Cómo referenciar este artículo / How to cite this article

Kheovichai, K., Nillapun, M., Boonkoum, W., Sungrugsa, N., Kitrungraung, P., Plungsricharoensuk, P. (2024). Nakhon Pathom's Educational Sandbox: A Mixed-Methods Study of Ecosystem Readiness and Transformation. *Espacio, Tiempo y Educación, 11*(2), pp. 206-222. doi: http://dx.doi.org/10.14516/ete.11210

Nakhon Pathom's Educational Sandbox: A Mixed-Methods Study of Ecosystem Readiness and Transformation

Kanit Kheovichai*
e-mail: kheovichai_k@su.ac.th
Faculty of Education, Silpakorn University, Thailand.

Maream Nillapun
e-mail: maream_su@hotmail.com
Faculty of Education, Silpakorn University, Thailand.

Wannawee Boonkoum
e-mail: bwannawee@gmail.com
Faculty of Education, Silpakorn University, Thailand.

Narin Sungrugsa
e-mail: narin_324349@yahoo.co.th
School of Education, Walailak University, Thailand.

Poranat Kitrungraung
e-mail: kitroongrueng.p@gmail.com
Faculty of Education, Silpakorn University, Thailand.

Panpat Plungsricharoensuk
e-mail: plungsricharoen_p@su.ac.th
Faculty of Education, Silpakorn University, Thailand.

Abstract: This study identifies the educational ecosystem, operational frameworks, and collaborative networks within Nakhon Pathom Province, one of the largest provinces in the western part of Thailand. The aim is to develop strategies for transforming the region into an educational and innovation hub. Employing a convergent sequential MMR design, the research integrates both quantitative and qualitative data. The quantitative phase involved a survey of 684 stakeholders, including school administrators, teachers, and community members, to evaluate the current state of educational management and infrastructure. The qualitative phase consisted of focus group discussions and in-depth interviews with 80 key informants. SWOT analysis was performed to identify existing challenges, resources, and strategic opportunities for improvement. The findings reveal strengths in curriculum management and network collaboration within the province, yet highlight persistent challenges such as funding disparities and educational inequality. This study argues that a collaborative, multi-level approach is crucial for building a successful educational innovation ecosystem in Nakhon Pathom emphasizing the importance of policy clarity, improved communication, and enhanced cooperation among schools, universities, and local communities. These findings underscore the

potential for Nakhon Pathom to serve as a model for regional educational innovation in Thailand, offering insights and strategies that can inform policy development and implementation in similar contexts nationwide.

Keyword: Educational Management, Innovation, Learning Ecosystem, Nakhon Pathom.

Received: 03-06-2024
Accepted: 26-08-2024

1. Introduction

While Nakhon Pathom possesses significant potential for educational innovation, existing challenges related to funding disparities, educational inequality, and fragmented collaboration hinder its transformation into a thriving education hub. Nakhon Pathom, a large province in the central-western region of Thailand, is administratively divided into 7 districts, 106 sub-districts, and 904 villages with almost a million population. The province aims to become a Smart City known for agriculture, education, and food tourism while developing its youth into Smart Citizens capable of economic contribution and addressing household and environmental issues (Sawangwong et al., 2024). In transitioning to be an education innovation city, called an education sandbox, Nakhon Pathom's education sector includes 336 schools across various administrative offices that need leading research to explore the readiness and porosity in various dimensions to ensure the future changes.

Although students studying in this province perform above the national average in O-NET national exams: Thai language scores averaged 60.56% (national average: 56.20%), English 51.46% (national average: 56.20%), science 33.18% (national average: 29.99%), and mathematics 41.79% (national average: 38.78%). This suggests the potential for developing students into Smart Citizens. However, there is still a need to improve academic achievement, as only the Thai language saw more than 74.81% of students meeting the standard, but significant percentages of students in mathematics, science, and English falling short (Kongcharoenkitkul, Nakum, & Chatpunnarangsee, 2022; Vanpetch & Sattayathamrongthian, 2020). Despite this, there is a need to improve education quality, especially in small and remote schools. Leveraging existing resources, the province seeks to enhance its educational quality in line with Ministry of Education policies (Fry, 2018; Sangnapaboworn, 2018). Thus, this research question proposes to how feasible it to transform Nakhon Pathom into an educational innovation area by analyzing its current educational ecosystem, identifying challenges, and leveraging stakeholder networks to develop effective educational management and innovation systems tailored to the province's context?

2. Literature Review

2.1. Area Based Development toward Education Innovation Sandbox Area

Area Based Development (ABD) emphasizes the development of geographic areas and other dimensions, such as cultural areas. This concept is widely used in Europe, Africa, and the Middle East for country development, rural development, public services, poverty alleviation, conflict resolution, and resource management. ABD involves assessing the area's potential, involving stakeholders, and community participation. Key steps include analyzing data and formulating strategies to create development that aligns with the area's context and people's needs, particularly to reduce inequality and alleviate poverty

(Grubbs, Chaengploy, & Worawong, 2009; Puthaprasert et al., 2024).

In transition to the innovation area, the Education Innovation Area Act of 2019 consists of 5 sections:1) Establishment of Education Innovation Areas, 2) Education Innovation Area Policy Committee, 3) Education Innovation Area Services, 4) Pilot Schools, and 5) Evaluation. The structure operates on three levels: policy, area, and operational. At the policy level, the Education Innovation Area Policy Committee, chaired by the Prime Minister or a designated Deputy Prime Minister, promotes, oversees, and evaluates the innovation areas. At the area level, the Education Innovation Area Steering Committee, chaired by the provincial governor, drives provincial policies, adapts core curriculums, promotes teacher and staff development, and designs assessments. At the operational level, pilot schools have autonomy in academics, personnel, budgets, and general administration (Suwanmanee et al., 2023).

