

Administration Of Technology Business Incubation (TBI) Programs in Ilocos Region

Joyce T. Alejo

Innovation and Technology Directorate, Technology Business Incubation Unit, Mariano Marcos State University, City of Batac, Ilocos Norte

Orlino J. Mandac

College of Business, Economics, and Accountancy, Department of Economics, Mariano Marcos State University, City of Batac, Ilocos Norte

Armie C. Sabugo

College of Business, Economics, and Accountancy, Department of Business Administration, Mariano Marcos State University, City of Batac, Ilocos Norte

Abstract

This study assessed the administration of Technology Business Incubation (TBI) Programs in the Ilocos Region, Philippines, in terms of planning, implementation, monitoring, and evaluation, and to identify the challenges encountered and intervention measures needed to improve TBI operations and support for startup development. A descriptive research design was employed involving 20 TBI staff and 34 incubatees from four Technology Business Incubators (TBIs) in the region. Descriptive statistics and analysis of variance (ANOVA) were used to evaluate the profiles of TBIs and incubatees, determine the level of TBI program administration, examine differences in the perceptions of TBI Staff and incubatees, and determine the challenges and intervention measures.

The study revealed the varied focus of TBIs in the region, particularly in sectors like agriculture, aquaculture, food processing, and technology-based innovation. While TBIs demonstrate strong planning capabilities and efficient implementation, challenges persist in monitoring and evaluation, indicating the need for clarity, adaptation strategies, and progress tracking improvement. Despite similarities in perceptions regarding planning and monitoring and evaluation, differences emerge in perceptions of implementation administration, emphasizing the

need for stronger communication, coordination, and collaboration between TBI management and incubatees.

Key challenges faced by TBIs include funding limitations, attracting high-potential incubatees, and retaining qualified mentors. Intervention measures encompass diversifying funding sources, networking, collaboration, specialized training, and support services.

1. Introduction

The Ilocos Region's Regional Development Plan, which covers the years 2023 to 2028, places a strong emphasis on the ecosystem's crucial contribution to economic growth and overall development. This emphasis is accomplished by strategically transforming the production sectors with the goal of boosting competitiveness and creating opportunities for high-quality employment. Supporting start-ups and MSMEs is one of the strategies that has received particular attention (National Economic Development Authority [NEDA], 2023)

The government intends to strengthen the policy and regulatory landscape while introducing new mechanisms to provide robust support for technopreneurs, start-ups, spin-off ventures, and MSMEs to foster innovation-driven entrepreneurship. These efforts include the establishment of technology business incubators in various regions in collaboration with private businesses and higher education

institutions (HEIs) (Espinosa et al., 2023). This strategy aims to improve productivity by facilitating technology commercialization, promoting existing technologies, and providing consulting services.

In addition to these initiatives, an innovation center will be established to serve as a hub for the expansion of incubation facilities tailored to MSMEs and start-up enterprises. Furthermore, this center will be critical in fostering innovation, design, and creativity. The Department of Trade and Industry (DTI) works closely with the Department of Science and Technology (DOST), other government agencies, academia, private entities, and people's organizations. This collaboration aims to secure critical investments in scientific and technological research while also ensuring broad government support for science and technology parks, as well as local R&D and training efforts.

While the region has several universities and colleges that are designated as Center of Excellence (COE) and Center of Development (COD), the roles of these HEIs will be maximized to become centers for innovation and start-ups by utilizing existing offices to promote culture of research and entrepreneurship among learners and the faculty. This is in line with the initiative of the region to pursue the establishment of a regional innovation hub that encourages tripartite collaboration between the academe, government, and industry to nurture new ideas, conduct R&D initiatives and pursue innovative and creative solutions.

Supplementing the existing offices of the HEIs, DOST provides Technology Business Incubation as a way to encourage the commercialization of technologies. Some SUCs in the region already have Technology Business Incubators (TBIs) and Innovation Centers (ICs).

