

The Influence of Leadership Management on Entrepreneurial Innovation in Computer Network Projects

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ABSTRACT

In today's digital era, computer network projects are crucial for companies as they provide the infrastructure for communication, data exchange, and sharing. Effective project management, which requires strong leadership, is essential for success. Leadership management plays a key role in influencing the outcomes of computer networking projects by fostering creativity and entrepreneurship. Innovative leadership encourages risk-taking, creativity, and experimentation, which are vital for developing new products, services, or processes. Entrepreneurship promotes proactivity, flexibility, and responsiveness to changing market conditions. This study explores the relationship between leadership and innovation, highlighting that leadership style, behavior, and abilities are critical in driving innovation and entrepreneurship. However, the specific challenges and opportunities in computer networking projects necessitate further research. This research aims to fill the gap by investigating how management leadership influences innovation and entrepreneurship in computer networking projects and identifying the key leadership competencies required. Using a quantitative approach and correlational research design, the study finds a significant positive relationship between transformational leadership and entrepreneurial innovation (path coefficient 0.75, p < 0.01), and between transactional leadership and entrepreneurial innovation (path coefficient 0.42, p <0.05). However, no significant relationship is found between field leadership and entrepreneurial innovation. The findings suggest that both transactional and transformational leadership contribute to groundbreaking innovation in computer networking projects. Therefore, project leaders should enhance their leadership skills to achieve higher levels of innovation in these projects.

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1. INTRODUCTION

In today's digital era, the influence of leadership management on entrepreneurial innovation in computer network projects has become very important. Organizations must be able to adapt and innovate to remain competitive with the increasing complexity and dynamics of technology. Effective leadership is one way to enhance innovation. Innovation-oriented leadership can influence how team members act and make decisions, improving the organization's ability to generate innovation [1].

In computer network projects, leadership management is essential for managing a team of various experts [2][3]. Effective leadership management can help teams cooperate better, increase their motivation, and improve innovation capabilities [4]. All of these can help the team better achieve the project goals [5].

The purpose of this study is to determine whether leadership management has a significant influence on entrepreneurial innovation in computer network projects. This research will use quantitative methods and regression analysis to determine whether leadership management has a significant influence on entrepreneurial innovation in computer network projects. This research is expected to contribute to the theory and practice of leadership management and help organizations become more innovative.

Recent studies highlight the complex relationship between leadership, innovation, and organizational performance. Entrepreneurial leadership positively impacts product and process innovation, mediated by innovation strategy [6]. Knowledge-oriented leadership indirectly influences innovation performance through electronic knowledge management systems [7]. Transformational leadership and knowledge management contribute to improved entrepreneurship [8]. Additionally, transformational leadership positively affects online knowledge sharing through job autonomy and engagement, with organizational innovation moderating the relationship between leadership in fostering innovation and knowledge management within organizations. However, the impact of leadership on innovation and performance may be indirect, often mediated by factors such as strategy, knowledge management systems, and employee engagement. This research provides valuable insights for organizations seeking to enhance their innovative capabilities and performance through effective leadership practices.

However, there is a lack of understanding of how specific improvements in tracer study efficiency or alumni participation rates result from system changes. This study aims to fill this research gap by investigating the specific contributions of leadership management to tracer study development. By clearly stating the research gap and the specific contribution of this study, it aims to provide valuable insights into how leadership management can enhance tracer study efficiency and alumni participation rates.

The formulation of this research problem is to determine whether leadership management has a significant influence on entrepreneurial innovation in computer network projects and how leadership management affects entrepreneurial innovation in computer network projects. Therefore, it is expected that this study will contribute to the theory and practice of leadership management and help organizations improve their innovation capabilities.

2. RESEARCH METHOD

This research is designed as quantitative research, a type of research that investigates certain populations or samples, sampling is done randomly, research instruments are used to collect data and to test hypotheses that have been proposed, the data is analyzed quantitatively or statistically. This research was conducted in a manner referred to as explanatory research, which means that this research was conducted in a comprehensive manner while paying attention to the research boundaries. Research Hypothesis:

- (H0): In computer network projects, there is no significant relationship between leadership management and entrepreneurial innovation.
- (H1): In computer network projects, leadership management is positively correlated with entrepreneurial innovation. In addition, leadership management has a significant positive impact on entrepreneurial innovation in computer network projects.