In addressing inequalities through innovation ecosystems, both ABD and the Education Innovation Area Act emphasize reducing disparities and fostering equity. Educational inequality and funding gaps are recurring themes in the literature, yet specific strategies for addressing these issues at a provincial level are underexplored. Much of the literature discusses inequality at a macro level, offering limited insight into localized solutions. This research fills the void by tailoring recommendations to the unique socio-economic conditions of Nakhon Pathom. This study leverages SWOT analysis to uncover actionable strategies for mitigating these challenges in Nakhon Pathom.

2.2 .Identify Resources in Learning Ecosystem

This research employs the concept of learning ecosystem components, comprising various elements as follows: organizational culture: leaders support personnel's learning and create a learning culture within the organization; personnel at all levels: everyone in the organization plays a role and benefits from the learning ecosystem; curriculum content: focuses on quality and access to essential content; technology: includes e-learning, various systems, and mobile devices; learning strategy: starts with understanding the organization's goals and continuously developing learning (Satiman, 2019; Thammetar & Khlaisang, 2019). Additionally, there are other components including collaboration and shared objectives: lifelong learning and managing challenges at all levels; key components of an appropriate learning ecosystem: operational strategy, learning management methods, new curriculum and activities, resources, technology utilization, and network collaboration (Bronfenbrenner, 1994; Norris, Eyt-Dessus, & Holtham, 2013; Schatz & Vogel-Walcutt, 2019).

From studying the components of the learning ecosystem from microsystem to macrosystem as Bronfenbrenner (1994) noted, essential elements for this research are summarized as follows: educational policy and strategic systems, provincial and district-level educational management systems, school and classroom-level curriculum and learning management systems, network collaboration systems, and technology-supported educational management and systems to achieve defined goals. In the light of making a network in the ecosystem, the process includes establishing a new structure and working model that fosters horizontal collaboration and coordination among stakeholders. Through collective efforts, strategies for development are formulated, allowing members to participate in brainstorming, decision-making, planning, responsibility-sharing, monitoring, evaluation, and benefit-sharing (Carvalho & Goodyear, 2018). Therefore, this explored collaborative network would aim to harness the combined strengths of its members to achieve shared goals in improving education in the area.

2.3. Present Study

From the aforementioned educational challenges in the area, this research project would provide valuable data on the current environment, key obstacles in educational management, existing operational resources, systems, mechanisms, and collaborative networks. This would enable a feasibility analysis of the project's implementation and the formulation of development strategies to transform Nakhon Pathom Province into an innovative educational area capable of addressing its unique educational challenges of the nation with main research questions toward the objectives as following: (1) To study the environment, components, and educational ecosystem; (2) To explore the current conditions and problem issues faced by schools, students, teachers, administrators, communities, and parents, as well as the educational expectations and needs of local residents, teachers, and the community; (3) To assess the existing operational resources and other innovation-driven entities involved in educational management; (4) To investigate the networks, mechanisms, key partners, roles, and strengths of organizations supporting educational management at various levels; and (5) To address the guidelines for transforming Nakhon Pathom Province into an innovative educational area.

3. Methodology

3.1. Research Design

Mixed methods research (MMR) is designed for our study due to its ability to counterbalance the limitations inherent in purely quantitative or qualitative approaches (Bryman, 2006; Creswell & Plano Clark, 2023). Consequently, we employed a convergent sequential MMR design (Figure 1). A distinctive feature of our research was the sequential timing of the quantitative and qualitative data collection and analysis, as convergent designs typically involve concurrent data collection to explore the following MMR research questions (Creswell & Poth, 2016).

The adopted convergent sequential approach was essential for two reasons. Firstly, this study aimed to verify that our sample reflected the common perception of the educational ecosystem. Secondly, this study aimed to purposefully sample for the qualitative phase based on their opinions on the current positive and negative evidence and perspectives as mentioned points in the research objectives. The qualitative phase followed an Interpretive Phenomenological design (Eatough & Smith, 2017). Integration occurred after separate analyses of both phases to illuminate guidelines for driving Nakhon Pathom into an education innovation sandbox city.

3.2. Quantitative Strand: Participants, Procedure, Measures, and Analyses

The population consists of schools providing basic education in Nakhon Pathom province, totaling 336 schools. The random technique was obtained for the sample group including 42 schools selected for the study located in the following districts: Mueang Nakhon Pathom (7 schools), Kamphaeng Saen (5 schools), Don Tum (6 schools), Bang Len (6 schools), Nakhon Chai Si (7 schools), Sam Phran (6 schools), and Phutthamonthon (5 schools). Academic teaching staff and teachers were selected using cluster random sampling to cover all districts, school sizes, and affiliations. Selected samples were chosen to respond to the questionnaire from a centralized system to complete a questionnaire. Informed consent was indicated by the school principals and the overt action of choosing

Espacio, Tiempo y Educación, v. 11, n. 2, July-December / Julio-Diciembre 2024, pp. 206-222.
ISSN: 2340-7263

to complete the questionnaire.

There were 684 participants recruited in this quantitative study using purposive sampling. The sample included school administrators' teachers and other stakeholders (n=400) to explore the current environment components, educational management ecosystem, situation and problems of schools at the initial stage. Additionally, for establishing feasibility and development strategies for driving the mechanism of educational innovation areas in Nakhon Pathom province, stakeholders including school administrators, teachers, parents, and the community representatives (n=100) were targeted to determine the feasibility and strategies for implementing the educational innovation area mechanism. For the study of networks, mechanisms, key partners, roles, and the strength of agencies in supporting the management of education at the local level, questionnaires will be administered to school administrators and deputy directors of academic affairs (two per school, n=84) as well as representatives from partner organizations (n=100).

The omnibus developed questionnaire contained 30 items measuring beliefs and practices related to environmental conditions, learning ecosystem components, and educational management systems in Nakhon Pathom province. This study focused on the four subscales measuring perspective on education policy and strategy systems, provincial and regional educational management, curriculum management and classroom learning at school and classroom levels, collaborative network systems among various sectors, and the utilization of technology to support educational management and learning. Participants indicated their agreement on a scale from 1 (strongly disagree) to 5 (strongly agree). Mean and level according to Best and Kahn (2016) were declared. For scale development, content validation, the index of item-object congruence (IOC), was employed at this item development stage, based on the acceptable standards outlined in Turner and Carlson's study (Turner & Carlson, 2003). A group of educational evaluation experts, educational psychologists and R&D research experienced interdisciplinary lecturers were tasked with the evaluation. In quantitative study, samples participated in this study voluntary.