In addition, technology business incubation has been named by the DOST as one of the strategies to support innovation and technopreneurship for the nation's socioeconomic development in a knowledge-based economy. Technology Business Incubator (TBI) is one of the driving forces behind improving a country's economic status. The government typically provides funding to encourage businesses and the commercialization of university-developed technologies. In the Philippines, several government organizations like DOST, NEDA and DTI have been collaborating to establish and support new businesses.

In Ilocos Region there are four TBIs, the Mariano Marcos State University Agri-aqua Technology Business Incubator (MMSU ATBI Dap-Ayan) and Don Mariano Marcos Memorial State University Agri-aqua Technology Business Incubator (DMMMSU ATBI) which is funded by DOST Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) focused on catering incubatees that are into agri-aqua food products

development, and agri-aqua production management while the MMSU BANNUAR TBI which is funded by the DOST Philippine Council for Industry, Energy, and Emerging technology, Research and Development (PCIEERD) is focused on catering incubatees with tech-based and tech-enabled products. In order to support the government of Ilocos Norte's vision and focus on growing the MSME sector, the Provincial Government of Ilocos Norte (PGIN) MSME Office also established its own TBI called Ilocos Norte MSME-Incubation Center (IN-MIC) which is initially funded by the NEDA. It also aims to highlight the goods produced by indigenous businesses in the province.

This complex landscape of business incubation, including the diverse objectives of incubators, the regional context, and the challenges faced, highlights the need for an assessment of the administration of Technology Business Incubation (TBI) programs in Ilocos Region. It focuses on three important areas: planning, implementation, and monitoring and evaluation, in order to better understand how they operate and suggest areas for improvement that might support future innovation, regional development, and economic progress.

2. Methodology

2.1 Locale of the Study

This study was conducted in Ilocos Norte and La Union where the four TBIs are located, namely MMSU ATBI Dap-Ayan, MMSU BANNUAR TBI, IN-MIC and DMMMSU ATBI.

The DOST-PCAARRD sector-focused organization is funding the MMSU ATBI and DMMMSU ATBI. The Higher Education Institution Readiness for Innovation and Technopreneurship (HEIRIT) Program funds the DOST-MMSU BANNUAR TBI, an incubator run by the DOST-PCIEERD. Its objective is to support and grow tech-based and tech-enabled startups that will aid in creating jobs in the Region. Lastly, is the IN-MIC which aims to support the government of Ilocos Norte's goal of growing the MSME sector. It also aims to highlight the goods produced by indigenous businesses in the province. The IN-MIC seeks to foster development and marketing initiatives while also gathering important clients and potential investors in one place, helping regional MSMEs increase and broaden the reach of their offerings.

2.2 Research Design

The descriptive research design was employed in this study because it involves collecting data through surveys, questionnaires, and structured observation to

describe the profiles of TBIs and incubatees, assess the level of administration, and identify challenges and intervention measures adopted.

The study used a mixed-method approach which included both quantitative and qualitative data gathering and analysis techniques. A survey questionnaire was used to collect quantitative data. To summarize and analyze the data gathered, descriptive statistics such as frequency counts, percentages, and means were employed. Analysis of Variance (ANOVA) was used to identify significant differences between TBI personnel and incubatees in terms of TBI administration planning, implementation, monitoring and evaluation.

In addition, qualitative data were gathered via a survey questionnaire with pre-defined options. The study's findings are presented utilizing tables and narrative descriptions to provide a full knowledge and assessment of the administration of technology business incubation programs in the Ilocos region by leveraging the strengths of each method.

