USE OF ENABLING LEVERS AND CONSTRAINING LEVERS TO RADICAL INNOVATION: INTERVENTION OF KNOWLEDGE SHARING AND TECHNOLOGICAL TURBULENCE

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ABSTRACT

Purpose: This study investigates how the absorptive management control system affects in the development of radical innovation. The purpose of this paper is to analyze the influence of using different types of management control (enabling levers and constraining levers) on radical innovation, which is mediated by knowledge sharing and moderated by technological turbulence.

Methods: This study uses a methodology partial least squares structural equation modeling and qualitative comparative analysis have been applied to a sample of 253 Indonesian startups.

Results and Conclusion: Enabling levers and constraining levers have an influence in generating the necessary knowledge sharing for a company to transfer information within, which affects the production of radical innovation, meaning innovation that is in line with market development and demand. Technological turbulence, as a moderator, has a relationship between knowledge sharing and radical innovation.

Implication of research: The results can be useful for managers of startups in the traction stage, as the research highlights different management controls and possible combinations that can be used to drive radical innovation. Additionally, the research highlights the role of knowledge sharing in promoting radical innovation, especially in the context of technological turbulence.

Keywords: radical innovation, technological turbulence, knowledge sharing, enabling levers, constraining levers.

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RESUMO

Objetivo: Este estudo investiga como o sistema de controle de gestão absorviva afeta o desenvolvimento da inovação radical. O objetivo deste artigo é analisar a influência do uso de diferentes tipos de controle de gestão (alavancas capacitadoras e de restrição) na inovação radical, que é mediada pela partilha de conhecimento e moderada pela turbulência tecnológica.

Métodos: Este estudo utiliza uma metodologia de modelagem de equações estruturais parciais de mínimos quadrados e análise comparativa qualitativa foram aplicadas a uma amostra de 253 startups indonésias.

Resultados e Conclusão: As alavancas capacitantes e limitadoras têm influência na geração da partilha de conhecimentos necessária para uma empresa transferir informações dentro da empresa, o que afeta a produção de inovação radical, o que significa inovação que está em consonância com o desenvolvimento do mercado e a demanda. A turbulência tecnológica, como moderador, tem relação entre compartilhamento de conhecimento e inovação radical.

Implicação da pesquisa: Os resultados podem ser úteis para os gerentes de start-ups na fase de tração, já que a pesquisa destaca diferentes controles de gestão e possíveis combinações que podem ser usadas para impulsionar a inovação radical. Além disso, a pesquisa destaca o papel da partilha de conhecimento na promoção da inovação radical, especialmente em contexto de turbulência tecnológica.

Palavras-chave: inovação radical, turbulência tecnológica, partilha de conhecimentos, alavancas facilitadoras, alavancas limitadoras.

1 INTRODUCTION

Innovation is recognized as a powerful tool for improving enterprise performance. Innovation is the development or utilize of fresh, original concepts, goods, methods, or services that bring genuine benefits to organizations who embrace them. The two main categories of innovation in the industry are (i) radical innovation, which involves the implementation of completely new and distinctive products, processing, or services; and (ii) incremental innovation, which involves the continuous development or improvement of products, processing, or services (Endenich et al., 2022b). In the industry, these two types of innovation are not utilized in the same way. Large initiatives are better suited for radical innovation since they allow for radical experimentation and development, remarkable investment, the creation of entirely new knowledge, procedures, or products, as well as longer payback times (Barba-Aragón & Jiménez-Jiménez, 2020). Startups utilize various MCS depending on their aims and strategies, and these controls are
important to organizational effectiveness (Santos et al., 2022). Startup growth and the level of MCS usage together.

The Management Control System (MCS) is divided into two categories in this research: constraining levers and enabling levers. According to earlier research (Baird et al., 2019), MCS is measured by enabling levers and constraining levers. This study takes measurements of enabling levers and constraining levers because it is very rare to do research that separates the two sides, namely the positive which consists of interactive and beliefs. The negative consists of boundary and diagnostic.

Although earlier researches looked into the connection between MCS and innovation, their outcome were inconsistent. The explanation that follows will outline certain research gaps on the connection between MCS utilize and innovation, which will provide as a justification and impetus for additional research. Supported information sharing among staff members be able to lead to innovation, which will have an effect on the enterprise (Koenig, 2011; Wang et al., 2023).