3.3. Qualitative Strand: Participants, Procedure, Materials, and Analyses

For the key informants, school principals, deputy directors of academic affairs, representatives of school boards, parent representatives, and community leaders who demonstrated achievements in the education development or support of educational management from those 42 school samples were selected using purposive selection for focus group discussions (n=50). Informed consent was indicated by the overt action of participation. Moreover, a purposive selected sample of provincial education administrators, regional education administrators, local education administrators, education supervisors, and educational scholars in curriculum and instruction or related fields were used for in-depth interviews (n=30).

Group interviews were conducted at local school meeting halls in each selected district and lasted approximately two and half hours. These group interviews were preferred to facilitate dynamic conversations and the sharing of experiences among those key informants. To guide the discussion, a semi-structured interview protocol was applied, focusing on these four key questions: (A) What are the current conditions and key issues faced by schools, students, teachers, administrators, communities, and parents? (B) What existing resources and agencies are driving innovation in the area? (C) What networks, mechanisms, key partners, roles, and strengths do agencies possess in supporting educational management at the local level? and (D) What policy directions

and recommendations should be pursued to transform Nakhon Pathom Province into an educational innovation area? Conducting small group interviews and individual interview was additional, encouraging some purposed participants to provide specific detail. Participants were compensated approximately $15 for their time.

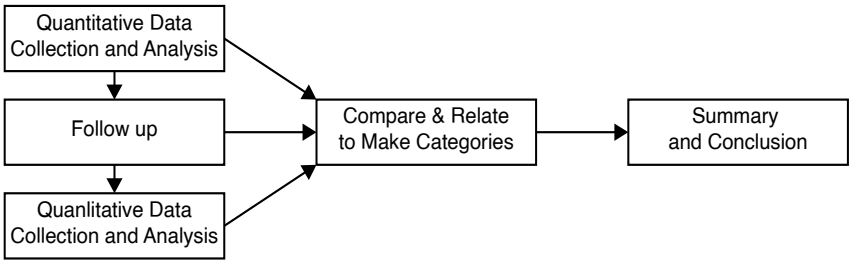
For the qualitative analysis, group interviews verbatim were transcribed then, employed an iterative and inductive analysis cycle guided by Interpretive Phenomenological Analysis (Eatough & Smith, 2017). The content analysis, conducted with a detailed interpretive reading of the transcripts. Each of the researchers independently indicated highlighted significant text segments and made initial annotations. This step was crucial for building consensus and ensuring a balanced interpretation, avoiding bias towards pre-existing assumptions. After applying the establish initial categories and codes to the identified text segments, the study reconvened to resolve discrepancies and finalize the main coded summary categories, a consensus from all responsible researchers, with examples of verbatim quotes representing the code.

3.4. Strategies and Procedures Integration

As design of Daniels, Poth and Goegan (2018) and Hitchcock and Onwuegbuzie (2020), this study adopted converged mixed analysis. The study involves analyzing the environment components, and educational management ecosystem in Nakhon Pathom Province. This is done through surveys, together with, mainly on, focus group discussions, in-depth interviews, and knowledge exchange forums with stakeholders within the research context. The objectives of the sub-activities were to propose strategies for managing current conditions and problems to establish the feasibility and methods for driving educational innovation area in the province based on existing resources.

Stakeholder meetings were mainly held to develop focus group strategies for addressing current conditions and indicating supportive factors thru SWOT and TOWS Metrix as Kowalik and Bagińska's guideline (2023). Thus, the research includes organizing forums to summarize and analyze networks, mechanisms, key partners, and roles in educational management that are the province's existing strengths. The goal is to address management systems that meet local needs, address obstacles, propose solutions, and enhance educational management. This is done in collaboration with school administrators and local educational leaders, culminating in policy recommendations for transitioning Nakhon Pathom into an educational innovation area. In the final stage, a public forum is also organized to disseminate the findings back to the community. All the procedure had been occurred in 6 months during the late 2023.

Figure 1: MMR Research Design Presentation.



Espacio, Tiempo y Educación, v. 11, n. 2, July-December / Julio-Diciembre 2024, pp. 206-222.
ISSN: 2340-7263

Table 1: Summary of Samples, Key Performance, Method & Procedure.

Sample/ Key Performance	QUAN	QUAL		
	Survey	Focus Group	In-Dept Interview	Public Forum
School administrators	400	10	-	*
Teacher & academic staffs	84	10	-	*
Parent & community	100	10	-	*
Provincial Governors related to education	100	10	30	*
Other Stakeholders	100	10	-	*
Total	684	50	30	open

Note: QUAN; quantitative study, QUAL; qualitative study, *; open for public hearing.

4. Findings

The study of the environment components, and educational management ecosystem in Nakhon Pathom province found that overall, it was at a high level from the perspectives of school administrators, teachers and other stakeholders. Ranked by average score, the highest are: 1) curriculum management and classroom learning at school and classroom levels, 2) collaborative network systems among various sectors, 3) the utilization of technology to support educational management and learning, 4) provincial and regional educational management, and 5) education policy and strategy systems as presented in Table 2.

To enhance the results, curriculum management and classroom learning at school and classroom levels received the highest average score among stakeholders, suggesting strong alignment in instructional practices. This is complemented by the robust collaborative network systems, which support a dynamic and inclusive educational ecosystem. The close scores of collaborative networks (M = 4.39, SD = .74) and the utilization of technology (M = 4.25, SD = .74) highlight the interconnectedness of these components, underscoring the pivotal role of partnerships and digital tools in driving educational innovation. Despite being rated at a high level, provincial and regional educational management (M = 4.07, SD = .75) received the lowest average score, suggesting potential challenges in coordinating broader administrative strategies that meet the needs identified at the school level. The results suggest that leveraging collaborative networks and advancing technology integration can serve as catalysts for improving other components of the educational ecosystem, such as regional management and strategic policy implementation.

