OPEN ACCESS
UNIVERSITY OF ARUSHA ACADEMIC JOURNAL
R-ISSN: 2665-0711, E-ISSN: 2685-6645
University of Arusha (UoA), P.O Box 7, Usa River, Arusha.
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UoAAJ
Vol. 3(2), December 2025 https://uoa.ac.tz/journal/ E-mail: editorial@uoa.ac.tz, wetengerekkj1@yahoo.com
University of Arusha Academic Journal (UoAAJ) 3(2), 2025

DETERMINANTS OF SUCCESSFUL RESEARCH COLLABORATIONS: A FACTOR ANALYSIS

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DOI: https://doi.org/10.69713/uoaaj2025v03i02.03

Abstract
This study analyzes the determinants of successful research collaborations. The descriptive survey research design and the quantitative methods were adopted for the study. A total of 354 respondents were sampled using the simple random sampling technique. The instrument used for data collection is a researcher-designed questionnaire consisting of 17 items on a five-point Likert scale, with a reliability coefficient of 0.847. Data collected was analyzed using descriptive statistics (mean and standard deviation) and factor analysis. Results from the descriptive analysis indicate that openness to alternative viewpoints and approaches from collaborators, as well as selecting individuals who are equally motivated to complete the project, are of utmost importance for successful research collaborations. Factor analysis revealed six very important determinants of successful research collaborations, and these are consensus among researchers on collaborative research; communications to clarify issues on the project; the use of available technologies to facilitate collaborative work; harmonized shared vision and work ethics of collaborators; mutual trust among collaborators; and openness to alternative viewpoints among team members. Based on the results of the study, it is recommended that, to foster successful research collaborations, collaborators must define clear goals, establish a formal agreement, maintain open communication, and acknowledge the contributions of all involved.

Keywords: Determinants, Research, Collaborations, Analysis.

INTRODUCTION

Collaboration refers to the process in which two or more individuals, groups, or organizations work together to achieve a common goal or task. It involves sharing resources, knowledge, and expertise to produce a result that is greater than what could be achieved independently. Research collaboration involves two or more parties working together to achieve a common research goal. This can include researchers, institutions, or even communities. It is a way to leverage diverse expertise, resources, and perspectives to advance knowledge and solve complex problems.

The analysis by Katz and Martin (1997) reveals that collaboration is a challenging concept to define. Thus, they defined collaboration as the working together of individuals to achieve a common goal, and that 'research collaboration' is the working together of researchers to achieve the common goal of producing new scientific knowledge. Research collaboration is

often an effective way to ensure research impact, providing an opportunity for academics to engage with others affected by and interested in the proposed research.

Research collaborations are crucial exercises for university faculty members and researchers, as they are pivotal in enhancing academic quality, broadening research horizons, preparing students for global challenges, addressing international issues, and fostering cultural understanding and global networks. However, there is a paucity of literature on factors for successful research collaborations, and the few available studies adopted the qualitative approach. The focal problem of this study is to establish the determinants of successful research collaborations using the quantitative approach.

REVIEW OF RELATED LITERATURE

The literature review covers the concept of Research collaboration, types of research collaborations, the importance of research collaborations, factors that motivate research collaborations, problems of research collaborations, and factors for successful research collaborations.

Concept of Research Collaboration

Research collaboration is the process of two or more researchers, organizations, or institutions working together to produce new knowledge by pooling resources, expertise, and knowledge. It could also be viewed as the collective production of new knowledge through coordination between researchers, institutions, and organizations. Katz and Martin (1997) defined collaboration as the working together of individuals to achieve a common goal, and that 'research collaboration' is the working together of researchers to achieve the common goal of producing new scientific knowledge. Research collaboration is often an effective way to ensure research impact, providing an opportunity for academics to engage with others affected by and interested in the proposed research. It is widely assumed that collaboration in research is 'a good thing' and that it should be encouraged.