Knowledge sharing belong both positive and harmful effects, according to a number of literary sources. First, it implies that the influence of knowledge sharing is holistic and be able to be separated into three categories: individual, team, and organizational, according to research outcome (Ahmad, 2021). This shows that information sharing is advantageous for both people and companies. Second, creativity, comprehending, and performance are the three aspects of information sharing that have received the most research. Third, sharing knowledge belong a number of effects on the workplace. For instance, it helps to promote teamwork. It promotes socializing, establishes trust, promotes reciprocity, fosters achievement, and fosters appreciation as a highly interactive activity.

The performance of a corporation will be directly impacted by innovation's ability to boost market value (Usman Shehzad et al., 2022). Technology must assist this creativity. Companies typically react to changes more swiftly as a outcome of technological disruption. This usually necessitates more management oversight, which affects innovation (Santos & Beuren, 2022).Rapid market innovation and variations in customer behavior necessitate fundamental rivalry in enterprise operations. According to (Scaringella et al., 2017), radical innovation is required to increase corporate performance since it be able to help enterprise compete in the market by engaging client demand. As
the primary answer in an industry, radical innovation is a very novelty and different innovation (Yusof et al., 2023).

Since new enterprise are heavily influenced by technology, this research factualized on them. As a outcome, this research makes a number of contributions. Instead of examining MCS in general, the first is the impact of management control system components (enabling levers and constricting levers) on the radical innovation processing in startup organizations. Considering the intricate nature of the association between management control systems (MCS) and creativity, this research also includes the moderating variable of technical turbulence and the mediating variable of information sharing, both of which have never been studied in the context of startups. Thirdly, unlike other researches that concentrated on high-tech or technology-based companies, this research factualizes on startups by a variety of industries. The research's findings are valuable in that they offer fresh perspectives on how and when varied management control information aids (or hinders) product creation in startups.

2 LITERATURE REVIEW
2.1 ENABLING LEVERS

2.1.1 Belief System

Employees are encouraged and motivated to seek out, discover, create, and perform actions that are in line by the proper course of action by the beliefs system, which effectively conveys fundamental values. (Biswa & Akroyd, 2022) this approach is primarily concerned by the implementation of strategy by the perspective of strategy.

2.1.2 Interactive System

In order to promote organizational dialogue and comprehending, which in turn outcome by proactive responses like strategy development, top managers regularly and personally engage in decision-making activities in the face of strategic uncertainties (such as technology, regulation, and competition) (Müller-Stewens, 2020). Top managers instruct the entire organization to concentrate on strategic uncertainties by using the interactive control system (Frezatti et al., 2017a). In order to promote organizational comprehending and the creation of fresh concepts and tactics, the interactive control system is utilized (Müller-Stewens et al., 2020).
2.2 CONSTRAINING LEVERS

2.2.1 Boundary Control System

Top managers utilize the boundary system, a formal framework, to set forth clear guidelines and needs that must be followed (Curtis, 2017). In order to accomplish strategic objectives and foresee potential hazards, the boundary control system must support firm operations (Endenich et al., 2022a).

2.2.2 Diagnostic Control System

A formal information system utilized by managers to track organizational performance and departures by predetermined norms is the diagnostic control system (Bisbe et al., 2019). For two reasons, the diagnostic system displays negative strength. One way that diagnostics are utilized is to concentrate on mistakes and modifications that are detrimental. The indicators of deviation, on the other hand, appear when the goals and output of the adjustment processing are inversely correlated in the feedback signal (Baird et al., 2019). Because they alert managers to potential negative changes and probable mistakes that could occur during the execution of specified strategies, diagnostic control systems are seen as negative levers of control (Bedford, 2015).

3 HYPOTHESIS DEVELOPMENT

3.1 MANAGEMENT CONTROL SYSTEM FOR KNOWLEDGE SHARING

Knowledge sharing is the processing by which people exchange information by one another about particular topics and experiences. It is created by using conversation, experience sharing, and comprehending (Baker, 2020; Nezafati et al., 2021). Knowledge sharing is a crucial strategic supplies for fostering innovation by organizations (Deng et al., 2022).