Table 2: Stakeholders' Perspectives on Educational Management Ecosystem.

No	Components	M	SD	Level	Ranking
1	education policy and strategy systems	4.25	.74	High	2
2	provincial and regional educational management	4.07	.75	High	5
3	curriculum management and classroom learning at school and classroom levels	4.18	.72	High	4
4	collaborative network systems among various sectors	4.39	.74	High	1
5	the utilization of technology to support educational management and learning	4.25	.74	High	2
	Total	4.22	.11	High	

4.1. Current Situation and Expectations Towards Educational Needs

Interviews revealed that small schools struggle with insufficient funding, hindering development and requiring strict budget management. Post-COVID-19 as Nursalim et al.'s (2023) and Sun et al.'s (2024) notes, students faced challenges readjusting to in-person classes, with some experiencing isolation and depression, requiring external

support. Economic hardships have also led to student dropouts, prompting schools to track and reintegrate them. Persistent issues of educational decline and inequality were also highlighted.

The SWOT towards TOWS analysis was shown in Table 3. The strengths of schools in Nakhon Pathom, such as collaboration with higher education institutions and well-qualified teaching staff, align effectively with opportunities to position the province as an education hub. By leveraging these strengths, schools can focus on fostering innovation and administrative mechanisms that enhance academic achievement and promote sustainable educational development. To counter the declining number of students and competition from Bangkok schools, Nakhon Pathom can utilize its strong collaborations with higher education institutions to improve vocational training and innovative learning approaches. This strategy aims to build parental and student confidence while expanding opportunities for rural students to access quality education from urban experts.

Addressing infrastructure inequality between urban and rural schools is critical to reducing educational disparities. Efforts to attract support from temples and private organizations could serve as a vital strategy for funding development projects and ensuring equitable access to quality education across the province. The persistent shortage of specialized teachers and staff, coupled with the declining student population, requires strategic interventions. Enhancing the skills of teachers to handle multi-grade classrooms and teaching outside their specialization can address immediate challenges. Meanwhile, streamlining financial management and procurement processes will improve operational efficiency.

The SWOT analysis underscores significant disparities between urban and rural schools in terms of infrastructure, staff availability, and access to technology. These disparities hinder equal development and demand urgent policy reforms to bridge the gap and ensure inclusive education for all students in Nakhon Pathom. Schools in the province require clear policies and increased funding to disseminate innovations effectively. Investments in modern technology and learning equipment are essential to foster active student participation, enhance learning outcomes, and support administrative efficiency.

Table 3: SWOT & TOWS Matrix Results for Identifying Competitive Strategies.

	Internal Strengths (S)	**Internal Weakness (W)**
Internal factors External factors	Schools benefit from extensive cooperation with numerous higher education institutions. Teaching staff possess expertise in instruction, research, and student development. Modern equipment is available for teaching and learning. The curriculum is designed to create career opportunities and generate income. Financial support is provided by the private sector, temples, and other organizations. Administrative personnel demonstrate strong leadership qualities, and there is ongoing staff development.	Schools face a shortage of teachers in certain subjects. There is inequality in location and infrastructure among schools. Staff transfers affect school operations. Slow procurement processes cause financial management issues. Declining student numbers lead to classroom consolidation.
External Opportunities (O)	**S-O Strategy: Maxi-Maxi**	**W-O Strategy: Mini-Mini**
The province aims to develop as an education hub, creating learning innovations and administrative network mechanisms. It focuses on fostering smart citizens and developing innovations to enhance academic achievement.	The focus is on fostering collaboration among higher education institutions to enhance academic achievement. Simultaneously, there is an emphasis on developing innovative learning approaches and new administrative mechanisms to improve overall educational quality.	The focus is on developing infrastructure to reduce the gap between urban and rural schools. Additionally, there are efforts to create opportunities for support from temples and private organizations to enhance educational development.
External Threats (T)	**S-T Strategy: Maxi-Mini**	**W-T Strategy: Mini-Mini**
The number of students is steadily declining. Additionally, the province's proximity to Bangkok, home to many prestigious schools, leads parents and students to opt for education in the capital instead. This trend exacerbates the disparity between urban and rural schools in the province.	The focus is on developing collaboration among higher education institutions to enhance academic achievement and build vocational skills, thereby increasing confidence among parents and students. Additionally, there is an emphasis on creating learning innovations that enable rural students to learn from expert teachers in urban schools.	The focus is on developing teachers' skills to teach subjects outside their specialization, addressing the shortage of teachers in certain fields. Additionally, there is an emphasis on enhancing the capabilities of support staff in efficient procurement processes.

Espacio, Tiempo y Educación, v. 11, n. 2, July-December / Julio-Diciembre 2024, pp. 206-222.
ISSN: 2340-7263

4.2. Existed Resources toward Educational Management

In Nakhon Pathom Province, educational management shows promise but also faces challenges. While the province hosts numerous higher education institutions, administrative limitations hinder comprehensive development. Educational policies align with modern concepts but lack inclusive participation, relying heavily on bureaucratic procedures. Integration between educational agencies under different affiliations remains fragmented, despite decentralization benefiting curriculum flexibility at the school level.

Efforts to collaborate with communities and organizations demonstrate varied success, influenced by community potential and administrative coordination. Technological adoption, accelerated by the pandemic, shows disparities in equipment and funding among schools. Despite existing relationships with supporting agencies and community resources, disparities persist, with larger schools benefiting more from administrative innovations and network readiness. Collaborative networks involving universities and support from agencies highlight opportunities for development. Overall, while Nakhon Pathom Province shows educational management potential, enhancing administrative systems, fostering collaboration, and leveraging local resources are crucial for advancing educational quality.