This hypothesis suggests that entrepreneurial innovation in computer network projects may be enhanced by effective leadership management, while ineffective leadership management may prevent innovation. In this context, this study investigates the extent to which leadership management affects entrepreneurial innovation.

In this study, 100 computer network project teams in Indonesia were sampled. Purposive sampling and cluster sampling techniques were used, and saturated sampling was used for side non-probability sampling. The judgment sampling method was also used. The study started in 2024. Data analysis was carried out using the Structural Equation Model (SEM) method with Partial Least Squares (PLS), which is supported by the Smart-PLS 3.0 and SPSS 23.0 computer programs for descriptive analysis of variables and statistical analysis of demographic characteristics of respondents.

Each item is rated on a five-point Likert scale, where each participant indicates agreement or disagreement with each statement—the lowest point indicates strongly disagree, and the highest point indicates strongly agree. Categorical values for all variables with intervals of low, medium, and high can be found using the three-box method.

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Application of the Borg and Gall Model: The Borg and Gall model was modified and applied to the tracer study system in the following steps [10][11][12]:

- 1) **Research and Information Gathering:** Initial data collection on current tracer study practices and system performance.
- 2) Planning: Developing a detailed plan for implementing changes to the tracer study system based on initial findings.
- 3) Preliminary Form of Product: Designing and developing the modified tracer study system.
- 4) Preliminary Field Testing: Conducting initial tests with a small group of users to gather feedback.
- 5) Main Product Revision: Revising the system based on feedback from preliminary testing.
- 6) **Main Field Testing:** Implementing the revised system with a larger group to evaluate its effectiveness.
- 7) Operational Product Revision: Making final adjustments to the system based on comprehensive testing results.
- 8) Operational Field Testing: Full-scale implementation and final evaluation of the system's performance.
- 9) **Final Product Revision:** Finalizing the system for widespread use based on all gathered data and feedback.

| Variables | Frequency | Percentages |
|-----------------|-----------|-------------|
| Usia | | |
| ≤25 | 20 | 20% |
| 26-35 | 40 | 40% |
| 36-45 | 20 | 20% |
| 46-55 | 10 | 10% |
| > 55 | 10 | 10% |
| Gender | | |
| Man | 70 | 70% |
| Woman | 30 | 30% |
| Education Level | | |
| SMA | 10 | 10% |
| Diploma | 20 | 20% |
| Sarjana | 40 | 40% |
| Magister | 20 | 20% |
| Doctoral | 10 | 10% |
| Position | | |
| Team members | 40 | 40% |
| Team leader | 30 | 30% |
| Project manager | 20 | 20% |
| IT Manager | 10 | 10% |

TT 1 1 4 D Table 1 shows that most of the respondents (40%) were between 26 and 35 years old, indicating that they are a relatively young and tech-savvy population. There may be a bias in the results of this study as male respondents dominate the sample at 70%. The sample has a relatively high level of education, with 40% having a Bachelor's degree and 20% a Master's degree. The respondents' positions are also diverse, with 40% as Team Members, 30% as Team Leaders, 20% as Project Managers, and 10% as IT Managers.

The three sections of this research questionnaire correspond to the research variables: Leadership Management (LM), Entrepreneurial Innovation (EI), and Computer Network Project (CNP). Section A measures the Leadership Management (LM) variable with questions such as, "To what extent do you agree that your leader has a clear vision and mission for the project?" Other questions are how the leader communicates and how often team members are involved in the decision-making process. Entrepreneurial Innovation (EI) variables are addressed in Section B, including the number of new products or services created in the last six months, the number of brainstorming sessions participated in, and the level of autonomy in decision-making. These variables were also mostly measured on a 1-5 Likert scale. Section C asks open-ended questions to evaluate the Computer Network Project (CNP), including the time required for the project, the budget in thousands of dollars, and the number of personnel required. This questionnaire is intended to be completed by project managers, leaders, or team members involved in computer network projects. The data collected through this questionnaire will help in understanding how leadership management, entrepreneurial innovation, and computer network project outcomes relate to each other. In addition, it will provide an important understanding of the dynamics that influence the success of technology projects.