A lot of exchanges or information sharing are seen in an atmosphere that encourages such engagement (Nurrachman et al., 2019). Consequently, informality fosters interpersonal interaction and dialogue, facilitating the establishment of trust, which serves as the cornerstone for knowledge exchange (Le & Le, 2023). Training programs, organized work teams, and incentive-based systems be able to all promote formal prospects (Thneibat, 2021). In this prospects, formal engagement is planned by the organization so that people be able to explicitly comprehend and share knowledge (Kumar et al., 2020). Additionally, people are given the tools they require to accomplish...
this purpose. Interpersonal connections and social networks, which support information sharing and comprehending as well, serve as the foundation for informal possibilities (Gong et al., 2022). Accordingly, it is possible to hypothesize:

H1: Enabling levers positively affects on knowledge sharing

A supportive environment for sharing and maximizing information flow inside the enterprise is provided by the Management Control System (MCS) (Radtke et al., 2023). Different management techniques be able to nurture, develop, and enhance information sharing in order to harmonize corporate goals (Ahmad & Karim, 2019), hence fostering a flexible work environment that will allow these practices to proliferate (Beuren et al., 2021). Various managerial controls be able to be linked to both formal and informal prospects for knowledge sharing.

The border system regulates strategy as a position, making sure that commercial actions take place by in specified product markets and by a reasonable amount of risk (Simons, 1995). The diagnostic control system controls strategy as a planning tool, ensuring that the planned performance targets be able to be achieved.

H2: Constraining levers positively affects on knowledge sharing

3.2 KNOWLEDGE SHARING FOR RADICAL INNOVATION

Knowledge sharing is the act of putting a person's information at the disposal of others by an organization in a way that allows them to absorb and utilize it, according to earlier research (Güldenpfennig et al., 2021) (Abd-mutalib et al., 2022). The research also clarifies how knowledge sharing and reporting activities are distinct by one another. While information sharing is a voluntary action, reporting activities are carried out as a outcome of duties and obligations that employees have at work. We live in a culture that is dependent on knowledge, and the knowledge that enterprise have access to is a strategically signified able to supplies—some even view it as a fundamental skill and a driver of corporate performance (Farooq, 2018).

Given that knowledge is one of the most valuable commodities in the modern technology era, openness to information creates a special wealth for enterprise. The transfer of knowledge and organizational innovation both depend heavily on knowledge sharing (Pešalj et al., 2018). Additionally, knowledge is the main driver of innovation by a corporation. Employees might develop innovative ideas by using sharing knowledge. Employees will get insights that inspire innovative ideas when knowledge is effectively
and broadly shared. These innovative concepts are subsequently put to utilize as capital to carry out firm-wide innovation, both in terms of products and processing, that be able to increase the effectiveness of the firm (Radtke et al., 2023). Therefore, the research's central hypothesis is that knowledge exchange fosters corporate innovation. It is thought that an organization's level of creativity increases by its level of information sharing. Consequently, it be able to be assumed that:

H3: The use of knowledge sharing positively affects on radical innovation.

3.3 TECHNOLOGICAL TURBULENCE BELONG A CORRELATION BETWEEN KNOWLEDGE SHARING AND RADICAL INNOVATION

Technological turbulence is defined as changes in technology that take place in the environment in which the organization is embedded (Santos et al., 2022). Companies are more likely to adapt to changes more quickly in a technologically volatile environment because here is where they may differentiate themselves and obtain a competitive edge (Chenhall, 2015). As organizations strive to examine theirs and the demand for diverse and extensive information for product innovation increases (Henri & Wouters, 2020), research belong shown that the utilize of MCS be able to assist to enhanced innovation in more turbulent environments (Müller-Stewens, 2020). To keep up by these changes and close information gaps brought on by this uncertainty, a faster and more effective MCS is required as technological turbulence increases. The findings demonstrate that firms utilize a mix of formal and informal control systems for their crucial strategic enterprise activities in order to adapt to uncertain circumstances (Laguir et al., 2022). They also discovered that the kind of control systems utilized ultimately depends on the inherent uncertainties in enterprise processing. Furthermore, Muller-Stewens et al. (2020) discovered a positive correlation between the utilization of controls in innovation and technical turbulence, highlighting how these controls facilitate innovation in contexts characterized by rapid adaptation needs.