Collaborative research is research involving coordination between the researchers, institutions, organizations, and/or communities. This cooperation can bring distinct expertise to a project. Collaboration can be classified as voluntary, consortia, federation, affiliation, and merger, and can occur at five different levels: within disciplinary, interdisciplinary, multi-disciplinary, trans-disciplinary, or national vs international. Collaborative research has the capabilities for exchanging ideas across disciplines, learning new skills, access to funding, higher quality of results, radical benefits, and personal factors such as fun and pleasure (Seema et al., 2019).

Types of Research Collaborations

Collaboration in research has been gaining significance in the academic world over the past two decades. According to Research. Life (2024) research collaborations could be interdisciplinary collaborations, cross-institutional collaborations, international collaborations, and public-private partnerships in nature. Interdisciplinary collaboration research projects involve researchers from two or more disciplines collaborating to advance knowledge or solve complex academic and scientific research problems. Cross-institutional collaborations involve researchers from two or more institutions collaborating in scientific inquiry. Such collaborations can lead to innovations and breakthroughs that may not have been possible when confined to a single institution. In international collaboration, partnerships typically involve researchers from different institutions located across geographies who have shared research interests coming together to collaborate on research projects. A significant advantage of such collaboration is its broad applicability and impact. The public-private partnerships research is gaining popularity and is being seen by governments

and businesses as a way of adding value in addressing various global challenges.

In the views of Katz and Martin (1997), collaboration can occur at several levels, and one needs to distinguish carefully between these. The various forms include collaboration between individuals, groups, departments, institutions, sectors, and countries. Bansal et al. (2019) identified the different kinds of collaboration, such as intra-disciplinary (team of researchers within the same department), interdisciplinary (team of researchers of different departments but with different backgrounds), multidisciplinary (team of researchers of different backgrounds), or transdisciplinary (involvement of people from outside academia in the research process). In the collaboration, everyone aspires for common demands such as making operational plans, communication between different research groups, sharing of credit and money, holding frequent meetings, and encouraging open communication.

Collaboration among researchers can take many forms. In academic research, collaboration usually means an equal partnership between two or more academic faculty members involved in a research project. The collaboration could range from initiating a project with colleagues from the same discipline to multidisciplinary collaborations, including collaboration between academic and government institutions or across geographic locations. The research could be funded or unfunded. In funded research, all collaborators need to understand the agreement between the principal investigator and the plan for the publication of the results (Delgadillo, 2018).

Importance of Research Collaborations

Research collaborations are very important exercises that have to be embraced by university faculty members and researchers. According to Levina (2024), the importance and benefits of international research collaboration for universities are manifold and profound. These collaborations are pivotal in enhancing academic quality, broadening research horizons, preparing students for global challenges, addressing international issues, and fostering cultural understanding and global networks. According to the researcher, collaboration exposes universities to diverse pools of knowledge and expertise, and the global exchange of ideas leads to more innovative, comprehensive, and impactful research outcomes. Collaboration opens up many research opportunities that might be limited within local or national confines, as not all universities and countries have the same level of technology, knowledge, and data. Additionally, universities can develop more comprehensive and impactful solutions by pooling knowledge, expertise, and resources from across the globe.

Dusdal and Powell (2021) believed that by mixing complementary expertise and resources, a complex problem that surpasses individual capabilities might be solved. This situation enhances creativity and problem-solving, thus promoting scientific innovative discoveries. In addition, it improves the number of funding opportunities and the more research collaborations, the stronger the impact. Research collaborative efforts minimize errors and biases as collective efforts to perform a task involve critical thinking, revision of manuscripts from different perspectives, and quality and control mechanisms during the research procedures. This often ensures accuracy, validity, and reproducibility of the data (Guerrero Bote et al., 2013).

