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ENHANCING THE SUCCESS OF MEDICAL STARTUPS: A FRAMEWORK FOR TAILORED SUPPORT IN UNIVERSITY INCUBATORS

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ABSTRACT

Incubators play an essential part in connecting academic research with the market, the critical function that incubators play is enabling the smooth transfer of breakthroughs from academic research to the marketplace. Incubators play a crucial role as dynamic intermediaries, providing businesses with a valuable ecosystem of resources and support, including capital, infrastructure, and mentorship. Based on 30 student businesses running in an academic incubator, it discovers the favourable association between a company's prospects of success and the mentoring program of an incubator. Making through the first year founding teams past experience. The complex influence of incubation settings on the commercialization of innovations inspired by research is the central theme of our main hypothesis. We hypothesize that the incubators significantly enhance the processes involved in technology transfer. The results show that companies with founding Groups who do not participate in the incubator's mentorship program have a lower likelihood of surviving compared to those with high levels of administrative expertise or business experience. The study clarifies how various prior experience types affect the connection between first-class survival for the enterprise odds and the mentorship program offered by the incubator its results are intended to guide tactics for maximizing the interaction between scholarly research, entrepreneurial pursuits, and the incubator market, ultimately resulting in a robust and long-lasting link between academia and industry.

Keywords: Incubators, Incubator Market, Experience of Entrepreneurs, Incubator's Mentorship Program

1. INTRODUCTION

Incubators for businesses are initiatives designed to promote the growth of prosperous enterprise [1]. Various services are offered for free at a discounted rate to accomplish this goal. Incubators offer a wide range of services, which include space, secretarial services, mentorship, company planning and guidance, grant writing support, venture capitalist connections and cash assistance [2]. Business incubation (BI) is the process of providing these crucial services [3] to start-ups and early-stage businesses. The process of offering these essential services to emerging and early-stage businesses is known as BI [4].It is a process of business support that offers entrepreneurs a range of focused assistance and resources in an effort to accelerate the effective growth of enterprises and developing enterprises [5]. Generally, incubator management develops or coordinates these services, which is provided in the BI, as well as through its network of contacts [6]. The primary objective of a BI is to create profitable businesses that will enable the program to become financially independent [7]. These graduates of incubators have the power to boost local and national economies, regenerate communities, commercialize novel inventions, and generate jobs [8].The ability of BI to close the gap between academia and industry has made popular in the higher education sector [9]. Academic institutions acknowledge the significance of fostering entrepreneurial skills and encouraging creativity among their staff and students [10]. Universities establish an ecosystem through the establishment of BI that promotes technology transfer, entrepreneurial