We anticipate that start-up enterprise working in fast-paced technology environments will require to utilize various types of management control more frequently in order to keep an eye on environmental risks and support the innovation processing. This is According to the data and arguments offered. The emergence of radical innovation changes is facilitated by the availability of knowledge sharing and supporting technology. So, here is the claim that requires to be made:
H4: Technological turbulence positively moderates the affect of using knowledge sharing on radical innovation.

3.4 MANAGEMENT CONTROL SYSTEM FOR RADICAL INNOVATION: ENABLING AND CONSTRAINING LEVERS

The two evaluations that make up MCS are allowing levers by a positive direction (interaction system and belief system) and constraining levers by a negative direction (boundary system and diagnostic system). The belief system and interaction system are examples of enabling levers that promote the pursuit of prospects and the formulation of novel strategic initiatives is crucial for startups that aim to pursue innovation (Simons, 1995). Innovative start-ups may benefit by the adoption of interactive control systems.

First of all, interactive control encourages experimentation, which be able to outcome in the identification of outdated processing that be able to be deleted (uncomprehended), then redesigned in a different way. For innovation, where change happens across many disciplines, this new corporate image is essential. Second, according to (Söderlund & Hansson, 2020), start-ups functioning in dynamic contexts frequently produce more uncertainty by in the enterprise. In this situation, interactive control systems' intensive two-way communication between management and workers be able to promote cohesion and deter disruptive conduct (Henri, 2006). In fact, empirical research shows how interactive systems be able to improve performance and creativity in enterprise that are dealing by the risks and uncertainties of innovation (Müller-Stewens, 2020). Third, contentious discussions by in startups made possible by interactive MCS might outcome in a reevaluation of present elements like client segments, important partners, and revenue streams (Zarzycka et al., 2019). Employees be able to identify areas for improvement thanks to the current enterprise model's enhanced comprehending, and it be able to act as a catalyst for reengineering creative routines, practices, and structures by using joint creation initiatives by clients (Aaltola, 2018). Fourth, experimentation is encouraged via interactive control, which also encourages interaction and the emergence of ideas.

The procedure also fosters a greater comprehending of the impact one's work belong on other people's efforts (Bisbe et al., 2019). One might anticipate that such greater awareness will boost employee enthusiasm, encourage comprehending, and
facilitate the open exchange of ideas required to produce radical innovation. Consequently, the following hypothesis be able to be put forth:

H5: Enabling Levers positively affect on Radical Innovation

The diagnostic control system and boundary system serve as the measured constraining levers. The diagnostic control system not only gives workers specific goals to work toward, but it also outlines how to accomplish them. Hence, integration diagnostic systems and boundaries be able to be regarded as highly effective in the well-structured processing of innovative activities, as it provides formal objectives and guidance in comprehending the domain of innovation. Employees necessitate clearly defined and enforceable regulations by in the boundary system, given that the targets established by in the diagnostic control system are often set at challenging levels, as they may be tempted to go over and beyond permitted levels to achieve their goals. As an outcome, the following hypothesis may be put forth:

H6: Constraining levers positively affect on radical innovation

Figure 1: Conceptual Model and Research Hypotheses

Source: Conceptual Model Author

4 RESEARCH METHODOLOGY

4.1 SAMPLING AND DATA COLLECTION

The mid- to upper-level leaders in Indonesian startup enterprises make up the research's population. Because they be able to articulate their firm's strategy, mid- to upper-level leaders in new enterprises were chosen as responders (Berg & Madsen, 2020). In this research, mid- to upper-level leaders in Indonesia served as the analytical unit. Purposive sampling was the method of sampling utilized in this investigation. Purposive
sampling was utilized in this research to make sure that the right subjects provided the researcher by the relevant data. Primary data were gathered for this research by distributing questionnaires via email and social media. There were 400 questionnaires distributed, but only 120 respondents returned them. 27 of the 280 questionnaires that were submitted were utilized less because they were completed by people in lower-level leadership roles rather than the mid- to upper-level leaders that this research required. As an outcome, 253 questionnaires were available for the data assessment. In other words, 64% of the questionnaires were returned.

4.2 MEASUREMENT OF VARIABLES

All constructs were determined using multiple items, as indicated in the Appendix, by statements adjusted by previous researches. A seven-point Likert scale ranging by 1 (strongly disagree) to 7 (strongly agree) was utilized to measure all items.

