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RESEARCH ARTICLE

Does Knowledge Sharing and Technopreneurship Affect Entrepreneurial Outcomes in Developing Economies? Using The SME and ANOVA Approaches

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ABSTRACT

This study on technopreneurship aims to reconfigure entrepreneurial outcomes, but how knowledge sharing moderates the interaction is an academic and practical concern. This study focuses on how knowledge sharing and technopreneurship affect the entrepreneurial outcome in Bangladeshi small and medium enterprises (SMEs). This research has established the following aims to establish a meaningful association between technopreneurship, knowledge sharing, and the outcomes of entrepreneurial endeavours. In pursuit of knowledge, data were collected through primary sources after establishing the questionnaire's validity and reliability. Findings revealed that technopreneurship and knowledge sharing individually affected entrepreneurial outcomes. However, knowledge sharing could not significantly moderate the interaction between technopreneurship and entrepreneurial outcomes. Hence, the recommendation was anchored on improving knowledge sharing, technopreneurship, and managerial dexterity of owners and managers.

Keywords: Technopreneurship; Knowledge sharing; Entrepreneurial outcomes; Owners and employees

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1. Introduction

The economy may get potential benefits through the implementation of information systems in Bangladesh [1]. The results of micro, small, and medium-scale firms, collectively called MSMEs, are essential for countries that want to foster economic growth and social-political resilience on the path to sustainable development. The survival outcomes goals are not geographically constrained because established, transitioning, and developing economies have all experienced a significant decrease in the growth and performance of micro, small, and medium-sized enterprises (MSMEs). Additionally, traditional indexes, such as financial and non-financial outcomes, implemented to assess the outcomes of MSMEs offer a universal measurement denominator relevant. Regardless of the outcome measurements that are used, the daunting issue posed by the performance of micro, small, and medium-sized enterprises (MSMEs) in the majority of countries around the world is unavoidable [2]. The expansion and growth of micro, small, and medium-sized enterprises (MSMEs) slowed due to political upheaval, structural issues, ambidexterity, weakness, and low-profit margins [2]. In addition, the empirical report demonstrates that 83.9% of MSMEs were negatively affected by the pandemic, while 29% of MSMEs startups ceased operations as a direct result of the pandemic [2]. MSMEs created 80 percent of jobs in Nigeria [3,4], generating 49.78 percent of the country's GDP [2]. Despite these contributions, the most superficial assessments demonstrate that approximately four of every five SMEs do not make it past the first five years after its founding due to a lack of experience, inadequate ambidexterity, and poor information sharing [5].

Even though not every small or medium firm (SME) becomes a significant enterprise, they all face the same challenges in their early days: Locating the right financing at an affordable cost to start and grow the business. Although the socio-economic conditions of the world's diverse areas vary greatly, the financial challenges faced by small and medium-sized enterprises (SMEs) are fundamentally the same everywhere in the world [6]. The capability of small and medium-sized enterprises (SMEs) can have access to and effectively manage financial resources, which is a significant factor in determining whether or not they will be able to develop, expand, maintain, or strengthen themselves. However, Small and medium-sized enterprises (SMEs), including micro-enterprises and new businesses, are in developing countries of the East and South [7-10].

For various reasons, financing is a significant limitation for SMEs. The owners of many SMEs do not adequately manage their working capital, the information asymmetry between SMEs and banks slows down the process of loan application and approval, and underdeveloped stock markets prevent SMEs from taking advantage of future growth potential. Policymakers can help improve conditions by acting as facilitators and communicators; however, governments in the East Asian countries of Cambodia, China, Indonesia, Lao People's Democratic Republic (PDR), Malaysia, the Philippines, Thailand, and Viet Nam, as well as the South Asian nations of Bangladesh, India, Nepal, and Sri Lanka, should avoid providing direct financial assistance if at all possible [11,12].

The term "SME finance" refers to various techniques that provide additional funding for the growth of smaller businesses. There are several important facets to consider regarding finance for SMEs. One of the most important characteristics is the capability to increase capital in response to SMEs' rapid expansion rapidly. It is evident when looking at venture financing in high-tech industries. Complementarity is another outstanding quality of SME financing, which refers to adding to the existing traditional funding sources in many different circumstances. The funding of successful small and medium-sized enterprises (SMEs) generates additional capital for subsequent SMEs, so generating a virtuous cycle. Adequate finance is also sustainable in this sense [12].

Nobody can say how many small and medium-sized businesses operate in Bangladesh. Around the year 1978, the Bangladesh Small and Cottage Enterprises Corporation (BSCIC), which was oper-

ating under the auspices of the Ministry of Industries at the time, surveyed the total number of cottage and small industries in the nation. Despite concerns over the reliability and validity of the survey and the lack of any further effort on the part of the Bangladesh Bureau of Statistics (BBS) or any other organization, this endeavour did provide a useful benchmark; nevertheless, it was never updated. In 2003, the Department of International Development (DFID) of the United Kingdom Government, the United States Agency for International Development (USAID), the Swiss Agency for Development and Cooperation (SDC), and the Swedish International Development Agency provided funding for the National Private Sector Survey of Enterprises in Bangladesh, which was carried out by the International Consultancy Group (ICG) of the United Kingdom in collaboration with the Micro Industries Development Assistance and Services (MIDAS). The survey was titled "National Private Sector Survey of Enterprises in Bangladesh" (SIDA). According to the findings of the study, there were approximately 6 million micro, small, and medium enterprises (MSMEs), which included businesses with up to 100 workers employing a total of 31 million people, which is equivalent to forty percent of the population of the country that is at least 15 years old. Micro, small, and medium-sized enterprises (MSMEs) are the primary contributors to household income in both urban and rural areas [13].