Research collaborations help in the transfer of knowledge, especially when universities collaborate with industries. Collaboration between universities and industries might accelerate the translation of research into practical applications, which determines its social impact. Collaboration between companies and universities also allows university students to understand how to work

for a company, promoting mentoring relationships and expanding their professional networks (Nyström et al., 2018).

Factors that Motivate Research Collaborations

On the motivation for collaboration, Bansal et al. (2019) opined that increasing collaborations can save considerable time and money, and most often, breakthrough research comes through collaborative research rather than by adhering to tried and true methods. According to Katz and Martin (1997), among the factors that motivate collaboration are the fact that funding agencies need to save money, the desire for intellectual interactions with other researchers, the need for a division of labor in more specialized or capital-intensive areas of research, the requirements of interdisciplinary research, and government encouragement of international and cross-sectoral collaboration.

Problems of Research Collaborations

Among the significant challenges faced by research collaborators are barriers to communication and coordination with different time zones, alignment on shared goals and possibly conflicting expectations, ensuring equitable distribution of funds and proper resource management, authorship credits, intellectual property, fair publication practices, and decision-making. Researchers need to navigate language barriers and methods of communication, as collaborators may be from other countries where English may not be a common language. Coordinating with collaborators located in different time zones is yet another challenge. As different collaborators are involved, there can be conflicting expectations despite initial interest and commitment to the research project. For collaborative research to achieve its goal efficiently and to make a significant impact, it is crucial to ensure equity in terms of the distribution of funds and proper resource management. In addition, conflicts and disagreements may emerge when there is no clarity regarding rights to royalty, due authorship credits, the power to make decisions regarding publication and future improvements, the ownership of intellectual property rights, and so on (OECD, 2016; Research Life, 2024). Bansal et al. (2019) categorize the challenges inherent in research collaborations as individual, institutional, challenges regarding funds, and systematic. In their view, the scarcity of competent researchers, differences in different approaches among the collaborating partners, the amount of funds granted to universities for research, and prioritizing researchers as administrative heads in research institutions rather than advancing research can be challenging to meaningful collaborations.

Factors for Successful Research Collaborations

There is a paucity of literature on factors for successful research collaborations, and the few available studies adopted the qualitative approach.

Successful research collaborations hinge on several key factors, including establishing clear goals and expectations, fostering strong relationships, and maintaining effective communication. These elements, combined with a commitment to mutual trust and respect, are crucial for collaborative research success. For instance, Jadson (2024) opined that regular meetings, open communication channels, and a willingness to engage in constructive feedback are vital for maintaining momentum and addressing challenges, while Humphrey, Etim, and Ugo (2024) emphasized that developing a shared vision for the collaboration, including a well-defined research plan, can help maintain focus and ensure that resources are used efficiently.

Bansal et al. (2019) considered the elements of successful collaboration as establishing channels for open communication, engaging all partners for meaningful self-reflection, identifying stakeholders, which will help better

understand cause and effect, clarifying roles and responsibilities, and establishing a professional environment to respect different cultures of different organizations. Malte (2022) investigated intrapersonal and interpersonal factors that are most significant for the success of a research team. To explore the ten most important reasons for the success of a research collaboration. A Random Forest classifier was employed to predict the success of research collaborations based on 51 input variables. The analyses were based on representative survey data on 1,417 principal investigators and spokespersons of ongoing and completed research clusters funded by the German Research Foundation. Findings revealed that the success of research cluster collaboration depends on highly realistic and clear research objectives, comprehensive agreement on research objectives, close interconnection of the subprojects' research work, and a fair and trusting cooperation climate.

The qualitative study by Ravasi, Zhu, Wan, Dorobantu, and Gruber (2024) on What Makes Research Collaborations Successful revealed that choosing the right partners, setting clear expectations, carefully managing the process, maintaining frequent and open communication, and ensuring equal access to data and involvement in the analysis are essential for a successful collaboration, regardless of location as reported by the respondents, International collaboration may present additional challenges that require partners to be mindful of differences, remain flexible and open minded, and focus on the extra opportunities that collaborations afford.