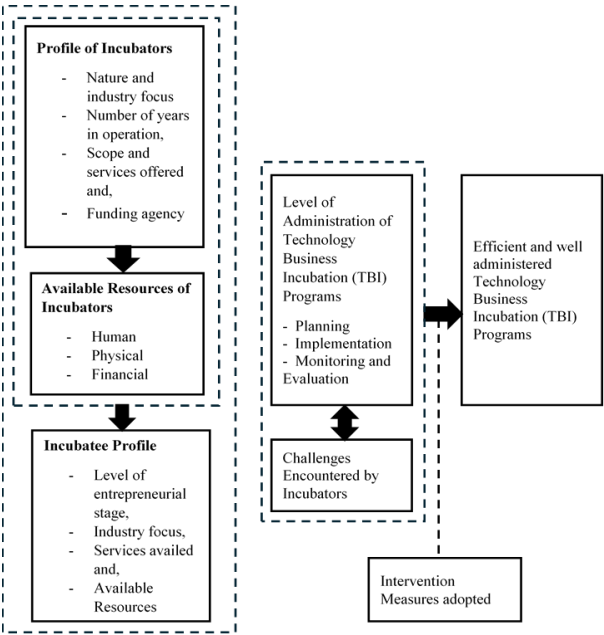


Figure 1. Research Paradigm

2.3 Data Gathering Procedure

The researcher strictly adhered to several procedures in the collection of data necessary for the study.

Data gathering commenced after the researcher was given clearance by the University Research Ethics Review Board (URERB) guaranteeing the protection of the study's human participants.

Request letters to gather data were forwarded to the DMMMSU ATBI, MMSU ATBI, MMSU Bannuar TBI, and IN-MIC project leaders or head of unit.

Meetings with the TBI Management Team were

scheduled after the request was approved. The identified and selected participants were informed of the study's goal and purpose. Through the help of the TBI Management Team, respondents answered a survey questionnaire through google forms. To create a more structured and systematic presentation of data, the survey results were encoded, totaled, analyzed, and interpreted.

2.4 Statistical Treatment of Data

The study used statistical tools such as frequency distributions, means, and analysis of variance (ANOVA) to treat the data gathered from the survey.

The following range of values were used to determine the level of administration of TBI program.

Range of Means	Descriptive Interpretation (DI)
4.00 – 5.00	Excellent
3.00 – 3.99	Average
2.00 – 2.99	Below Average
1.00 – 1.99	Poor

3. Results

Level of Administration of the Technology Business Incubation (TBI) Programs in Ilocos Region

3.1 Planning

Table 1 shows that the program excels in strategic planning and communication, as evidenced by the high ratings provided by both incubators and incubatees. With mean scores of 4.10 and 4.59 respectively, respondents perceived the program as possessing a clear and well-defined strategic plan. Moreover, with mean ratings of 4.15 and 4.44, stakeholders believe that the program effectively communicates its goals and objectives to relevant parties.

Additionally, respondents consider the program to be proactive in adapting to changing circumstances, with a mean rating of 4.41 provided by incubatees, indicating that the program regularly reviews and updates its strategic plan. Although incubators rated this aspect slightly lower with a mean score of 3.90, the overall trend suggests a commitment to adaptability and responsiveness to environmental changes.

In terms of stakeholder engagement, both groups provided similar ratings for the active solicitation and

consideration of feedback in the planning process, with mean scores of 3.90 and 3.91 respectively.

Table 1. Mean ratings of the level of administration of TBI programs in Ilocos Region as perceived by the incubators and the incubatees.

ADMINISTRATION	INCUBATOR (n=20)		INCUBATEE(n=34)	
	$\bar{x}$	DI	$\bar{x}$	DI
PLANNING				
The program has a clear and well-defined strategic plan.	4.10	Excellent	4.59	Excellent
Goals and objectives for the program are effectively communicated to stakeholders.	4.15	Excellent	4.44	Excellent
The program regularly reviews and updates its strategic plan to adapt to changing circumstances.	3.90	Average	4.41	Excellent
Stakeholder feedback is actively sought and considered in the planning process.	3.90	Average	3.91	Average
The program's planning process aligns with the needs and goals of startups it supports.	4.50	Excellent	4.38	Excellent
Composite Mean	4.11	Excellent	4.35	Excellent
IMPLEMENTATION				
The program effectively executes its activities and initiatives as planned.	4.30	Excellent	4.71	Excellent
Resources are allocated efficiently to support program activities.	4.45	Excellent	4.74	Excellent
The program provides adequate support and services to startups during their incubation period.	4.40	Excellent	4.74	Excellent
Startups within the program have access to necessary resources and facilities.	4.25	Excellent	4.82	Excellent
The program fosters collaboration and networking opportunities among startups.	4.60	Excellent	4.82	Excellent
Composite Mean	4.40	Excellent	4.76	Excellent
MONITORING AND EVALUATION				
The program conducts regular assessments and reviews to measure its impact and effectiveness.	4.10	Excellent	3.94	Average
Startup performance metrics and milestones are clearly defined and monitored.	3.95	Average	3.97	Average
Feedback from startups is actively collected and used for program improvement.	4.05	Excellent	3.94	Average
The program regularly evaluates and adapts its strategies based on monitoring outcomes.	3.85	Average	3.88	Average
There is an effective system in place for tracking the progress of startups within the program.	4.00	Excellent	3.91	Average
Composite Mean	3.99	Average	3.93	Average
Overall Mean	4.17	Excellent	4.35	Excellent