The interaction between an interactive system and a belief system is what this research measures as an enabling lever. Employees are encouraged and motivated to seek out, investigate, create, and take part in acts that are in line by the best course of action by the beliefs system, which effectively conveys fundamental values. This system primarily belongs to do by how strategy is put into practice, especially strategy as a perspective (Simons, 1995). Managers of a corporation regularly and personally participate in decision-making processing by in the organization using an interactive. The eleven questions on the instrument were created by (Frezatti et al., 2017a) and (Henri, 2006)

Knowledge sharing is a strategy or action utilized in knowledge management to provide and spread information by a person, department, organization, institution, or enterprise in order to lay the groundwork for collaboration. In order to generate ideas and innovations that will assist to an organization's sustainability, knowledge sharing is a component of knowledge management. The five questions that make up the instrument were created by (Ahmad, 2021).

Technological turbulence is the amount of technological changes that occur by using out time in a certain industry and the degree to which those changes have an impact on that industry. The degree to which the environment undergoes unanticipated technological developments is referred to as technological turbulence. Four questions created by comprise the research instrument.
Radical innovation is a fundamental change in products, services, or the introduction of entirely new ways in organizational processing, products, and services that are deliberately tailored to engage the needs of new customers and markets by introducing new designs or offerings, creating fresh market prospects, or developing innovative distribution channels. The instrument comprising six questions was developed by (Frezatti et al., 2017a)

4.3 METHODS OF DATA ASSESSMENT

SEM-PLS, or structural equation modeling-partial least squares, is the data assessment technique utilized in this research. According to the beginning of the article, there are two types of SEM: covariance-based SEM (CB-SEM) and variance-based SEM, often known as partial least squares (SEM-PLS) (Hair, 2017). In order to support numerous sample observations, The PLS method utilizes the bootstrap approach to determine the statistically remarkable of the regression coefficients in the structural model (Nooman, 2019). In accordance by the bootstrap method, the model incorporated all mediating variables simultaneously to examine both direct and indirect effects. Conversely, moderation was determined using the product indicator approach by including the interaction term (Beuren et al., 2022).

5 ASSESSMENT AND CONCLUSIONS

5.1 VALIDATION AND RELIABILITY TESTING FOR THE OUTER MODEL

Convergent validity is an integral aspect of the measurement model in Structural Equation Modeling by Partial Least Squares (SEM-PLS), commonly known as the outer model. On the other hand, Confirmatory Factor Assessment (CFA) is a component of the measurement model in covariance-based. Two criteria are utilized to determine If the outer model fulfills needs for achieving convergent validity in Self-reflecting concepts: (1) loadings should exceed 0.7, with (2) the p-value should be statistically Remarkable (0.05). However, in some circumstances, especially for recently developed surveys, the require for a loading exceeding 0.7 is frequently not reached. As an outcome, state that loadings between 0.40 and 0.70 should still be regarded as being maintained. The composite reliability is 0.7 and the AVE limit value is 0.50. The effect on the construct’s content validity of deleting indications is another factor to take into account. Because they
add to the construct’s content validity, indicators by low loadings are occasionally (Hair, 2017).

Figure 5.1 Validity Testing Using the LoadingFactor

Table 5.1 Discriminant Validity according to the Fornell Larcker Criterion

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constraining Levers (CL)</td>
<td>(0.948)</td>
<td>0.374 (0.946)</td>
<td>0.624</td>
<td>0.643</td>
<td>0.978</td>
<td>0.972</td>
</tr>
<tr>
<td>Enabling Levers (EL)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Knowledge Sharing (KS)</td>
<td></td>
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<tr>
<td>Radical Innovation (RD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technological Turbulence (TT)</td>
<td>0.102</td>
<td>0.146</td>
<td>0.251</td>
<td>0.102</td>
<td>0.989</td>
<td></td>
</tr>
<tr>
<td>TT*KS</td>
<td>0.033</td>
<td>0.049</td>
<td>-0.361</td>
<td>0.035</td>
<td>-0.021</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Results of data analysis by author