It was determined that the firm's high-income contribution might be ascribed to the fact that they worked 10 hours per day, 28 days per month, and eleven months out of the year [14]. A study revealed poor Information and Communication Technology (ICT) adaptation, knowledge management, and me-too orientation, which makes MSMEs unprofitable [15] when other studies acknowledged the multiple issues that influence MSMEs [16].

Technopreneurship is a learning process in which people acquire, assimilate, and organize newly formed knowledge and align with pre-existing structures, as well as how this learning affects entrepreneurial action. In this process, people acquire, assimilate, and organize newly formed knowledge and align with pre-existing structures. It proposes and compares entrepreneurship to the experiential approach by which enterprising persons continuously receive expertise during their professional lives, consequently increasing their overall business performance [2,17,18]. In addition, the researchers provided their opinion that knowledge collecting is a shared understanding of gathering information from employees, consumers, and other related parties. In contrast, knowledge donating is a shared understanding of providing information to employees, consumers, and other parties. Both of these procedures used a knowledge network to accomplish their respective organizational aims [19]. Kura and Abubakar [18] highlight the connection between technopreneurs' learning, innovativeness, and firm performance [18]. The level of awareness among technical entrepreneurs about the influence of information sharing on the outcome of their entrepreneurial endeavours is insufficient. As a result, there is now a pressing need to explore whether or not the act of information sharing moderates the relationship between technological entrepreneurship and the results of entrepreneurial endeavours. The phrase "technopreneurship" is a portmanteau that was created by combining the words "technology" and "entrepreneurship". It belongs to the category of business ventures that are concerned with technology [2,20,21].

On the other hand, in contrast to entrepreneurship, which a single person may frequently carry out, it calls for tech-savvy, creative, and inventive people willing to take calculated risks [22]. Because nothing in this world is permanent, not even the innovations that we dream of or create, we need to alter what we already have to build something new for the people or anything new that contributes to the development or progress of our society. In light of this, technopreneurship will be critical for every entrepreneur interested in improvisation and a variety of other vital elements for the engaging nature of their company. When it comes to starting a tech company, business owners need to keep in mind a few key factors, as outlined in the following:

1) Thanks to technological advancements,

everything in an organization can now be managed efficiently, saving time and money.

2) Business owners may develop ideas for their company that range from the absurd to the sensible, which can then contribute to the organization's growth in terms of profit, revenue, and other crucial business indicators.

3) Developing or inventing a new product will continue to help obtain a job for many years, thanks to the concept of technopreneurship.

Findings revealed that technopreneurship and knowledge sharing individually affected entrepreneurial outcomes. However, knowledge sharing could not significantly moderate the interaction between technopreneurship and entrepreneurial outcomes.

The rest of the sections of this study are as follows: 2. Literature review, 3. Research methodology, 4. Result analysis, 5. Discussion, 6. Conclusions, limitations and future direction of the study.

2. Literature review

2.1 Empirical literature

The financial and non-financial approaches are two essential metrics of performance that are accepted in the body of academic research. Non-financial performance measures include employee development, customer satisfaction, job satisfaction, and efficient organizational internal processes. While financial performance measures proxies such as profitability, growth, productivity, level of sales revenue, market share, product, return on investments, and product-added value, non-financial performance measures focus on the satisfaction of employees, customers, and jobs [23,24]. It is necessary to measure enterprise outcomes since doing so provides a method for identifying whether or not an organization is accomplishing its pre-determined goals and assesses the overall health of a business [25]. In this study, entrepreneurial outcomes were measured using both financial and non-financial indicators. Researchers were aware that effects refer to the results that a company has accomplished.

In this technologically advanced period, an increasing number of enterprises specializing in technology are making valuable contributions to the economy, which in turn offers prospects for employment [26,27]. Therefore, it is thought that technological entrepreneurship is essential for social development [28-30] and it is also taken as a dynamic track for economic growth, competitiveness, as well as the settlement of social interest problems [26,27]. A new company that operates in an environment that places a high demand on technological resources is referred to as a "technopreneur", which can be characterized as a technology-based organization or a high-tech venture. It combines technical expertise and specialized talents to effect changes in the nature of products and services [26]. In recent years, technopreneurship has come to be regarded as a way of life. As a consequence, academics have become increasingly interested in researching the characteristics of technopreneurs, technopreneurship, and the competencies required of technopreneurs endeavours [26,31].