However, the program's planning process is highly regarded in terms of alignment with the needs and goals of supported startups, receiving mean scores of 4.50 from incubators and 4.38 from incubatees. Planning is an essential part of government initiatives and activities. It establishes the framework for success by clearly defining objectives, identifying necessary resources, and developing a plan for accomplishing those goals. Effective planning aids in anticipating obstacles, efficiently allocating resources, and establishing realistic timetables. It ensures that all stakeholders share the program's vision and objectives, allowing for improved collaboration and communication. Furthermore, thorough planning supports risk management by recognizing probable challenges and preparing contingency plans. This proactive strategy decreases inconsistency and improves the likelihood of program success.

3.2 Implementation

The results highlight the program's exceptional performance in implementing activities and initiatives, as evidenced by high ratings from both incubators and incubatees.

Respondents perceived the program as effectively executing its planned activities, with mean scores of 4.30 and 4.71 from incubators and incubatees, respectively. Furthermore, they believed that resources were efficiently allocated to support program activities, as indicated by mean ratings of 4.45 and 4.74 from incubator and incubatees, respectively. This indicates that TBI's resources are effectively allocated to MSMEs and startups, ensuring that these businesses get the assistance and resources they need to expand and thrive. The efficient use of resources highlights the program's dedication to supporting entrepreneurship and innovation, which helps to further the objectives of

economic growth.

Additionally, the program is praised for providing adequate support and services to startups during their incubation period, with mean scores of 4.40 and 4.74 from incubators and incubatees, respectively. Startups within the program also have access to necessary resources and facilities, with mean ratings of 4.25 from incubators and an impressive 4.82 from incubatees. Moreover, the program fosters collaboration and networking opportunities among startups, earning high ratings of 4.60 from incubators and 4.82 from incubatees.

3.3 Monitoring and Evaluation

The results regarding the monitoring and evaluation practices of the program present a nuanced view, indicating areas of strength alongside opportunities for improvement.

Respondents perceive the program as proactive in conducting regular assessments and reviews to measure its impact and effectiveness, with incubator rating this aspect as excellent (mean score of 4.10), while incubatees rate it slightly lower as average ($x = 3.94$).

However, there is room for improvement in the clarity and monitoring of startup performance metrics and milestones, as both incubators and incubatees rated this aspect as average, with mean scores of 3.95 and 3.97 respectively.

On the other hand, respondents perceive the program as actively collecting and utilizing feedback from startups for program improvement, with both incubators and incubatees rating this aspect positively (mean scores of 4.05 and 3.94 respectively). However, there is a perceived need for improvement in the program's regular evaluation and adaptation of strategies based on monitoring outcomes, with both incubators and incubatees rating this aspect as average, with mean scores of 3.85 and 3.88 respectively.

Moreover, while respondents perceive there to be a robust system in place for tracking the progress of startups within the program, they rated this aspect slightly lower compared to others, with mean scores of 4.00 from incubators and 3.91 from incubatees.

While the program demonstrates strengths in certain aspects of monitoring and evaluation, such as feedback collection and progress tracking, there are clear opportunities for improvement in areas such as defining performance metrics and adapting strategies based on monitoring outcomes. Monitoring incubatees' success rates and milestones is currently in the pipeline to improve monitoring and evaluation practices. This will enable more precise assessments of the program's impact and the effectiveness of its support strategies. Implementing these improvements will allow the program to adapt its strategies more dynamically,

ensuring that resources are allocated efficiently and that the support provided is tailored to meet the evolving needs of MSMEs and startups.