education and cooperation between academic researchers and entrepreneurs [11]. Access to specialist facilities, networking opportunities and mentorship are provided by BI in higher education institutions in an effort to increase the success rate of enterprises and promote economic growth [12]. In China, the number of BI increased despite the country's long history of reform and opening up and enterprises were urged to foster innovation [13].Additionally, the cost of conducting business and gaining access to information and modern technology is decreased by the development and sufficiency of infrastructural networks, such as communication and internet usage, increasing the manufacturing base and the competitiveness of the private sector and fostering entrepreneurship [14]. In the meanwhile, a nation's productivity determines its level of affluence and innovation is the engine driving increased productivity. To achieve greater value creation, the government needs to establish a knowledge-based entrepreneurial society that emphasizes innovation and makes products stand out from the competition. Entrepreneurs in the technology sector are vulnerable to criticism over dangers related to finances, health and safety, laws and ethical norms [15]. Consequently, BI are thought of crucial places for small technology entrepreneurs to establish a home since they offer essential places for information exchange and creative endeavors, as well as support innovation and technology entrepreneurship. BI witnessed rapid development as a result of enhanced venture capital development rules and regulations, as well as increased support for business start-ups and innovation efforts. China's BI has expanded by almost a factor of hundreds and is a new source of innovation in the country. Higher education in medicine is a crucial component of university education [16].The number of BI in China has increased significantly, especially those assist medical college students and businesses in the healthcare industry. These incubators are essential for developing innovative ideas, supporting entrepreneurship and bringing medical research to real-world uses [17].The process of producing exceptional medical students at higher medical colleges and universities requires the integration of innovation and entrepreneurial education, which enrich their own meanings are unavoidably necessary for the advancement of society.The study [18] presented BI as an effective internationalization strategy for clients that include start-ups with limited resources and localized foreign expertise.They observed that BI plays the function of knowledge intermediaries by grouping and training international clients through the process of upstream and downstream connections in global marketplaces as well as internal client-market matchmaking.The research [19] examined the connection between Indonesian BI success criteria and incubator performance. It has been determined to be one of the abilities of BI facilities that contribute to their results, meeting the criteria for entering directly contributes to the incubators' effectiveness. In addition, several variables from the local context work in concert to foster a community that accentuates the techniques employed by the incubators.The investigation [20] examined the connection between new venture success and BI networks. It presented a combined framework that uses environmental dynamism and entrepreneurial orientation (EO) to determine how BIs' internal and external networks affect the performance of new enterprises. The study [21] developed the concept of planned action framework and described how student entrepreneurial intention is affected by perceived university assistance by utilizing the theory of planned behaviour perspective. According to the study's findings, students' attitudes toward entrepreneurship were highly influenced by their perceptions of university assistance, indicating the crucial role that colleges play in helping students develops an entrepreneurial spirit. There was a notable impact on behavioural control for perceived university support. The research [22] explored in which BI supports their start-up clients from emerging economies as they expand internationally. The study presents BI as an effective internationalization strategy for clients with limited resources and localized foreign expertise. The investigation [23] investigated the way business incubators contribute to the development of entrepreneurship by offering more services (training programs, capital support, and networking services). Also, it examined the government rules and business enterprises play a mediating and regulating role in entrepreneurship. The study [24] examined the impact of innovation on the performance of entrepreneurs placed in BI.Also, the study investigated how entrepreneurship education helps establish long-term, highly sustainable businesses that generate value for society.

The research was structured into the remaining portion of the segments: part 2 presents the hypotheses, part 3 examines the methods, part 4 presents the findings, part 5 evaluates the discussion and part6 closes the study.

2. HYPOTHESES

BI provides a secure, nurturing environment with a variety of real and immaterial resources to assist in the launch and growth of new businesses.

Hypothesis 1: The Entrepreneur's chances of surviving will be impacted by the incubator's guidance program.

The industry knowledge and extensive networks of a guide enable entrepreneurs to proceed through a cyclical process of eliminating and relocating potential markets. Their knowledge makes easier for business owners to select the best business plan and model while requiring them to follow a trial-and-error learning process. Founders emphasize information that supports their opinions and ignore information that contradicts them. In these situations, guides might increase the amount of data that needs to be considered, examined and evaluated.The guide helps the companies sheltered in areas in which they lack the necessary knowledge and experience and it is regarded as a fundamental component of the incubation system. Incubators provide founding teams with direct access to mentors or seasoned entrepreneurs who can impart knowledge on how to launch and run a fresh enterprise, which can impact the enterprise's development and strategy. Incubator mentors can help firms connect with investors or other decision-makers, as well as acquire internal and external resources. Overall, incubator-provided mentoring programs are more likely to increase the chances of survival for firms.

Hypothesis 2: When a founding team has a high degree of previous managerial expertise, mentoring programs have a beneficial impact on the firm's prospects of survival.

The company's operations are directed by the founding team's prior managerial experience as well as an implicit knowledge of the company's assets and capabilities. This knowledge also directs the company on a specific path.A new business must be formed with knowledge and expertise in a variety of areas, including sales, negotiation, administration, organizing, making choices, problem-solving, business and interaction. These areas are covered by managerial experience. Additionally, it promotes familiarity with organizational responsibilities and makes information easier to obtain for routines and skill development those new initiatives first lack.Entrepreneurs of firms with established managerial backgrounds could believe that thefollowing standard template leads to better organizational performance. In this way, having managerial experience encourages people to take advantage of certainties and copy information from earlier endeavours or organizations. As a result, the connection between an incubator's mentoring system and the newly founded business has a better chance of surviving when the founding team has a high degree of prior administrative experience. Teams with a lot of previous management expertise replicate processes and practices that have been effective in the past, which leads to exploitative learning experiences for students.High-level managerial experience establishing teams can attempt to imitate a methodical, more fact-based decision-making process that takes into consideration numerous, intricate and varied aspects.