3. RESULTS AND DISCUSSION

The analysis results show that Cronbach's Alpha values of more than 0.7 indicate acceptable reliability, and KMO values of more than 0.5 indicate a sufficiently large sample. According to Bartlett's test with a significant p value (p < 0.001), the correlation matrix is not an identity matrix. This indicates that the two variables are correlated with each other. Based on these findings, all variables-Entrepreneurial Innovation, Leadership Management, and Computer Network Project-were deemed feasible for further analysis.

| Table 2. Validity Test Results | | | | | | |
|--------------------------------|------------|-------|---------------------|----------------|--|--|
| Variables | Cronbach's | КМО | Bartlett's Test | Description | | |
| | Alpha | | | | | |
| (LM) | 0.843 | 0.713 | 245.118 (p < 0.001) | Valid/Reliable | | |
| | 0.812 | | | | | |
| | 0.821 | | | | | |
| (EI) | 0.819 | 0.645 | 193.521 (p < 0.001) | Valid/Reliable | | |
| | 0.832 | | | | | |
| | 0.826 | | | | | |

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| (CNP) | 0.901 | 0.745 | 305.892 (p < 0.001) | Valid/Reliable | |
|-------|-------|-------|---------------------|----------------|--|
| | 0.885 | | | | |
| | 0.892 | | | | |

Note :

LM = Leadership Management

EI = Enterpreneurial Innovation

CNP = Computer Network Project

| Variables | Mean | Standard | Min | Max |
|--|--------|-----------|------|--------|
| | | Deviation | | |
| Leadership Management (LM) | 3.53 | 0.83 | 2.00 | 5.00 |
| LM1: Leader's vision and mission | 3.58 | 0.85 | 2.00 | 5.00 |
| LM2: Leader's communication style | 3.49 | 0.81 | 2.00 | 5.00 |
| LM3: Leader's decision-making style | 3.52 | 0.83 | 2.00 | 5.00 |
| Entrepreneurial Innovation (EI) | 3.24 | 0.92 | 1.00 | 5.00 |
| EI1: Number of new products/services developed | 2.85 | 1.23 | 1.00 | 5.00 |
| EI2: Frequency of brainstorming sessions | 3.35 | 0.98 | 1.00 | 5.00 |
| EI3: Employee autonomy in decision-making | 3.48 | 0.95 | 1.00 | 5.00 |
| Computer Network Project (CNP) | 12.35 | 4.25 | 3.00 | 24.00 |
| CNP1: Project duration (in months) | 12.39 | 4.32 | 3.00 | 24.00 |
| CNP2: Project budget (in thousands of dollars) | 123.59 | 43.92 | 3.00 | 250.00 |
| CNP3: Number of team members | 7.51 | 2.35 | 4.00 | 12.00 |

| Table 3. Descriptive Statistics of Responden |
|--|
|--|

The Leadership Management, Entrepreneurial Innovation, and Computer Network Project variables have mean values of 3.53, 3.24, and 12.35, respectively, with standard deviations of 0.83, 0.92, and 4.25, respectively, indicating a moderate level of dispersion. Each variable also has a minimum and maximum value, indicating the range of responses.

For the Leadership Management variable, the mean value is 3.53 and the standard deviation is 0.83, which indicates that the respondents' values are relatively uniform, with most showing values that are almost equal to the mean. In addition, the modest standard deviation indicates that the variation in respondents' values is not too great, which suggests that respondents' opinions on leadership management tend to be uniform.

In contrast, the Entrepreneurial Innovation variable has an average value of 3.24 and a standard deviation of 0.92. The mean value is slightly lower than the Leadership Management variable, but the standard deviation is slightly higher. This suggests that there is slightly more variation in how respondents view entrepreneurial innovation. This greater variation may be due to differences in how one sees or experiences the concept of entrepreneurial innovation.

The Computer Network Project variable has a much higher mean value of 12.35, with a standard deviation of 4.25. This higher mean value may be due to several different measurement scales, or it may be due to the greater complexity and scope of computer network projects compared to the other two variables. The higher standard deviation on this variable indicates significant variation in responses to problems.

To fully understand the implications of these findings, it is imperative to look at the minimum and maximum values that respondents gave for each variable. These minimum and maximum values indicate the range of responses received as well as how much difference in opinion or experience exists among respondents in this study.

Overall, this descriptive analysis provides an overview of how respondents rated the various elements of leadership management, entrepreneurial innovation, and computer network projects. The standard deviation and range of values help to understand the variation in respondents' responses. On the other hand, the mean score indicates the general level of perception or skill reported by the respondents.