4.3. Roles and Strengths of Organizations in Supporting Educational Management

Nakhon Pathom Province has developed a comprehensive educational management system with collaborative networks at three levels: school, educational district, and provincial. At the school level, each institution employs a tailored approach, involving administrators, school committees, parents, alumni, and teachers. These stakeholders coordinate formally and informally with various sectors, ensuring diverse support and resource sharing to enhance educational quality. Schools focus on developing desirable student qualities aligned with societal and employer needs.

At the educational district level, offices are dedicated to improving educational quality within their jurisdictions. They establish Memoranda of Understanding (MOUs) with higher education institutions, vocational schools, government agencies, and private sectors to create robust networks for learning management, resource sharing, and professional development. Effective coordination exists between secondary and primary educational district offices and local government organizations to streamline efforts and maximize impact.

At the provincial level, collaboration networks concentrate on educational administration, supervision, and learning management. Key participants include Silpakorn University and Nakhon Pathom Rajabhat University (a formal teacher university). These institutions work together to ensure the province is well-prepared and committed to advancing the educational sector. This multi-tiered approach facilitates continuous improvement and adaptation, promoting a high standard of education throughout Nakhon Pathom Province.

4.4. Approaches for Transforming Nakhon Pathom Province into an Educational Innovation Sandbox Area

The abundance of educational resources and the collaborative network involving over 10 higher education institutions underscore Nakhon Pathom's readiness to transition into an educational innovation area. Schools have demonstrated their capability

through management innovations, robust curricula, and a supportive community, setting a solid foundation for systemic transformation. Despite these strengths, there is a pressing need to foster mutual understanding and awareness of the educational innovation area concept among stakeholders. Clear operational guidelines and policies tailored to the needs of the new generation and global trends are critical to achieving this transformation.

Administrators play a pivotal role in driving change by educating teachers and parents and building bridges between schools, universities, and businesses. Universities, in turn, must take an active role in research, development, and the dissemination of innovative educational practices. Developing prototype models in larger schools as a starting point will help refine best practices before scaling to smaller schools. This approach can reduce disparities and ensure tailored solutions that address the unique needs of diverse areas. Facilitating knowledge exchange and setting a clear, actionable roadmap will drive sustainable progress.

The transition requires the establishment of strategic policies that include: Defining clear objectives and goals for educational innovation. Developing new, adaptable models for education that ease the burden on teachers and students. Ensuring resource allocation and collaboration mechanisms are in place, with active involvement from both public and private sectors. Encouraging local government participation to integrate education management with regional needs. Reducing educational disparities is essential for inclusive development. This can be achieved by promoting equitable resource distribution, strengthening collaboration among schools, and leveraging the strengths of both urban and rural areas. Stakeholders must also prioritize teacher training and curriculum development to ensure that all students have access to quality education. By integrating innovative management practices and engaging diverse stakeholders, Nakhon Pathom can establish a dynamic educational ecosystem. Long-term sustainability requires ongoing evaluation, adaptation, and the active participation of the entire community. Participant sample statements in were presented in Table 4.

Table 4: Participant Sample Statements on Four Key Questions.

Participants	Direct Quote (category)
Deputy Director of the Educational Service Area Office	Becoming an innovation area will stimulate local interest and readiness to adapt to this new status. Once an area becomes an innovation zone, there will be monitoring and expansion of the implemented innovations, with each area developing its unique innovations. Nakhon Pathom is ready to become an innovation area due to the support from various agencies. However, there should be an increase in knowledge dissemination and public relations to ensure everyone understands how innovations work and who benefits from being an innovation area. (A)
Chairman of the Nakhon Pathom Provincial Federation of Industries	Educational change requires a complete transformation and thinking outside the box. The old methods won't be used anymore; everything must be done anew. The needs of the new era and the new generation must be fully addressed. Educational reform must include changes to entrance exams. Education should be integrated with other fields. We need to look at the big picture, identifying strengths and weaknesses. Creative thinking and innovation should be emphasized in all aspects. Parents must be involved. There needs to be strong support and collaboration, creating a 'Nakhon Pathom Model' as a unique example that other provinces have never done. If these changes occur, they will benefit the quality of learners and reduce educational disparities among schools with diverse educational contexts, ultimately impacting the quality of the students. (C)(D)
Executive from the Provincial Education Office	Adjusting the mindset of administrators and teachers to align with the goals of educational innovation areas is crucial for bringing about change in students and benefiting Nakhon Pathom. This can help create a model for others to follow. (D)
Chief Executive of the Subdistrict Administrative Organization	We should start with teaching and learning at the local level. It is essential to connect all levels, including universities, schools, and workplaces. (B)(C)
Teacher Representative	A roadmap should be established as a provincial agenda with continuous monitoring and oversight. Specialized education (alternative schools) should be distributed throughout the province. The mobilization of resources from both public and private sectors should be efficient and sustainable. The process of implementation should have clear guidelines and a defined path to action.(B)(C)

Note: Category A: Current situation and expectations towards educational needs, B: Existed Resources toward Educational Management, C: Roles and Strengths of Organizations in Supporting Educational Management and D: Approaches for Transforming Nakhon Pathom Province into an Educational Innovation Sandbox Area.

Espacio, Tiempo y Educación, v. 11, n. 2, July-December / Julio-Diciembre 2024, pp. 206-222.
ISSN: 2340-7263

Figure 2: Key Informants from Education Stakeholdersin Nakhon Pathom Province, Thailand.

5. Discussion

This study provided a comprehensive analysis of the stakeholders' perspectives on the educational management ecosystem in Nakhon Pathom province, identifying current conditions, challenges, and opportunities. The mixed-methods approach, utilizing quantitative data and qualitative narratives from participants in 42 selected schools, focus groups, and interviews, offered a multidimensional understanding of the issues. Key findings highlight actionable pathways for transitioning Nakhon Pathom into an education sandbox.