Hypothesis 3: Efficient Interaction and Coordination in Incubators Lead to Enhanced Market Entry Techniques for Medical Student Enterprises.

Student enterprises are thought to have better market entrance strategies if they participate in networking and collaborative activities in incubators, connecting with industry experts, other entrepreneurs and potential partners. This hypothesis is predicated on the idea that the utilization of industry knowledge, the development of strategic relationships and market validation are facilitated by an established network and collaborative environment are essential for a successful market launch.

Hypothesis 4: Low levels of prior entrepreneurial expertise among the founding team increase the favourable impact of incubators on business survival.

Experience in the business sector with responsibilities such as prospect identification, assessment and pursuit is a unique quality that could give the enterpriseof a competitive advantage. To achieve significant conceptual rises and generate new concepts that are not linear and technically based, founding teams that gain such knowledge utilize a heuristic-based logic. Their approach to addressing things differs from those who adopt a factual stance,

as they engage in unique thought processes and perspectives. By participating in incubator programs and drawing on the guide's experience, which combines his or her business instinct, manufacturing system and knowledge, businesses with limited entrepreneurial experience can overcome this risk. By utilizing their guide's knowledge and entrepreneurial skills, students are able to expand their resources and improve their prospects of survival.Less experienced entrepreneurial teams can view the business's foundation process as a collection of discrete obstacles and have less sophisticated cognitive representations of business prospects. They are vulnerable because they do not have a holistic viewpoint. Highly established entrepreneurs could be well-versed in the world of entrepreneurship. Because of their past experiences, they can question standards, have a new perspective on reality and follow an exploratory learning route. Because of this, it is anticipated that the effect of incubator programs on company survival will be less noticeable for teams who have a lot of prior entrepreneurial experience.

Hypothesis 5: Business incubators offer financial support that promotes the growth of entrepreneurship.

In the private sector, capital support emerged as a new source of funding for technological advancement. Policymakers must concentrate on entrepreneurship and capital support since they are recognized as important sources of innovation, jobs and economic growth. There are unfulfilled needs among entrepreneurs who require cash as a result of these obstacles and the absence of funding suitable for different new enterprises. Additionally, entrepreneurs are unable to select the financing services that are most appropriate for their particular business.

3. MATERIALS AND METHODS

Participants for this study were meticulously selected based on their active involvement in the early stages of a business within the university's incubator program in Mainland China. The selection criteria included students who were currently enrolled in medical or healthcare-related fields and had initiated or co-founded a startup that was being incubated. Specifically, these businesses were required to be in the ideation, development, or initial launch phases, typically not exceeding two years of operation. This criterion ensured that the study focused on those entrepreneurs who were navigating the foundational challenges of establishing a medical startup, thereby providing insights into the critical role of incubation services at this crucial juncture. Additionally, to ensure a diverse representation of experiences and challenges faced by student entrepreneurs, we included participants from various sub-disciplines within medicine and healthcare, such as biotechnology, medical devices, healthcare services, and digital health solutions.

