2006). Moreover, the respondents showed their understanding regarding the importance of project scope validation in checking if the project specification captures the need of the customer (Khan, 2006). This process is however a subjective process as it shows how well the project fulfils customer's requirements and this justify why telecommunication project management teams in Somaliland ranked this as one of the top significant processes.

Respondents ranked project scope verification as the third most influential scope management process that is responsible for successful implementation of telecommunication projects in Somaliland. This is however, not surprising because telecommunication projects are expected to meet up with strict timelines. Moreover, the respondents showed their understanding regarding the importance of project scope verification in the establishment of various vital documents in the process of advancing a finished project before it is officially received by the customers. These documents may include document updates, work performance information, accepted deliverable and change request as suggested by (Khan, 2006). This is why (Ogunberu et al., 2016) suggested that one of the challenges associated with scope management in telecommunication projects is the incompleteness and inaccuracy of project scope which often causes unnecessary schedule mistakes and cost overrun in telecommunication projects (Fashina et al., 2020). Besides, project scope verification is one of the scope management processes that could provide assistance in ensuring that the WBS is as productive as possible in controlling the project's scope regularly, in an effort to minimize the aforementioned challenges.

As perceived by the respondents, work breakdown structure was ranked as the fourth most significant scope management process that influence implementation of telecommunication projects in Somaliland. The choice of the respondents here is justifiable as it is generally perceived that the concept of the WBS is well understood by most project managers, and it is one of the techniques that appears to be readily known and accepted by project managers, irrespective of the industry, experience or location as this process just happens to work (Khan, 2006; E. I. A. Lester, 2017; Young, 2007). This is the reason why WBS did not fall within the first three rank position.

Scope management plan was ranked by the respondents as the fifth most significant project scope management process that influence implementation of telecommunication projects in Somaliland. Since the outputs of scope management planning details how the project scope will be defined,

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developed, and verified (Thamhain, 2013), the respondent ranked scope management plan ahead of project scope definition statement. This is the reason why the telecommunication project management team make efforts to develop different scope statements that are appropriate for the required level of project WBS (Khan, 2006; A. Lester, 2007a). It is however important as prior studies on project scope in telecommunication projects linked ambiguity in scope with misunderstanding and redundant work in telecommunication projects (Gutierrez & Berg, 2000; Ogunberu et al., 2018; Samset & Haavaldsen, 1999).

Project scope definition statement is ranked by the respondents as the least significant project scope management process that influence the implementation of telecommunication projects in Somaliland. This can be traceable to the fact that it is mandatory that every project manager must be familiar with project scope definition statement, since it safeguards the accuracy of project cost, duration and resource estimates, and also defines the reference point for performance measurement and control (Khan, 2006; Nath & Momin, 2014). This is because appropriate scope definition is crucial to telecommunication projects. This is also in line with the findings of (Scott-Young & Samson, 2008; Young, 2007) that suggested that the root cause of lateness in project deliveries and sometime an unending project can be linked to the scope management having a transient project scope.

On a final note the current study fills the knowledge gap regarding the investigation of the extent to which project scope management processes influence the implementation of telecommunication projects in the Somaliland context and elsewhere. As such, it introduces an organized and all-inclusive document that serves as a benchmark for research related to the application of scope management in telecommunication projects, particularly, in the low-income countries. Moreover, future researchers that might need to investigate similar studies in other countries can validated their findings using the outcome of this study.

Conclusions

The extent to which project scope management processes influence the implementation of telecommunication projects has examined in the current study. The six features of project scope management have been investigated to successfully achieve the objective of the study. They include: scope management plan, project scope definition statement, work breakdown structure, project scope verification, project scope validation, and project scope control. According to Table 4, the findings from the study indicate that project scope control (1st), project scope validation (2nd) and project scope verification (3rd) are the three most significant project scope management process that influence the implementation of telecommunication projects in Somaliland.

Furthermore, the key contribution of the current study is providing an improved understanding on the extent to which project scope management process influence the implementation of telecommunication projects in the Somaliland context. The findings from this study are therefore of significance to major stakeholders within the global telecommunication industry and as such could provide evidence-based insights that could guide the development of new strategies needed for impending implementation of project management in the telecommunication industry. This is nevertheless important to the success of any telecommunication project. Moreover, future academic and government researchers who may want to carry out studies in related research areas can validated their findings using the valuable outcome of this study.

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One can therefore argue that since it has been shown in this study that the application of project scope management practices has meaningfully impact on the success of telecommunication projects, it is strongly recommended that telecommunication companies should mandate scope management practices when implementing future telecommunication projects. However, this would not be effective unless telecommunication companies continuously organize project management training activities that will update the knowledge of their staff to become acquainted with the essential project management skills.

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Dr. Adebayo has conducted training workshops, seminars and given speeches/talks/presentations at local and international conferences. He has published more than 20 articles in reputed journals and is an active reviewer of many international journals. He is a motivated, energetic and focused individual with strengths in innovative teaching approaches, interdisciplinary research, data analysis, teacher training and team management. His research interest includes sustainable living, project management, RE policy and management, education organization management system (EOMS), educational planning, photonic nanostructures of materials etc. He is a fellow of African Scientific Institute, USA and the Institute of Management Consultants, Nigeria.

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