The literature review showed that most of the research on factors for successful research collaboration is qualitative, thus leading to methodological gaps. The need for more empirical data and innovative research methods on the subject matter is inevitable. The present study, therefore, is an analysis of the Determinants for Successful Research Collaborations.

Purpose of the Study

This study aims to analyze the determinants of successful research collaborations. The research questions answered are:

1. What are the main determinants of successful research collaborations?
2. What are the dimensions of determinants of successful research collaborations as extracted by factor analysis?

METHODOLOGY

The research analyzed the determinants of successful research collaborations. As a result, the descriptive survey research design and the quantitative methods were preferred. The descriptive survey aims at fact-finding and generally tries to collect information from a representative sample, which is analyzed statistically (Awoniyi, Aderanti & Tayo, 2020). The population for the study consisted of 354 academic staff whose email addresses were accessible. The instrument for the study was a 17-item online survey questionnaire of a five-point Likert scale, from Utmost Important to Not Important, developed by the researcher on determinants of successful research collaborations after a thorough literature review.

The questionnaire was face and content validated with an Alpha correlation coefficient of 0.847, indicating that the instrument is reliable. The communalities of all the items on the questionnaire range from 0.584 to 0.897, further confirming the reliability of all items on the questionnaire. After a persistent follow-up of the online questionnaire, 131 academic staff responded. The data collected was analyzed using descriptive statistics (mean and standard deviation) and factor analysis.

RESULTS

The results of the collected and analyzed data on the determinants of successful research collaborations are presented according to the research questions.

Research Question 1: What are the main determinants of successful research collaborations?

Table 1: Determinants of successful research collaborations

Items	Mean	Std. Deviation	Rank Order
Getting to know your potential partners.	4.4504	.82475	4
Working with people you trust and get along well with	4.0916	.96437	15
Making sure your work style and ethic fit	4.2519	.72688	10
Choosing people who are as motivated as you are to complete the project	4.5115	.74799	2
Clarifying the expected outcomes of the project and the intended outlet.	4.4275	.76491	6
Clarifying expected roles and contributions of collaborators (consensus about who does what and expected timeline for deliverables)	4.4427	.75611	5
Clarifying the leadership and authorship order of the collaboration	4.2595	.72947	8
Respecting differences in working style, timelines, constraints, and availabilities	4.1221	.92006	14
Establishing a clear schedule and meeting regularly	4.2443	.49756	11
Communicating frequently and openly	4.4733	.55923	3
Making the best use of available technologies to facilitate collaborative work	4.2595	.72947	8
Shared accountability for data collection and analysis	4.3130	.70257	7
Sharing contextual knowledge to aid clarity and interpretations	4.2290	.70781	12
Openness to alternative viewpoints and approaches of collaborators	4.5573	.60967	1
Take collaboration as an opportunity to question and revisit your assumptions/an opportunity to learn.	4.1832	.64213	13
Estimating the amount of time and energy required for a project	3.9618	.75859	16
Having a balanced portfolio (collaborating with senior scholars and scholars of the same rank)	3.6870	.89515	17

Table 1 shows the mean, standard deviation, and rank order for the seventeen items of the questionnaire. From the table, Openness to alternative viewpoints and approaches of collaborators with a mean of 4.5573 ranks first, followed by Choosing people who are as motivated as you are to complete the project with a mean of 4.5115. The mean scores for the two items indicated that both are of utmost importance as far as research collaborations are concerned, and the respondents were homogeneous in their responses, with low standard deviations. The majority of the respondents, 105 (80.2%), were involved in

collaborative research in the last three years and therefore experienced factors responsible for successful research collaborations. The result of the analysis, therefore, revealed that the main determinants of successful research collaborations are openness to alternative viewpoints and approaches of research collaborators and choosing people who are as motivated as you are to complete the project. The result is in agreement with that of Ravasi et al. (2024), who find that choosing the right partners is of paramount importance for successful research collaboration.