First, a qualitative study of semi-structured interviews with student entrepreneurs in the early stages of their business was conducted. The topics of discussion during each 45-minute interview comprised the business's concept, the founders' past experiences, and elements of the incubation environment that contributed to the business up to Point of Success. The purpose of the interviews was to deepen the knowledge about the particular resources that impact student entrepreneurs and enterprise success. Additionally, data was gathered from the team of entrepreneurs twice: first during the program's start, questioned about the idea and their previous knowledge and again at the end of the program. Students were asked to describe the commercial possibilities they discovered for their company idea and to indicate how much they employed the mentorship program in the second survey. The survey was sent to 1320 medical students, and 83.2% of them responded.In total, the research comprised of businesses that had fulfilled both questionnaires. 30 enterprise teams in the sample made through at least 11 months.

i. Factors

A binary variable was used for assessing enterprise survival, indicating whether the team continued to work on the enterprise after 10 months (coded as '1') or not (coded as '0').Students were questioned about the number of years they had been in management, and this question was used to gauge their managerial experience. Experience as an entrepreneur was quantified.After being accepted into the incubator program, teams were asked to select the mentors they would like to work with. Each new enterprise was connected to one of the sectors of entrepreneurship. The students agreed to spend a few hours in each week or every other week, meeting with

coaching enterprises that were incubated. Every incubated team had a mentor given to them, they were required to remain in communication and discuss the team's development and present difficulties.Because management and entrepreneurial experiences encourage distinct kinds of actions when functioning in an incubator, the focus of this research on these experiences. Age, gender ratio of students, and team size were added as a control variable.

4. RESULT

The Mean, Standard deviations (SD), and correlations factors are used to evaluate enterprise survival by Random Forest are displayed in Table 1.

Table 1: Evaluation of enterprise survival

Variable	Mean	SD	Mentoring program	Managerial experience	Entrepreneurial experience	age
Mentoring program	3.19	0.85	-	-	-	-
Managerial experience	1.89	1.33	0.07	-	-	-
Entrepreneurial experience	1.01	1.53	-0.09	0.26	-	-
Age	2.85	0.47	0.07	0.43	0.20	-
Team Size	3.49	2.05	-0.17	-0.10	0.19	0.14

There were strong and significant relationships between the amount of business potential the founding team explored and the enterprise's ability to survive its first year.Figure 1 depicts the probability of survival through the usage of mentoring programs through their entrepreneurial experience.

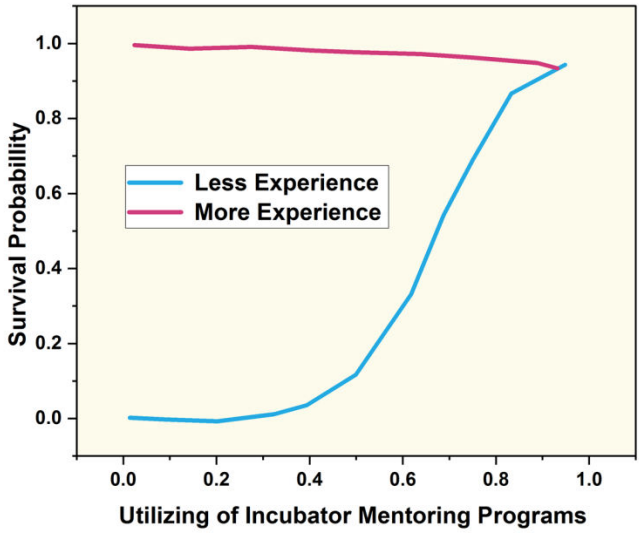

Figure 1: Survival rate of enterprises based on entrepreneurial experience

Teams with lower degrees of prior entrepreneurial experience have greater survival rates when the mentoring program is used more frequently. As expected by Hypothesis 1, there was a favourable correlation between enterprise survival and the incubator's mentorship program. The link among the team's managerial abilities and mentorship was also verified, as Hypothesis 2 stated. The third hypothesis, which postulated that Efficient Interaction and Coordination in Incubators Leads to Enhanced Market Entry Techniques for Medical Student Enterprises, was similarly confirmed. The fourth hypothesis suggested that Low levels of prior entrepreneurial expertise among the founding team increase the favourable impact of incubators on business survival was also verified. The fifth hypothesis which states that business incubators provide financial assistance to encourage the

expansion of entrepreneurship is likewise verified. Figure 2 represents the survival rate of enterprises with managerial experience with previous managerial experience.