In the determinant of discriminant validity, the square root of the AVE for each latent variable is compared to the correlation coefficients between that latent variable and other latent variables. The square root of the AVE for each latent variable is found to be higher than the correlation coefficients between that latent variable and other latent variables, as expected. Consequently, it be able to be concluded that discriminant validity belongs been established.
5.2 OUTCOME OF REMARKABLE TEST OF INFLUENCE (BOOTSTRAPPING)

Table 5.2 Path Coefficient Test & Significant Test of Influence

<table>
<thead>
<tr>
<th>Panel A - Direct Effects</th>
<th>Original Sample (O)</th>
<th>Sample Mean (M)</th>
<th>Standard Deviation (STDEV)</th>
<th>t-value</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Enabling levers &gt; Knowledge Sharing</td>
<td>0.476</td>
<td>0.473</td>
<td>0.088</td>
<td>5.442</td>
<td>0.000</td>
</tr>
<tr>
<td>H2: Constraining Levers &gt; Knowledge Sharing</td>
<td>0.446</td>
<td>0.446</td>
<td>0.091</td>
<td>4.901</td>
<td>0.000</td>
</tr>
<tr>
<td>H3: Knowledge Sharing &gt; Radical Innovation</td>
<td>0.418</td>
<td>0.425</td>
<td>0.150</td>
<td>2.797</td>
<td>0.003</td>
</tr>
<tr>
<td>H4: Technological Turbulence * Knowledge Sharing &gt; Radical Innovation</td>
<td>0.147</td>
<td>0.151</td>
<td>0.076</td>
<td>1.945</td>
<td>0.026</td>
</tr>
<tr>
<td>H5: Enabling levers &gt; Radical Innovation</td>
<td>0.280</td>
<td>0.281</td>
<td>0.125</td>
<td>2.236</td>
<td>0.013</td>
</tr>
<tr>
<td>H6: Constraining Levers &gt; Radical Innovation</td>
<td>0.267</td>
<td>0.259</td>
<td>0.119</td>
<td>2.250</td>
<td>0.012</td>
</tr>
</tbody>
</table>

Source: Results of data analysis by author

According to the outcome in Table 4.2, it was found that enabling levers belong to a positive and remarkable effect on knowledge sharing, by a coefficient value (Original Sample column) = 0.476, and remarkable by a P-Values = 0.000 < 0.05 (Hypothesis 1 Accepted). Knowledge sharing is the processing by which people exchange information by one another about particular topics and experiences. It is created by using conversation, experience sharing, and comprehending (Baker, 2020; Nezafati et al., 2021). Additionally, people are given the tools they require to accomplish this purpose. Interpersonal connections and social networks, which support information sharing and comprehending as well, serve as the foundation for informal possibilities (Gong et al., 2022).

Constraining levers belong to a positive and remarkable effect on knowledge Sharing, by a coefficient value (Original Sample column) of 0.446, and remarkable, by a P-Values value of 0.000 < 0.05 (Hypothesis 2 Accepted). The border system regulates strategy as a position, making sure that commercial actions take place by in specified product markets and by a reasonable amount of risk (Simons, 1995). The diagnostic control system controls strategy as a planning tool, ensuring that the planned performance targets be able to be achieved.

Knowledge sharing belong to a positive and remarkable effect on radical innovation by a coefficient value (Original Sample column) = 0.418, and remarkable, by a P-Values value = 0.003 < 0.05 (Hypothesis 3 Accepted). Employees will get insights that inspire
innovative ideas when knowledge is effectively and broadly shared. These innovative concepts are subsequently put to utilize as capital to carry out firm-wide innovation, both in terms of products and processing, that be able to increase the effectiveness of the firm (Radtke et al., 2023). Therefore, the research's central hypothesis is that knowledge exchange fosters corporate innovation. It is thought that an organization's level of creativity increases by its level of information sharing.

hypothesis is that knowledge exchange fosters corporate innovation. It is thought that an organization's level of creativity increases by its level of information sharing.

Technological turbulence moderates the effect of knowledge sharing on radical innovation, by a P-Values value = 0.026 < 0.05. (Hypothesis 4 Accepted). We anticipate that start-up enterprise working in fast-paced technology environments will require to utilize various types of management control more frequently in order to keep an eye on environmental risks and support the innovation processing. This is According to the data and arguments offered. The emergence of radical innovation changes is facilitated by the availability of knowledge sharing and supporting technology.