The analysis revealed that Nakhon Pathom's educational ecosystem is highly functional, with robust local resources presenting significant opportunities for further development. The existing framework supports the vision of positioning the province as an educational innovation area. As a recognized educational hub, Nakhon Pathom is home to eight prestigious research institutions and top-tier universities, including Mahidol University, Kasetsart University, and Silpakorn University. Additionally, specialized institutions such as Mahamakut Buddhist University and Mahachulalongkornrajavidyalaya University, alongside St. John's College, enrich the province's educational and innovation landscape by contributing specialized expertise, manpower, and investment potential. The presence of diverse universities fosters an ecosystem conducive to urban and innovation development. These institutions contribute to advancing knowledge, driving manpower development for innovation, and providing the financial resources necessary for sustained growth. The specialized expertise within these institutions aligns with the strategic goals of developing Nakhon Pathom into an education sandbox (Autthawuttikul et al., 2024; Ferraris et al., 2020; Markatou & Alexandrou, 2015).

The province's well-known primary and secondary schools recoznized as a national science-based education schools, contribute to the strong academic reputation. These institutions have provided academic support and enhance curriculum and extracurricular activities in the central and southern regions. Consequently, administrators, teachers,

public and private sector employees, and civil society, inherently value this province as an education city and perceive the educational ecosystem as favorable. In sum of the result, the management of curriculum and learning processes at both school and classroom levels, collaboration networks, technology integration, and provincial educational management systems are all considered to be highly effective. However, as the recommendation of Žalėnienė and Pereira (2021) and Giesenbauer and Müller-Christ (2020) the current policy and strategic educational systems, event also rated highly, are identified as the last area needing improvement to suit the establishing learning innovation link between higher education institutions and schools sustainably.

In terms of curriculum management and classroom learning processes, the high perspectives among key informants declared that this area would be a strong academic support from universities and large, collaborative schools that serve as practicum training sites for student teachers. These schools have the capacity to develop innovative teaching and management practices, setting several teaching models examples for other area. This aligns with Wiggins & McTighe's modeling idea (Wiggins & McTighe, 2005) that teachers should be able to design curriculum and instruction to address student needs, and Wiles emphasis on promoting leadership model in curriculum and teaching to foster further innovations (Wiles, 2009; Yoshida et al., 2021).

The 2018 National Education Standards emphasize creating innovative co-creators for a sustainable society, which complements Nakhon Pathom vision of becoming a Smart City (Sawangwong et al., 2024). This has driven school administrators and teachers to improve educational quality and innovation. However, some schools that lack access to these academic support networks face educational disparities in both urban and rural areas, especially in small scaled schools. In the light to find solution, a network collaboration, leveraging the strengths and innovations of various agencies such as firm's collaboration (Wang et al., 2014). and agricultural knowledge systems (Hermans, Klerkx, & Roep, 2015) could enhance educational quality and support Nakhon Pathom development as an educational innovation area as an education-industry-government collaboration for future workforce (Boonroungrut & Huang, 2021; Ehlen, 2015).

Despite the policy and strategic educational systems, the challenges in setting comprehensive visions, policies, and strategies for future education at all levels remain. Rincón-Gallardo and Fullan (2016) note that successful educational leaders must be visionaries, instructional leaders, and collaborators. Given the diverse and numerous educational institutions in Nakhon Pathom, establishing an educational innovation area could facilitate the development and enhancement of educational policies and strategies. A steering committee, led by the provincial governor, could harness the educational potential of all institutions, particularly the universities, to foster synergy and support the principles of education for all and all for education. This approach aligns with Luksha and Kinsner's (2020) emphasis on collaboration and shared objectives to meet diverse needs and create a robust educational ecosystem. With effective provincial leadership, leveraging various systems to support policy and strategic educational management could drive continuous educational development, balancing top-down and bottom-up approaches.

Espacio, Tiempo y Educación, v. 11, n. 2, July-December / Julio-Diciembre 2024, pp. 206-222.
ISSN: 2340-7263

6. Conclusion and Recommendation

Nakhon Pathom Province possesses remarkable potential to emerge as a hub for educational innovation, driven by its renowned universities and their specialized expertise. These institutions provide essential resources, knowledge, and skilled personnel, contributing to urban development and fostering innovation while expanding educational opportunities across the region. To successfully establish Nakhon Pathom as an educational innovation area, a comprehensive Road Map and Master Plan is required, coupled with clear communication and collaboration across government, private sectors, and educational institutions. Emphasis should be placed on enhancing outcomes in small and remote schools, developing the "Nakhon Pathom Model," and promoting partnerships to advance technology, learning systems, and educational achievements.

Figure 3: Educational Ecosystem for Nakhon Pathom Transition into an Education Sandbox.

Future efforts must focus on empowering teachers and educational personnel through continuous training and mentorship, fostering area-based management, and addressing disparities in access to quality education. Integrating technology, local curricula, and active community involvement will be vital in creating engaging learning environments and sustainable educational innovations. This study contributes significantly to the field of educational innovation by highlighting a replicable framework for transforming regions into innovation-driven education hubs. The findings underscore the broader implications of such initiatives for reducing educational inequalities and fostering sustainable development as presented in Figure 3.

5.1. Declaration

The study design and procedures were approved by the Silpakorn University's institutional review board (IRB), and the research team implemented all necessary measures to ensure confidentiality, including obtaining consent and securing data storage. The authors declared no potential conflicts of interest.

5.2. Acknowledgements

We do acknowledge the consistent funding and support from Program Management Unit on Area Based Development (PMUA-A13F660093) with tittle "a study of learning ecosystem, feasibility, and guideline for transforming Nakhon Pathom province into education sandbox", Thailand. The authors wish to express their profound gratitude to all individuals whose invaluable contributions have been instrumental in the success of this research. While the journal's guidelines limit the number of main authors to six, this study greatly benefited from the dedication, expertise, and support of several esteemed colleagues as co-authors. In particular, we extend our sincere appreciation to Orapin Sirisamphan (orapin.sirisamphan@gmail.com), Saisuda Tiacharoen (saisuda.tiancharoen@gmail.com), Siriwan Vanichwatanavorachai (wantoo_@hotmail.com), Nopporn Chantaranamchoo (nopporncu@gmail.com), Chaiyos Paiwithayasiritham (chaiyos2010@gmail.com), Napasorn Neelapaijit (neelapaijit_n@su.ac.th), Chinun Boonroungrut (boonroungrut_c@su.ac.th), Wisud Pongern (wisudpo@gmail.com), and Prapon Leksuma (Ballozo86@gmail.com) for their valuable insights, guidance, and unwavering support throughout this research. Their contributions have been essential in shaping the study and ensuring its successful completion.