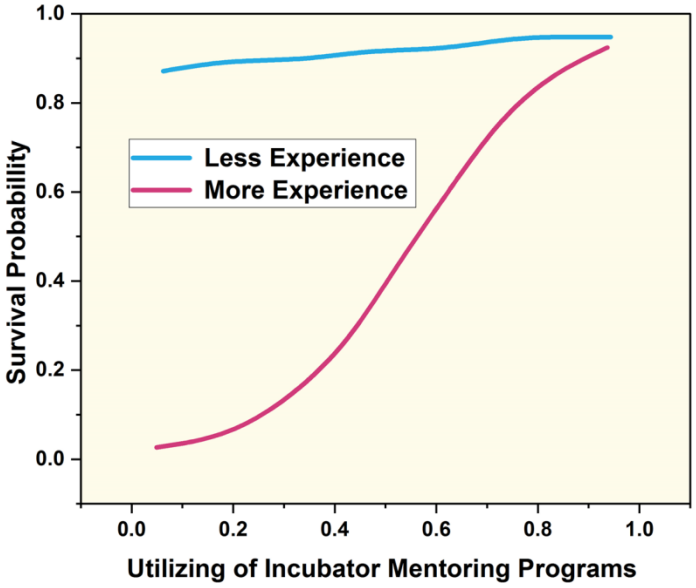

Figure 2: Survival rate of enterprises based on managerial experience

Low survival rates are caused by high levels of managerial expertise in firms whose founding teams utilized the incubator program selectively. Furthermore, it implies that in spite of the student, degree of administrative expertise, good survival rates are connected with high levels of engagement in the incubator program. Additionally, it demonstrates that teams with less managerial experience survive well and are unaffected by the degree to which the mentorship program is implemented.

5. DISCUSSION

The study examined incubator resources with the goal of explaining how these affect an enterprise's chances of surviving when the students' prior expertise is taken into account. The study identified circumstances in which the kind and degree of prior experience of the founding team had an impact on the association between survival and an incubator's mentoring program. The research established a favourable correlation between company longevity and an incubator's mentorship program and it identified circumstances in which the kind and degree of prior expertise of the founding team had an impact on this association. The resources that incubators supplied would assist enterprises in managing the risk associated with being new and raising their chances of survival. There was evidence to support the first hypothesis, which proposed a positive correlation between incubator programs and enterprise survival. The current analysis confirms earlier conclusions and demonstrates the value of the incubator program for early-stage entrepreneurs. The resources that incubators supplied would assist enterprises in managing the risk associated with starting new and raising their chances of survival. Incubators are referred to the perfect place for entrepreneurs to expand and build their companies, providing anything from state-of-the-art laboratories to virtual assistance and desk rentals in between. There was evidence to support hypothesis 1 that incubator programs and entrepreneur survival are positively correlated. The current analysis demonstrates the value of the mentorship program for early-stage entrepreneurs. The current analysis implies that the lack of focus on the tailored service strategy is the reason for earlier contradictory and unclear findings about the impact of incubator resources on company survival. When incubators address the needs of their enterprise and the traits of entrepreneurs at the same time, their enterprise can benefit more. Experience-based knowledge affects the strategic decisions made by business owners, especially when they are faced with the problem of obtaining resources. This study focuses on management and entrepreneurial expertise, showing how each influences the

association between incubator mentorship programs and the probability of businesses surviving their first year. Incubators help businesses expedite their development timeline and shorten the time required to bring academic research to market by offering a supportive atmosphere, resources, and expertise. The results supported the hypothesis stated in Hypothesis 2, demonstrating that teams lacking managerial experience making use of the mentoring program had little chance of surviving. When the founding team of the incubator uses the mentorship program barely, these actions could negatively impact the enterprise's chances of surviving. Teams that leverage mentoring programs are more likely to thrive, especially when equipped with a wealth of managerial expertise. Hypothesis 3, incubators that function well together foster an atmosphere that is favourable to the creation of informed and customized market entrance strategies for businesses run by medical students. This cooperative strategy increases the overall chances of success for medical companies in the competitive market environment by utilizing the pooled knowledge, resources and support available in the incubator ecosystem. It was proven that groups with less earlier entrepreneurial knowledge have a larger positive correlation between the mentorship program and business survival, which is the fourth hypothesis. The findings show that teams with little to no prior entrepreneurial experience had poor survival rates when they chose not to participate in the mentorship program. These results corroborate and strengthen earlier research suggesting the value of the mentorship program for company growth, but they also raise the possibility that it can be significant for teams to no prior entrepreneurial experience. Hypothesis 5 states that,by providing financial support that helps businesses overcome their early-stage funding hurdle; business incubators greatly contribute to the growth of entrepreneurship. In addition to assisting in overcoming the early financial obstacles, this support paves the way for continued expansion, inventiveness and the ultimate success of the business enterprises.