Enabling levers belong a positive and remarkable effect on radical innovation, by a coefficient value (Original Sample column) = 0.280, and remarkable, by a P-Values value = 0.013 < 0.05 (Hypothesis 5 Accepted). Employees be able to identify areas for improvement thanks to the current enterprise model's enhanced comprehending, and it be able to act as a catalyst for reengineering creative routines, practices, and structures by using joint creation initiatives by clients (Aaltola, 2018). Experimentation is encouraged via interactive control, which also encourages interaction and the emergence of ideas. The procedure also fosters a greater comprehending of the impact one's work belong on other people's efforts (Bisbe et al., 2019). One might anticipate that such greater awareness will boost employee enthusiasm, encourage comprehending, and facilitate the open exchange of ideas required to produce radical innovation.

Constraining levers belong a positive and remarkable effect on radical innovation, by a coefficient value (Original Sample column) = 0.267, and remarkable by a P-Values = 0.012 < 0.05 (Hypothesis 6 Accepted). Hence, integration diagnostic systems and boundaries be able to be regarded as highly effective in the well-structured processing of innovative activities, as it provides formal objectives and guidance in comprehending the domain of innovation. Employees necessitate clearly defined and enforceable regulations by in the boundary system, given that the targets established by in the diagnostic control
system are often set at challenging levels, as they may be tempted to go over and beyond permitted levels to achieve their goals.

6 DISCUSSION

6.1 REVIEW AND IMPLICATIONS

According to the research's findings, radical innovation is facilitated by startup companies' utilize of managerial control, and knowledge sharing is an important and strategic component of the innovation processing in startups. Startups operating in a setting of technological turbulence have more and more varied information requires, some of which are essential to the radical innovation processing. In this situation, startups communicate by clients in other ways to comprehend more about their goods and gauge their utility while innovating. Given that individuals be able to utilize their knowledge to address issues and challenging circumstances and knowledge sharing belong been demonstrated to have a positive impact on radical innovation as it serves as the cornerstone for the development of new products and technologies (Deng et al., 2022). The value of knowledge sharing the startup environment when technology changes present prospects. Empirical evidence indicates that, apart by considering the correlation between management control systems (MCS) and innovation, other factors such as technological disruption, knowledge sharing, and supplies availability play remarkable roles in explaining the adoption of diverse types of management control systems (Müller-Stewens, 2020). The fact that technological turbulence was remarkable to innovation in all scenarios shows that enterprise engaged in radical innovation have prospects as a outcome of technical advancements.

6.2 IMPLICATIONS FOR THEORY AND PRACTICE

The findings of this research have consequences for literature and organizational practices. The comprehending of the connection between MCS and radical innovation in new enterprise is expanded by this research. The research examines how linked data coming by various management controls (enabling levers and limiting levers) that are connected to innovation in start-up enterprise are utilized. This research adds technology turbulence and knowledge sharing to the body of literature. It is acknowledged that information sharing is important for both innovation and the operational and financial success of the enterprise (Pešalj et al., 2018). However, there belong been limited
exploration by in the field of knowledge management academics regarding the management processes associated by strategy formulation, organizational structure, and control (Bortoluzzi et al., 2020).

Our research furthers this field by demonstrating that the environment in which startups operate and the suppliers at their disposal have an impact on the MCS utilized for innovation. The ability of these firms to generate innovation depends on their comprehending of these issues.

Therefore, startups should consider its internal management, including structure and MCS, as well as external environmental elements, such technological turbulence, that be able to aid in innovation and information exchange. Professionals working in startups be able to benefit by these findings since they be able to assist them discover the management controls that facilitate more effective and efficient innovation.

6.3 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The primary limitation of this research is the potential deviation in the standard procedure brought on by the utilize of self-report data. We were unable to conduct a more thorough longitudinal assessment of the analyzed conceptual structure because this research was According to cross-sectional data. Because the many forms of explored MCS were examined separately, the theoretical model choice in and of itself is a limitation. Future research be able to examine the interconnectedness of different MCS subtypes or test the suggested connections using other types of control. Additional research may examine the impact of external factors like market volatility as well as other aspects of innovation, such as product innovation and innovation in enterprise models.