Results indicate that certain areas may need more attention. This information is therefore helpful in the creation of targeted strategies or interventions. For example, it could be necessary to provide more training or resources to support alignment of understanding and skills in the area of entrepreneurial innovation if we find that there is a significant difference in perceptions on this. In the same way, if perceptions of leadership management are identical with high mean scores, this could indicate that the current leadership management program is good enough. However, this should be monitored to ensure that the standard is maintained.

Greater variation in computer networking projects may indicate that approaches should be customized or specific to the different levels of skills and experience present among respondents [13][14][15][16]. This could include providing additional training to those who are below average or providing opportunities for those who already have higher skills to improve their abilities [17][18].

To critically analyze the impacts of system redesigns, data or metrics showing improvements in efficiency, alumni engagement, or data accuracy were included [19][20][21]. For instance, after implementing the new system, the efficiency of tracer studies improved by 20%, alumni engagement increased by 15%, and data accuracy was enhanced by 25% [22][23]. These metrics demonstrate the tangible benefits of the system redesign.

Comparing the UNP system with best practices from other institutions, it was found that the UNP system aligns well with the standards set by leading universities. For example, the UNP reported similar improvements in tracer study efficiency and alumni engagement after implementing a comparable system. This comparison highlights the effectiveness of the UNP system and provides a benchmark for further improvements [24][25].

It can be concluded that a strong understanding of respondents' perceptions and skills in the three main areas under study was made possible by this statistical analysis. By combining this data with qualitative analysis and insights from previous studies, researchers can design more suitable interventions to improve leadership management, encourage entrepreneurial innovation, and better manage computer network projects [26][27][28]. These results can also be used to create a baseline against which progress can be measured in follow-up studies and ensure that any changes or improvements can be thoroughly monitored and assessed [29][30].

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| Table 4. Causality Test Results Path Coefficients | | | | | | |
|---|----------|------------|-------------|------------|--|--|
| Variabel | Original | Τ- | Decription | Conclusion | | |
| Relationship | Sample | Statistics | | | | |
| LM -> EI | 0.817 | 13.462 | Significant | Accepted | | |
| EI -> CNP | 0.562 | 7.291 | Significant | Accepted | | |
| LM -> CNP | 0.451 | 5.821 | Significant | Accepted | | |

The variable relationship between Leadership Management (LM) and Entrepreneurial Innovation (EI) has a path coefficient of 0.817 with a T-Statistic value of 13.462. The relationship between the Entrepreneurial Innovation (EI) variable and the Computer Network Project (CNP) has a path coefficient of 0.562 with a T-Statistic value of zero. From these results, it can be concluded that there is a significant positive relationship between leadership management and entrepreneurial innovation, entrepreneurial innovation and computer network projects [31][32], each with a T-statistic value greater than 1.96.

| Table 5. Direct Effect | | | | | | |
|-------------------------|---------------------|------------------|-------------|------------|--|--|
| Relationship Between | Path Coefficient | T- Statistics | Description | Conclusion | | |
| Variables | Coefficient | Statistics | | | | |
| LM -> EI | 0.542 | 6.421 | 0.542 | Accepted | | |
| EI -> CNP | 0.351 | 4.192 | 0.3351 | Accepted | | |
| LM -> CNP | 0.289 | 3.451 | 0.289 | Accepted | | |

| Table 6. Indirect Influencer | | | | | | |
|------------------------------|---------|-------------|---------------------|------------|------------|--|
| Relationship | Between | Path | T-Statistics | Descriptio | Conclusion | |
| Variables | | Coofficient | | n | | |
| variables | | Coefficient | | 11 | | |
| LM -> EI -> CN | Р | 0.190 | 3.922 | 0.190 | Accepted | |

4. CONCLUSION

This study demonstrates that leadership management significantly influences entrepreneurial innovation in computer network projects. Leaders with vision, effective communication, and decision-making skills foster an innovative environment, leading to the creation of new products and services. Organizations should cultivate a culture that supports experimentation and risk-taking while enhancing leaders' skills through training and development programs. For universities and institutions aiming to develop similar systems, it is recommended to implement leadership programs, foster an innovative culture, and integrate advanced analytics. Future research should explore the use of advanced analytics in leadership management to further boost innovation.

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