6. OPERATIONAL GUIDE UNIVERSITY INCUBATORS

6.1 Tailored Mentorship Programs for Medical Startups

University incubators should implement Tailored Mentorship Programs that specifically focus on the critical aspects of medical startups: regulatory navigation, clinical trial management, and healthcare market strategies. These programs must enlist mentors with a proven track record in medical entrepreneurship, deep knowledge of healthcare regulations, and experience in medical technology development. Such focused mentorship can guide startups through the complexities of regulatory compliance, crucial for products needing FDA approval or navigating other healthcare standards. Furthermore, mentors experienced in clinical trial management can provide essential insights into designing and executing trials that meet both regulatory requirements and scientific rigor. Lastly, understanding the healthcare market's nuances, from patient needs to healthcare provider constraints, is vital for the commercial success of medical innovations. This targeted mentorship approach ensures that medical startups not only overcome sector-specific hurdles but also position their innovations effectively within the competitive healthcare marketplace.

6.2 Enhancing Entrepreneurial and Managerial Skills

Enhancing the entrepreneurial and managerial skills of student-led medical startups is pivotal for their success within the highly regulated and competitive healthcare industry. To achieve this, university incubators should implement a comprehensive education and training program focusing on the critical aspects of medical business management. Firstly, workshops, seminars, and courses should be offered regularly, covering essential topics such as intellectual property rights, which are crucial for protecting innovations in the medical field. Understanding the intricacies of medicine approval processes is another critical area, as navigating these can significantly accelerate the time to market for new medical products and technologies. Additionally, knowledge of healthcare policy and its implications on business operations can empower startups to make informed decisions and advocate for beneficial regulatory changes. Furthermore, incubators should foster an environment that encourages the formation of cross-disciplinary teams, blending the expertise of students from medical and business schools. This approach not only enriches the managerial and entrepreneurial perspectives within these startups but also facilitates a more holistic understanding of the challenges and opportunities in the healthcare

sector. By combining medical knowledge with business acumen, these teams can better navigate the complexities of launching and scaling a medical startup, from concept validation to commercialization and beyond.

6.3 Specialized Resources and Support

To effectively support the unique needs of medical startups, university incubators must offer specialized resources and support that facilitate the transition from conceptual ideas to market-ready innovations. A critical component of this support system is providing access to medical labs and prototype development facilities. These resources enable startups to conduct necessary research and development activities, iterate on product designs, and develop prototypes that are essential for demonstrating their concepts' viability. Such facilities should be equipped with the latest technologies and equipment relevant to medical research and product development, ensuring startups can advance their innovations with precision and efficiency.

Moreover, clinical trial support is indispensable for medical startups as it bridges the critical gap between prototype development and market entry. Incubators should offer guidance and resources to help startups navigate the complex process of organizing and conducting clinical trials, including assistance with regulatory compliance, patient recruitment strategies, and data management. This support is crucial for validating the safety and efficacy of medical innovations, a prerequisite for regulatory approval and commercial success.

Additionally, incubators should actively facilitate connections with key stakeholders in the healthcare ecosystem. This includes establishing partnerships with healthcare institutions that can provide valuable insights into clinical needs and opportunities for pilot studies or clinical validation. Collaboration with industry partners and access to a network of investors focused on medical innovations are equally important. These connections can offer startups critical funding opportunities, mentorship, and strategic partnerships that accelerate their growth and market penetration.