7 CONCLUSIONS

There exist research gaps concerning the specific mechanisms and timing through which the utilization of management control systems (MCS) facilitates innovation in startup enterprises, despite prior researches examining the correlation between MCS usage and innovation. The types of management controls implemented by these enterprise have a remarkable influence on the innovation outcomes. In order to produce radical innovation, this research belong examined the impact of applying several types of managerial control (enabling levers and restrictive levers). This research reinforces the
role of knowledge exchange and technological turbulence in mediating the role of managerial control (MCS) in generating radical innovation in start-up enterprise.
REFERENCES


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Müller-Stewens, B., Widener, S. K., Möller, K., & Steinmann, J. C. (2020). The role of diagnostic and interactive control uses in innovation. Accounting, Organizations and


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**APPENDIX**

Please respond to the following questions based on your experience and understanding. Rate each item on a scale of 1 to 7, where 1 represents "accomplishly disagree" and 7 represents "totally agree."

<table>
<thead>
<tr>
<th>Items</th>
<th>Supporting theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enabling Levers</td>
<td></td>
</tr>
<tr>
<td>• Interactive use:</td>
<td>(Henri, 2006) (Frezatti et al., 2017a)</td>
</tr>
<tr>
<td>EL1: Developing discussions in meetings with superiors, subordinates, and colleagues</td>
<td></td>
</tr>
<tr>
<td>EL2: Developing challenges and debates based on data, assumptions, and action plans.</td>
<td></td>
</tr>
<tr>
<td>EL3: Providing an overview of the organization.</td>
<td></td>
</tr>
<tr>
<td>EL4: Commitment to the organization.</td>
<td></td>
</tr>
<tr>
<td>EL5: Focusing on key issues.</td>
<td></td>
</tr>
<tr>
<td>EL6: Focusing on success factors.</td>
<td></td>
</tr>
<tr>
<td>EL7: Developing a common language within the organization.</td>
<td></td>
</tr>
<tr>
<td>• Belief Sistem</td>
<td></td>
</tr>
<tr>
<td>EL8: The company's mission statement is clearly communicated to all employees.</td>
<td></td>
</tr>
<tr>
<td>EL9: Top managers communicate the company's core values to employees.</td>
<td></td>
</tr>
<tr>
<td>EL10: The workforce is aware of the company's core values.</td>
<td></td>
</tr>
</tbody>
</table>
EL11: The company's mission statement inspires employees

2. Constraining levers (CL) (Frezatti et al., 2017b) (Baird et al., 2019)
   - **Diagnostic System**
     CL1: Tracing progress.
     CL2: Monitoring results.
     CL3: Comparing results with expectations.
     CL4: Reviewing key success measures.
   - **Boundary system**
     CL5: Companies rely on a code of ethics to determine ethical behavior for employees.
     CL6: Behavioral guidelines in the company inform employees about prohibited behaviors.
     CL7: Companies have a system to communicate the risks that employees must avoid.

<table>
<thead>
<tr>
<th>Items</th>
<th>Supporting theory</th>
</tr>
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<tbody>
<tr>
<td>3. Knowledge Sharing (KS) (Ahmad, 2021), (Santos et al., 2022)</td>
<td></td>
</tr>
<tr>
<td>KS1: I share the expertise I gain from my education or training with other team members.</td>
<td></td>
</tr>
<tr>
<td>KS2: I share my experiences or knowledge upon the request of other team members.</td>
<td></td>
</tr>
<tr>
<td>KS3: I always provide my know-where or know-who upon the request of other team members.</td>
<td></td>
</tr>
</tbody>
</table>
KS4: I provide manuals, methodologies, and models for these team members.

KS5: I often provide work reports and official documents to these team members.

4. Technological Turbulence (TT) (Santos et al., 2022)

TT1: Technology changes quickly in companies.
TT2: Technological changes provide significant opportunities.
TT3: It is difficult to predict where technology is headed.
TT4: The process of developing small technology.

5. Radical Innovation (RD) (Frezatti et al., 2017a) (Arifin & Info, 2022)

RI1: creating recent creations or services to overcome obstacles.
RI2: new discoveries are typically driven by explorations in applicable technology.
RI3: there is a high level of risk involved in exploration.
RI4: innovators typically come from individuals and line units.
RI5: the procedure begins by clear informal procedures and rules.
RI6: business plans grow based on new discoveries