References

Autthawuttikul, S., Laisema, S., & Rodkroh, P. (2024). Enhancing critical learning through an adaptive web application: A case study of lower secondary school students studying artificial intelligence technology. *Humanities, Arts and Social Sciences Studies, 24* (1), 55–67. https://doi.org/10.69598/hasss.24.1.263101

Best, J. W., & Kahn, J. V. (2016). *Research in Education*. Pearson Education.

Boonroungrut, C., & Huang, F. (2021). Reforming Theory of Planned Behavior to Measure Money Management Intention: A Validation Study Among Student Debtors. *RAUSP Management Journal, 56*(1), 24-37. https://doi.org/10.1108/RAUSP-02-2019-0029

Bronfenbrenner, U. (1994). Ecological Models of Human Development. In T. H. Husén & T. N. Postlethwaite (Eds.), *International Encyclopedia of Education* (Vol. 3, pp. 37-43). Pergamon. https://deiafrica.org/wp-content/uploads/2024/10/Ecological-Models-of-Human-Dvp.pdf

Bryman, A. (2006). Integrating quantitative and qualitative research: how is it done? *Qualitative Research, 6*(1), 97-113. https://doi.org/10.1177/1468794106058877

Carvalho, L., & Goodyear, P. (2018). Design, learning networks and service innovation. *Design Studies, 55*, 27-53. https://doi.org/10.1016/j.destud.2017.09.003

Creswell, J. W., & Plano Clark, V. L. (2023). Revisiting Mixed Methods Research Designs Twenty Years Later. In J. W. Creswell & V. L. Plano Clark (Eds.), *Handbook of Mixed Methods Research Designs* (pp. 21-36). Sage Publications. https://doi.org/10.4135/9781529614572.n6

Creswell, J. W., & Poth, C. N. (2016). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Sage Publications. https://edge.sagepub.com/creswellqi4e

Daniels, L. M., Poth, C., & Goegan, L. D. (2018). Enhancing Our Understanding of Teachers' Personal Responsibility for Student Motivation: A Mixed Methods Study. *Frontiers in Education, 3*, 91. https://doi.org/10.3389/feduc.2018.00091

Eatough, V., & Smith, J. A. (2017). Interpretative Phenomenological Analysis. In C. Willig & W. Stainton-Rogers (Eds.), *The Sage Handbook of Qualitative Research in Psychology* (pp. 193-209). Sage Publications. https://doi.org/10.4135/9781526405555.n12

Ehlen, C. (2015). *Co-Creation of Innovation: Investment with and in Social Capital: Studies on Collaboration Between Education-Industry-Government* [Doctoral Thesis, Open Universiteit]. https://research.ou.nl/ws/portalfiles/portal/935731/E-book%20Dissertatie%20Corry%20Ehlen.pdf

Ferraris, A., Belyaeva, Z., & Bresciani, S. (2020). The role of universities in the Smart City innovation: Multistakeholder integration and engagement perspectives. *Journal of Business Research, 119*, 163-171. https://doi.org/10.1016/j.jbusres.2018.12.010

Fry, G. W. (2018). *Education in Thailand: An Old Elephant in Search of a New Mahout*. Springer. https://doi.org/10.1007/978-981-10-7857-6

Giesenbauer, B., & Müller-Christ, G. (2020). University 4.0: Promoting the Transformation of Higher Education Institutions toward Sustainable Development. *Sustainability, 12*(8), 3371. https://doi.org/10.3390/su12083371

Grubbs, S. J., Chaengploy, S., & Worawong, K. (2009). Rajabhat and traditional universities: institutional differences in Thai students' perceptions of English. *Higher Education, 57*(3), 283-298. https://doi.org/10.1007/s10734-008-9144-2

Hermans, F., Klerkx, L., & Roep, D. (2015). Structural Conditions for Collaboration and Learning in Innovation Networks: Using an Innovation System Performance Lens to Analyse Agricultural Knowledge Systems. *The Journal of Agricultural Education and Extension, 21*(1), 35-54. https://doi.org/10.1080/1389224X.2014.991113

Hitchcock, J. H., & Onwuegbuzie, A. J. (2020). Developing Mixed Methods Crossover Analysis Approaches. *Journal of Mixed Methods Research, 14*(1), 63-83. https://doi.org/10.1177/1558689819841782

Jehma, H., & Akaraphattanawong, A. (2023). VRChat as a virtual learning platform for enhancing English listening skills. *International Journal of Information and Education Technology, 13*(5), 813-817.

Kongcharoenkitkul, J., Nakum, N., & Chatpunnarangsee, K. (2022). A Study of English Reading Difficulties in GAT English of Thai High School Students. In *Proceedings of the 14th NPRU National Academic Conference 2022* (pp. 1190-2006). Nakorn Pathom, Thailand. https://publication.npru.ac.th/jspui/handle/123456789/1769

Kowalik, K., & Bagińska, I. (2023). The SWOT-TOWS analysis as a tool for quality management for an enterprise with PKD 85.59 b–extracurricular forms of education. *Scientific Papers of Silesian University of Technology–Organization and Management*

Series, 178, 351-361. https://doi.org/10.29119/1641-3466.2023.178.19

Luksha, P., & Kinsner, W. (2020). Transformation Into a New Education Paradigm and the Role of Ecosystemic Leadership. *Cadmus, 4*(2), 182-198. http://www.cadmusjournal.org/files/pdfreprints/vol4issue2/Transformation-into-a-New-Education-Paradigm-PLuksha-WKinsner-Cadmus-V4-I2-P2-Reprint.pdf