6.4 Cultivating a Supportive Community

Cultivating a supportive community within the incubator is essential for nurturing the growth and success of medical startups. By fostering a vibrant community of medical entrepreneurs, incubators can create an environment ripe for peer learning, collaboration, and network building, which are critical components for the development of any successful enterprise in the healthcare sector.

To facilitate this, incubators should actively encourage interactions and collaborations among the resident startups. This can be achieved by setting up dedicated spaces for co-working and informal gatherings, where entrepreneurs can share ideas, challenges, and solutions. Such interactions not only foster a sense of community but also promote the exchange of knowledge and experiences, enhancing the learning curve for all involved.

Furthermore, the organization of regular networking events is crucial. These events can range from informal meet-and-greets to more structured pitch sessions and forums, where startups have the opportunity to present their innovations to a wider audience. By inviting healthcare professionals, seasoned entrepreneurs, and potential investors to these events, incubators can provide their startups with valuable exposure and feedback, while also facilitating the establishment of important connections. These interactions can lead to mentorship opportunities, strategic partnerships, and even funding, all of which are invaluable for a startup's growth and market entry.

Additionally, hosting forums and workshops on relevant topics can further enrich the community. These events can serve as platforms for discussing emerging trends in healthcare, regulatory changes, and best practices in medical entrepreneurship. By bringing together diverse perspectives from within and outside the incubator, such forums can stimulate insightful discussions, foster innovation, and strengthen the community's collective knowledge and expertise.

In essence, by cultivating a supportive community, university incubators can significantly enhance the prospects of medical startups. This community not only serves as a robust support network but also as a dynamic ecosystem that accelerates learning, fosters innovation, and facilitates the successful navigation of the complex healthcare industry.

6.5 Continuous Evaluation and Adaptation

To ensure that university incubators remain effective and responsive to the needs of medical startups, it is crucial to establish a system for continuous evaluation and adaptation of their services and resources. This system should involve regular feedback mechanisms from the startups themselves, leveraging surveys, interviews, and informal discussions to gather insights on the utility and impact of the incubator's offerings. By analyzing this feedback, incubators can identify areas for improvement, uncover emerging needs, and adjust their support services to better align with the startups' evolving requirements.

Furthermore, incubators must proactively stay abreast of the rapidly changing landscape of the healthcare sector. This entails monitoring advancements in medical technologies, shifts in healthcare policies and regulations, and emerging market trends. By understanding these external factors, incubators can anticipate the challenges and opportunities they present for their resident startups and tailor their support services accordingly.

Adapting support services may involve introducing new workshops on cutting-edge technologies, updating mentorship programs to include experts on recent regulatory changes, or facilitating access to new markets and customer segments identified through market trend analyses. Additionally, incubators should foster partnerships with research institutions, industry bodies, and regulatory agencies to provide startups with direct access to the latest knowledge and resources in the field.

Implementing a dynamic system of continuous evaluation and adaptation not only ensures that incubator services remain relevant and valuable but also signals to medical startups that their growth and success are the incubator's top priorities. This approach fosters a culture of innovation and agility within the incubator, empowering medical startups to navigate the complexities of the healthcare industry and achieve sustainable growth and impact.

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7. CONCLUSION

Incubators are essential because they act as a link between university research and industry. This study demonstrates that while engaging with the resources of the incubator, an enterprise's chances of survival vary depending on the amount of various intangible resources which the team possesses. Incubators help make the transition from conceptual ideas to real goods and services by promoting effective communication, supplying necessary resources, and giving customized support. The dynamic interaction observed at incubators improves market entrance strategies, shortens development times, and fosters entrepreneurial expansion. Incubators establish a collaborative environment among scholars, industry professionals, and entrepreneurs to tackle real-world problems by providing mentorship, networking opportunities, and financial support. Incubators play a crucial role in advancing innovation and entrepreneurship by serving as a bridge between academic research and industry, even as they undergo continuous evolution.

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