Perceived Level of Administration of the Technology Business Incubation (TBI) Programs in Ilocos Region by the Incubators and the Incubatees

Table 2 results indicate that there is no statistically significant difference between incubators and incubatees' mean levels of Technology Business Incubator (TBI) administration during planning ($p=0.103$). In particular, TBI incubatees reported an average of approximately 4.35, whereas TBI personnel reported an average of roughly 4.11. The p -value surpassing the 0.05 level of significance suggests that this difference is not statistically significant, even with the small numerical difference in means. Therefore, both incubators and incubatees provided similar assessments of TBI administration levels under planning.

However, under the administration in implementation, the data revealed significant differences between incubators and incubatees. Incubators provided an average rating of $\bar{x}=4.40$, whereas TBI incubatees reported a slightly higher average rating of approximately $\bar{x}=4.76$. The ANOVA results showed a statistically significant difference in the average ratings of TBI administration in implementation between the two groups ($p=0.0029$).

Table 2. Analysis of variance on the level of administration of TBI programs as perceived by the incubators and the incubatees

Administration	Incubators	Incubatees	p-value
Planning	4.11	4.35	0.10
Implementation	4.40	4.76	0.0029
Monitoring and Evaluation	3.99	3.93	*

* p -value <0.05 – significant difference

One possible reason for this difference could be the perspective and roles of incubators versus incubatees. Incubators may have a broader view of the overall strategic direction and operational challenges of the incubator, whereas incubatees are more directly involved in the day-to-day activities and execution of TBI initiatives. As a result, incubatees may have a more detailed understanding of the challenges and successes encountered during implementation, leading to their higher ratings. Additionally, the support and resources provided by TBIs may influence incubatees' perceptions of implementation effectiveness. Incubatees often rely on incubators for guidance, mentorship, and access to networks and resources to support their ventures.

Positive experiences with incubators' support may contribute to higher ratings of implementation

effectiveness among incubatees. Also, this can be attributed to the same funding agency supporting the TBI and requiring the same deliverables. However, there are differences in the implementation of the incubators due to various factors like leadership and availability of other resources.

Furthermore, incubatees may have a vested interest in perceiving implementation as successful, as it directly impacts the success of their businesses. As such, they may be more inclined to rate implementation administration higher compared to incubators, who may take a more critical or objective view based on their broader organizational responsibilities.

In addition, comparing the average ratings of the level of administration under monitoring and evaluation, it's evident that incubators provided a mean of $\bar{x}=3.99$, while TBI incubatees reported a slightly lower average rating of approximately $\bar{x}=3.93$. However, the statistical analysis revealed that these differences were not significant ($p=0.71$). This suggests that both incubators and incubatees hold similar perceptions regarding this aspect of TBI management.

While both incubators and incubatees demonstrate similar assessments of TBI administration levels during planning and monitoring and evaluation, differences emerged on perceptions of administration toward implementation. These findings underscore the complexity of TBI management and highlight the importance of fostering collaboration and communication between stakeholders to ensure consistent and effective implementation of TBI initiatives.

Challenges Encountered and Intervention Measures Adopted by the Technology Business Incubation (TBI) Programs in Ilocos Region

Table 3 depicts that one of the most prominent challenges reported is limited access to capital for startups by 75%. This challenge reflects the broader difficulty that startups face in securing external funding and investment, which can significantly impact their ability to scale and grow (Wang et al., 2020).

In addition, funding and financial sustainability, with 70% of the respondents citing it as a major concern. This finding underscores the critical importance of securing adequate funding to sustain TBI operations and provide essential support services to startups (Phan et al., 2005). Without adequate funding, TBIs may struggle to maintain their programs and meet the changing needs of incubatees, potentially impeding their ability to foster innovation and drive economic growth.