Research Question 2: What are the dimensions of determinants of successful research collaborations as extracted by factor analysis?

The dimensions of determinants of successful research collaborations were determined using factor analysis. Factor analysis is a statistical technique that reduces a set of variables by extracting all their commonalities into a smaller number of factors. It is used to determine which of a large set of items "hang together" as a group, or are answered most similarly by participants (Leech, Barrett & Morgan, 2005). Factor analysis, therefore, becomes a statistical technique used to see how a group shares a common variance. The significant Bartlett's test of sphericity indicates that items on the questionnaire are capable of hanging together as a group referred to as a factor. The total variance explained by each of the factors is expressed in percentages. (Field, 2005).

The results of the factor analysis indicated that six factors accounted for 76.726% variance in the determinants of successful research collaborations, an indication that the research questionnaire was able to capture 76.726% of the determinants of successful research collaborations. The six factors are: (i) Consensus on collaborative research (15.886%); (ii) Communications to clarify issues on the project (15.317%); (iii) Use of available technologies to facilitate collaborative work (13.546%); (iv) Harmonized shared vision and work ethics (12.972%), (v) Mutual trusts among collaborators (9.590%); and (vi) Openess to alternative viewpoints among collaborators (9.415%).

The results of the factor analysis for the dimensions of determinants of successful research collaborations are presented in Tables 2 to 7 below.

Table 2: Consensus among Researchers on Collaborative Research

Item	Factor Loading	Mean	Std. Deviation
Clarifying the expected outcomes of the project and the intended outlet.	.813	4.4275	.76491
Clarifying expected roles and contributions of collaborators (consensus about who does what and expected timeline for deliverables)	.778	4.4427	.75611
Getting to know your potential partners.	.774	4.4504	.82475
Average		**4.4402**	**.78192**

Variance Accounted for = 15.886%

Table 2 shows that consensus among researchers on collaborative research accounted for 15.886 % variance of the determinants of successful research collaborations. The factor loading of the three items for consensus among researchers on collaborative research had high factor loading, an indication that all the items belong to the theme. The overall mean of

4.4402 shows that consensus among researchers on collaborative research is a very important determinant of successful research collaborations. The low standard deviation of .78192 shows that respondents are homogeneous in their responses. This is in agreement with the study of Malte (2022), who revealed that intrapersonal and interpersonal factors are most significant for the success of a research team.

Table 3: Communications to Clarify Issues on the Project

Item	Factor Loading	Mean	Std. Deviation
Establishing a clear schedule and meeting regularly	.736	4.2443	.49756
Respecting differences in working style, timelines, constraints, and availabilities	.682	4.1221	.92006
Communicating frequently and openly	.650	4.4733	.55923
Estimating the amount of time and energy required for a project	.620	3.9618	.75859
Clarifying the leadership and authorship order of the collaboration	.500	4.2595	.72947
Average		**4.2122**	**.69298**

Variance Accounted for = 15.317%

Table 3 reveals that communications to clarify issues on the project accounted for 15.317 % variance of determinants of successful research collaborations. The factor loading of the five items for communications to clarify issues on the project had high factor loading, an indication that all the items belong to the theme. The overall mean of 4.2122 shows that communications to clarify issues on the project are a very important determinant of successful research collaborations. The low standard deviation of .69298 shows that respondents are homogeneous in their responses. Jadson (2024) opined that regular meetings, open communication channels, and a willingness to engage in constructive feedback are vital for maintaining momentum and addressing challenges in research collaborations.