Markatou, M., & Alexandrou, E. (2015). Urban System of Innovation: Main Agents and Main Factors of Success. *Procedia - Social and Behavioral Sciences, 195*, 240-250. https://doi.org/10.1016/j.sbspro.2015.06.355

Norris, L., Eyt-Dessus, A., & Holtham, C. (2013). The Learning Ecosystem: A Practical, Holistic Approach to Old Problems in a New World. In H. Carter, M. Gosper, & J. Hedberg (Eds.), *Electric Dreams. Proceedings ascilite 2013 Sydney* (pp. 633-641). ASCILITE Publications. https://ascilite.org/conferences/sydney13/program/papers/Norris.pdf

Nursalim, M., Saroinsong, W. P., Boonroungrut, C., Wagino, & Costa, A. d. (2023). Prediction of students' COVID-19 resilience: An artificial neural network based on gender, age, stress intensity, and mindfulness variables. *Psychology in the Schools, 60*(9), 3253-3265. https://doi.org/10.1002/pits.22920

Puthaprasert, C., Supising, J., Boonchai, T., Kosanpipat, S., & Poungkaew, P. (2024). School Administration Model by Area-based Approach to Develop A Sustainable Educational Quality (In accordance with the 20-Year National Strategy : Stability, Prosperity and Sustainability). *The Golden Teak: Humanity and Social Science Journal, 30*(2), 77-93. https://so05.tci-thaijo.org/index.php/tgt/article/view/261724

Rincón-Gallardo, S., & Fullan, M. (2016). Essential features of effective networks in education. *Journal of Professional Capital and Community, 1*(1), 5-22. https://doi.org/10.1108/JPCC-09-2015-0007

Sangnapaboworn, W. (2018). The Evolution of Education Reform in Thailand. In G. W. Fry (Ed.), *Education in Thailand: An Old Elephant in Search of a New Mahout* (pp. 517-554). Springer Singapore. https://doi.org/10.1007/978-981-10-7857-6_21

Satiman, A. (2019). A Development of Knowledge Management System on Mobile Devices for Higher Education, Thailand. In *Proceedings of the 2019 2nd International Conference on Computers in Management and Business* (pp. 87-90). Association for Computing Machinery. https://doi.org/10.1145/3328886.3328897

Chantanin R. ., Sawangwong B., & Jaidee K. (2024). Community economic development model for sustainable provincial development in Nakhon Pathom Province. *Ramkhamhaeng Journal of Public Administration, 7* (3), 337–374. Retrieved from https://so16.tci-thaijo.org/index.php/RJPA/article/view/1220.

Schatz, S., & Vogel-Walcutt, J. (2019). *Modernizing Learning: Building the Future Learning Ecosystem*. Advanced Distributed Learning Initiative, U.S. Department of Defense. https://adlnet.gov/publications/2019/04/modernizing-learning

Sujarwanto, Saroinsong, W. P., Boonroungrut, C., Adhe, K. R., Purwoko, B., & Riyanto,

Y. (2022). Special Education Teachers' Perceived Stress towards Transformational Teaching. *International Journal of Instruction, 15*(4), 971-986. https://e-iji.net/ats/index.php/pub/article/view/297

Sun, D., Zhu, X., Bao, Z., & Lin, X. (2024). Association between healthy lifestyles and post-COVID-19 syndrome among college students. *Annals of Thoracic Medicine, 19*(2), 139-146. https://doi.org/10.4103/atm.atm_219_23

Suwanmanee, S., Wannapairo, S., Chumruksa, C., Kasinant, C., Prasitpong, S., Sae-Tae, K., et al. (2023). Transformational Leadership Development for School Administrators Emphasizing Area Potential with Learners' Science, Math and Technology Competencies in Education Sandbox, Thailand. *Cogent Social Sciences, 9*(1), 2179740. https://doi.org/10.1080/23311886.2023.2179740

Thammetar, T., & Khlaisang, J. (2019). Promoting open education and MOOCs in Thailand: A research-based design approach. In K. Zhang, C. Bonk, T. Reeves, & T. Reynolds (Eds.), *MOOCs and Open Education in the Global South* (pp. 140-155). Routledge. https://doi.org/10.4324/9780429398919-16

Turner, R. C., & Carlson, L. (2003). Indexes of Item-Objective Congruence for Multidimensional Items. *International Journal of Testing, 3*(2), 163-171. https://doi.org/10.1207/S15327574IJT0302_5

Vanpetch, Y., & Sattayathamrongthian, M. (2020). The challenge and opportunities of thailand education due to the covid-19 pandemic: case study of Nakhon Pathom, Thailand. *E3S Web of Conferences, 210*, 18058. https://doi.org/10.1051/e3sconf/202021018058

Wang, C., Rodan, S., Fruin, M., & Xu, X. (2014). Knowledge Networks, Collaboration Networks, and Exploratory Innovation. *Academy of Management Journal, 57*(2), 484-514. https://doi.org/10.5465/amj.2011.0917

Wiggins, G. P., & McTighe, J. (2005). *Understanding by Design*. ASCD. https://files.ascd.org/staticfiles/ascd/pdf/siteASCD/publications/UbD_WhitePaper0312.pdf

Wiles, J. (2009). *Leading Curriculum Development*. Corwin Press. https://us.sagepub.com/en-us/nam/book/leading-curriculum-development

Yoshida, M., Theeraroungchaisri, A., Thammetar, T., & Khlaisang, J. (2021). Exploring MOOCs that promote innovative public services. *Sustainability, 13*(24), 1-13. https://ideas.repec.org/a/gam/jsusta/v13y2021i24p13939-d704481.html

Žalėnienė, I., & Pereira, P. (2021). Higher Education For Sustainability: A Global Perspective. *Geography and Sustainability, 2*(2), 99-106. https://doi.org/10.1016/j.geosus.2021.05.001