According to data collected, 75% of respondents identified diversifying funding sources as a critical intervention. To reduce financial risk and improve sustainability, this strategy emphasizes securing a variety of funding sources, including grants and private

partnerships (Cohen & Hochberg, 2014). TBIs can lessen their reliance on a single funding source and better assist startups at various phases of development by spreading their funding sources.

Table 3. Challenges encountered and Intervention measures adopted by the TBIs in Ilocos Region.

Challenge s*	INCUBAT OR (n=20)		Interventio ns*	INCUBAT OR (n=20)		F	%	Intervention measures	F	%
	F	%		F	%					
Limited access to capital for startups	15	75.0	Establishing partnerships with local government agencies for support	18	90.0	9	45.0	Establishing industry- specific partnerships or resources	12	60.0
			Providing access to funding networks and investor connections for startups	14	70.0			Organizing industry- specific conferences or networking events	12	60.0
			Diversifying funding sources (e.g., grants, private partnerships)	15	75.0	2	10.0	Facilitating access to shared office spaces and facilities	12	60.0
Funding and financial sustainabil ity	14	70.0	Creating specialized training programs for startups	16	80.0			Collaboratin g with other TBIs or incubation programs	15	75.0
			Hosting startup pitching events or demo days to attract investors	14	70.0					
			Offering marketing and PR support to increase visibility	12	60.0					
Attracting and retaining high- potential incubatees	11	55.0								
Finding and retaining	10	50.0	Implementin g mentorship	15	75.0					

qualified
mentors
and
advisors

and advisory
programs

Limited
industry-
specific
resources

Competitio
n with
other
incubators

Access to investor and funding networks is another crucial intervention, used by 70% of TBIs. By connecting entrepreneurs with potential funding institutions and investors, this program seeks to expand their access to capital and facilitate their growth (Block et al., 2018). TBIs can serve as a bridge between investors and startups by promoting networking and connections, which in turn creates an environment conducive to funding and investment. By providing financial support and allowing access to funding options, TBIs are essential in closing this gap (Spender et al., 2017).

Additionally, 55% of respondents cited attracting and keeping high-potential incubatees as another major challenge. This highlights the competitive environment in which TBIs operate as they strive to attract innovative startups with significant growth potential (Shinnar et al., 2004).

Furthermore, 75% of TBIs use collaboration with other TBIs or incubation programs as a common intervention. This cooperative strategy encourages TBIs to share knowledge, pool resources, and form synergistic partnerships, improving the ecosystem that supports startups (Huggins and Thompson, 2015).

According to 50% of respondents, finding and retaining qualified mentors and advisors is another

challenge. This emphasizes the crucial role of a strong support network for the success of startups. The difficulties faced by TBIs are further compounded by competition with other incubators (10%) and limited industry-specific resources (45%). These results highlight the complexity of fostering the growth and innovation of startups and underscore the necessity of collaboration to successfully address these issues.

Through the utilization of combined knowledge and resources, TBIs can increase their impact and offer a wider array of opportunities and support services to startups. Furthermore, 80% of TBIs support the development of specific training courses for startups as a prominent intervention. Through specialized training, skill enhancement, and capacity-building initiatives, these training programs provide startups with the knowledge and resources they need to succeed in competitive markets.

By utilizing various strategies such as funding, networking, collaboration, mentorship, training, and support services, TBIs can establish a dynamic ecosystem that facilitates the success of MSMEs and startups and aids in the administration of TBI programs in the region.

4. Conclusion

The provision of tailored services such as specialized training, mentorship programs, and shared service facility support to address the diverse needs of startups and MSMEs at different stages of development, facilitated by experienced mentors, industry experts, and specialized teams.

Incubatees exhibit a strong presence in food processing and agriculture/agritech sectors, typically operating for one to three years and currently progressing through startup, growth, and expansion stages.

The study findings support the effective administration of technology business incubation programs in the Ilocos region as perceived by both incubators and incubatees. The program shows excellent planning skills and excellent implementation, but there are still issues with monitoring and evaluation, which suggests that clarity, adaptability strategies, and progress tracking need to be improved. Although incubators and incubatees have similar perspectives on planning, monitoring, and evaluation, there are disparities in how they view implementation administration, which emphasizes the significance of encouraging collaboration and communication among stakeholders. The challenges faced by TBIs, such as funding constraints and talent retention, are being addressed through intervention measures focusing on diversifying funding sources, networking, collaboration, specialized training, and support

services.