Table 4: Use of Available Technologies to Facilitate Collaborative Work

Item	Factor Loading	Mean	Std. Deviation
Making the best use of available technologies to facilitate collaborative work	.858	4.2595	.72947
Take collaboration as an opportunity to question and revisit your assumptions/an opportunity to learn.	.719	4.1832	.64213
Average		**4.2213**	**.68580**

Variance Accounted for = 13.546

From Table 4, the use of available technologies to facilitate collaborative work accounted for 13.546% of the variance of the determinants of successful research collaborations. The factor loading of the two items for the use of available technologies to facilitate collaborative work had a high correlation, indicating that both items belong to the theme. The overall mean of 4.2213 shows that the use of available

technologies to facilitate collaborative work is a very important determinant of successful research collaborations. The respondents were homogeneous in their responses, with a low standard deviation of .68580.

Table 5: Harmonized Shared Vision and Work Ethics

Item	Factor Loading	Mean	Std. Deviation
Making sure your work style and ethic fit	.890	4.2519	.72688
Choosing people who are as motivated as you are to complete the project	.555	4.5115	.74799
Shared accountability for data collection and analysis	.536	4.3130	.70257
Sharing contextual knowledge to aid clarity and interpretations	.515	4.2290	.70781
Average		**4.3263**	**.72131**

Variance Accounted for = 12.972%

Table 5 shows that harmonized shared vision and work ethics accounted for 12.972 % variance of the determinants of successful research collaborations. The factor loading of the four items for harmonized shared vision and work ethics had high factor loading, an indication that all the items belong to this factor. The overall mean of 4.3263 shows that harmonized shared vision and work ethics are very important determinants of successful research collaborations. The low standard deviation of .72131 shows that respondents are homogeneous in their responses. Malte's (2022) findings revealed that the success of research cluster collaboration depends on comprehensive agreement on research objectives, close interconnection of the subprojects' research work, and a fair and trusting cooperation climate.

Table 6: Mutual trusts among collaborators

Item	Factor Loading	Mean	Std. Deviation
Working with people you trust and get along well with.	.835	4.0916	.96437

Variance Accounted for = 9.590

From Table 6, mutual trust among collaborators accounted for 9.590% of the variance of the determinants of successful research collaborations. The factor loading of the only item for mutual trust among collaborators was found to be high. The mean of 4.0916 shows that mutual trust among collaborators is a very important determinant of successful research collaborations. The respondents were homogeneous in their responses, with a low standard deviation of .96437.

Table 7: Openness to Alternative Viewpoints among Collaborators

Item	Factor Loading	Mean	Std. Deviation
Open to alternative viewpoints and approaches of collaborators	.759	4.5573	.60967
Average		**4.1211**	**.75241**

Variance Accounted for = 9.415%

Table 7 reveals that openness to alternative viewpoints among collaborators accounted for 9.415% of the variance of the determinants of successful research collaborations. The factor loading of the two items for openness to alternative viewpoints among collaborators had high factor loading, an indication that the two items belong to this determinant. The overall mean of 4.1211 shows that openness to alternative viewpoints among collaborators is a very important determinant of successful research collaborations. The low standard deviation of .75241 shows that the respondents are homogeneous in their responses.

CONCLUSIONS AND RECOMMENDATIONS

The results from the descriptive analysis indicate that openness to alternative viewpoints and the selection of equally motivated collaborators are crucial for successful research collaborations. Factor analysis identified six key determinants of effective collaboration, which include: Consensus among researchers regarding the collaborative research objectives, clear communication to address and clarify project-related issues, utilization of available technologies to enhance collaborative efforts, a harmonized shared vision and work ethic among collaborators, mutual trust among team members, and openness to diverse perspectives within the team. These factors collectively contribute to fostering a productive and successful collaborative research environment.

In light of the study's findings, it is recommended that successful research collaborations be cultivated through several key strategies. These include the establishment of clear and measurable goals, the creation of formal agreements to outline roles and responsibilities, the maintenance of open and transparent communication channels, and the acknowledgment of contributions from all participants. By implementing these practices, collaborators can enhance trust, foster a collaborative spirit, and ultimately achieve more impactful research outcomes.

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