Evaluation of TBI administration reveals similarities in perceptions regarding planning and monitoring and evaluation, highlighting effective management. However, differences emerge in perceptions of administration in implementation, emphasizing the importance of collaboration and communication between incubators and incubatees to address challenges effectively. The TBI program is well administered, with ongoing efforts to address challenges and enhance support for startup growth and development in the region. Hence, it also indicates areas for further improvement of TBI operations and support mechanisms.

4.1 Recommendation

Based on the conclusions drawn from the research findings, the study recommends the following:

The TBIs are encouraged to continue efforts to diversify funding sources beyond government support and partnerships by exploring opportunities for grants, private partnerships, and philanthropic initiatives to ensure financial sustainability and reduce dependence on a single funding stream. Moreover, initiatives to attract and retain high-potential incubatees should be intensified, emphasizing the unique value proposition and support offerings of TBIs. Strengthening mentorship and advisory councils is also important. This necessitates proactive recruitment and retention strategies to ensure startups and MSMEs have access to qualified guidance and support. Collaboration among TBIs, as well as with industry partners and other stakeholders, is essential to overcome challenges related to competition and limited resources, fostering a synergistic ecosystem that maximizes support for startup growth and innovation.

Also, TBIs may implement continuous improvement initiatives across all aspects of TBI operations, including planning, implementation, and monitoring and evaluation.

Regularly reviewing program effectiveness, soliciting feedback from stakeholders, and proactively addressing areas for improvement are also proposed to ensure ongoing relevance and impact. While the TBI is effectively implementing its activities, it is crucial to enhance its monitoring and evaluation processes by implementing measures to improve clarity, adaptability strategies, and progress tracking.

Furthermore, TBIs are encouraged to address the challenges faced by incubatees. Conducting thorough assessments to identify common challenges and implementing targeted support mechanisms, such as mentorship programs and access to industry experts, can significantly help MSMEs and startups overcome these barriers.

Lastly, establishing a comprehensive sustainability plan for TBIs is essential for ensuring their long-term viability. This plan may encompass strategies for securing continuous funding, fostering industry partnerships, and maintaining a constant flow of innovative startups, thereby supporting the ongoing success and development of technology business incubators.

By implementing these recommendations, the TBI program in Ilocos Region can further enhance its impact, effectiveness, and sustainability, ultimately contributing to the growth and success of startups and MSMEs in the region.

4.2 Acknowledgement

The researchers extend their heartfelt gratitude to Mariano Marcos State University for its invaluable support and assistance throughout the conduct of this study. Sincere thanks are also given to the incubatees who participated in the survey, as well as to the TBI staff who generously shared their time, insights, and expertise, all of which greatly contributed to the successful completion of this research. The researchers are likewise deeply grateful to their families for their unwavering moral and financial support, which provided strength and encouragement throughout the entire journey.

REFERENCES

1. BLOCK, J. H., FISCH, C. O., HAHN, A., & SANDNER, P. G. (2015). Why do SMEs file trademarks? Insights from firms in innovative industries. *Research Policy*, 44(10), 1915–1930. <https://doi.org/10.1016/j.respol.2015.06.007>
2. BRINCKMANN, J., & KIM, S. M. (2015). Why we plan: The impact of nascent entrepreneurs' cognitive characteristics and human capital on business planning. *Strategic Entrepreneurship Journal*, 9(2), 153–166. <https://doi.org/10.1002/sej.1197>
3. COHEN, S., & HOCHBERG, Y. V. (2014). Accelerating Startups: The Seed Accelerator phenomenon. *Social Science Research Network*. <https://doi.org/10.2139/ssrn.2418000>
4. DELMAR, F., & SHANE, S. (2003). Does business planning facilitate the development of new ventures? *Strategic Management Journal*, 24(12), 1165–1185. <http://www.jstor.org/stable/20060610>
5. ESPINOSA, A. A., GOMEZ, M. A. C., MIRANDA, P. A., DAVID, A. P., ABULON, E. L. R., HERMOSISIMA, M. V. C., QUINOSA JR., E. A., SOLIMAN, A. A., DE VERA, J. L., CLAROS, I. H. A., CRUZ, H. G. M., & GONZALES, N. S. J. (2023). Technology in education: A case study on the Philippines (ED/GEMR/MRT/2023/SA/P1/08). Philippine Normal University. Paper commissioned for the 2023 Global Education Monitoring Report, Southeast Asia - Technology in education. *Global Education Monitoring Report*, UNESCO. Technology in education: a case study on the Philippines. (2023b). <https://doi.org/10.54676/xkhi4627>
6. ISENBERG, D. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 40–50. <https://hbsp.harvard.edu/product/R1006A-PDF-ENG>
7. HACKETT, S. M., & DILTS, D. M. (2004). A Systematic Review of Business incubation research. *the Journal of Technology Transfer/the Journal of Technology Transfer*, 29(1), 55–82. <https://doi.org/10.1023/b:jott.0000011181.11952.0f>
8. HUGGINS, R., & THOMPSON, P. (2015). Entrepreneurship, innovation and regional growth: a network theory. *Small Business Economics*, 45(1), 103–128. <https://doi.org/10.1007/s11187-015-9643-3>
9. KURATKO, D. F., GOLDSBY, M. G., & HORNSBY, J. S. (2018). *Corporate Innovation*. In Routledge eBooks. <https://doi.org/10.4324/9780429489143>
10. MIAN, S. A. (1996). Assessing value-added contributions of university technology business incubators to tenant firms. *Research Policy*, 25(3), 325–335. [https://doi.org/10.1016/0048-7333\(95\)00828-4](https://doi.org/10.1016/0048-7333(95)00828-4)
11. MASON, C. M., & HARRISON, R. T. (2006). After the exit: Acquisitions, entrepreneurial recycling and regional economic development. *Regional Studies*, 40(1), 55–73. <https://doi.org/10.1080/00343400500450059>
12. NATIONAL ECONOMIC DEVELOPMENT AUTHORITY. (2023) Philippine Development Plan 2023–2028. <https://pdp.neda.gov.ph/philippine-development-plan-2023-2028/>.

13. OAKEY, R. R., & MUKHTAR, S.-M. (1999). United Kingdom High-Technology Small Firms in Theory and Practice: A Review of Recent Trends. *International Small Business Journal*, 17(2), 48-64. <https://doi.org/10.1177/0266242699172003>
14. PHAN, P. H., SIEGEL, D. S., & WRIGHT, M. (2005). Science parks and incubators: Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD). (n.d.). Technology Innovation for Commercialization (TECHNiCOM) program guidelines. Department of Science and Technology. Retrieved May 30, 2024, from <https://www.pcieerd.dost.gov.ph>
15. SHINNAR, R. S., GIACOMIN, O., & JANSSEN, F. (2012). Entrepreneurial Perceptions and Intentions: The Role of Gender and Culture. *Entrepreneurship Theory and Practice*, 36(3), 465-493. <https://doi.org/10.1111/j.1540-6520.2012.00509.x>
16. SPENDER, J., CORVELLO, V., GRIMALDI, M., & RIPPA, P. (2017). Startups and open innovation: a review of the literature. *European Journal of Innovation Management*, 20(1), 4-30. <https://doi.org/10.1108/ejim-12-2015-0131>
17. WANG, H., FENG, J., ZHANG, H., & LI, X. (2020). The effect of digital transformation strategy on performance. *the International Journal of Conflict Management/International Journal of Conflict Management*, 31(3), 441-462. <https://doi.org/10.1108/ijcma-09-2019-0166>
18. YLI-RENKO, H., AUTIO, E., & SAPIENZA, H. J. (2001). Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms. *Strategic Management Journal*, 22(6-7), 587-613. <https://doi.org/10.1002/smj.183>