The newly developed product or process technologies ought to be further commercialized so that effective knowledge application can serve as the basis. Applying significant new technologies to new market opportunities is the essence of innovation, which is an essential component of commercializing technologies [32]. It is a very dangerous, time-consuming, and resource-intensive procedure. Still, the goal is to improve the company's existing products or services significantly by collaborating and exchanging information among the company's employees [33]. Therefore, sharing information within a company is advantageous to the innovation of that company [33,34].

2.2 Theoretical framework and conceptual framework

The notion of creative destruction, first proposed by Joseph Schumpeter in 1942, will serve as the foundation for this article. The mechanism of perpetual product and process innovation that the theory alludes to is the process by which new manufacturing units replace older, less efficient ones. This reorganization process permeates the primary features of macroeconomic performance, including growth over

the long run and economic volatility, structural adjustment, and the operation of factor markets. Over time, the creative destruction process is responsible for more than fifty percent of the development in productivity. When looking at the frequency of business cycles, restructuring tends to slow down during economic downturns, contributing significantly to cost reductions. As a result, the creative destruction idea posits that long-standing arrangements and assumptions need to free up resources and energy to deploy innovation. The economy's growth is the inevitable consequence of competition within the market, which is spurred on by the possibility of making a profit [35,36].

This study has been formulated based on the Resource Based View (RBV) of competencies which claims that technopreneurship and knowledge sharing are valuable and considered intangible resources that lead to better Entrepreneurial outcomes and performances. Hence, the constructs under investigation in this study are shown in the following diagram. This research was designed based on the Resource-Based View (RBV) of competencies, which asserts that knowledge sharing and technological entrepreneurship have value and should be regarded as intangible resources because they improve entrepreneurial outcomes and performances. The RBV was the inspiration for the formulation of this study.

As a result, the conceptual frameworks that will be investigated in this study are depicted in **Figure 1**.

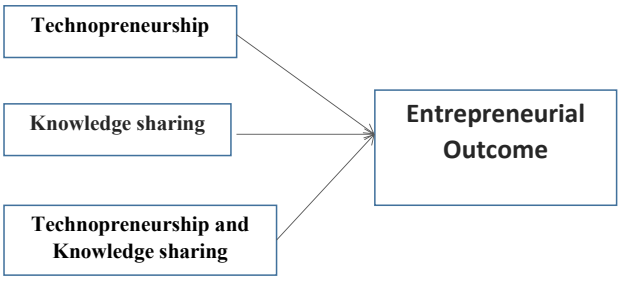

Figure 1. Conceptual framework.

2.3 Hypothesis development

Technopreneurship and entrepreneurial outcome

Technopreneurship is not a commodity that can be traded, as it is a composition of a group of skills, scientific expertise, and intelligence possessed by an individual or several individuals [17,37]. This composition of skills, scientific expertise, and intelligence represents the first building blocks of the digital society, smart cities, and space technology Suradi, Yasin [38] proficiency, and provides sophisticated programs to create strategic thinkers with the required skills to achieve success in a competitive [39]. In a similar, technopreneurship is merely entrepreneurship that takes place in an environment that is heavily reliant on technology. It combines one's technical expertise with business savvy and entrepreneurial talents [40]. The drive to become a technopreneur, which is fuelled by a company's need to remain competitive, becomes a lever to boost creativeness and innovation [41]. Scholars define "technopreneurship" as the practice of business owners entering the technology sector to "unlock creativity" and "sustain long-run competitive advantage" [42]. Therefore, to maintain essential competitiveness, micro, small, and medium-sized enterprises (MSMEs) need to develop or utilize indigenous technology and new product or process-based innovations, seek out new technological concepts, and make significant technological improvements. It appeared that there is a positive relationship between the ability to share knowledge and the ability to mediate the relationship between technological capabilities and the intention to engage in technopreneurship, as well as the relationship between financial capabilities and the intention to engage in technopreneurship [2,43,44]. Based on the review mentioned above, hypothesis one is stated as follows:

H1: Technopreneurship significantly affects Entrepreneurial outcomes.

Knowledge sharing and entrepreneurial outcome

One definition of the practice known as "knowledge sharing" describes it as "the dissemination or transfer of information between individuals, groups, or organizations" [45]. It involves a procedure that enables individuals to share their tacit and explicit knowledge with one another and generate new in-

formation [46]. Assuming that the knowledge being shared is accurate, the benefits of knowledge sharing include that it is necessary for increasing operational efficiency and reducing expenses. Many scholars continue to concentrate on the human element of making knowledge sharing at work possible, despite the majority of senior management feeling that technology is a facilitator of knowledge flow [47]. In addition, Nwagwu and Ibeku [48] emphasized the significance of networking behaviours for disseminating information. They demonstrated that a person's capacity to innovate, acquire, comprehend, and apply knowledge strongly correlates with the quality of the relationships they maintain with edge sources. According to the findings of this article, knowledge sharing is defined as the process of knowledge sharing, including new devices and applications, trends in the market, and new products, with co-workers and suppliers operating within the market. Following the review that was discussed above, the hypothesis might be put as follows:

H2: Knowledge Sharing significantly affects Entrepreneurial Outcome

Knowledge sharing, technopreneurship, and entrepreneurial outcome

Various researchers have approached studies on technopreneurship [49,50] from a variety of viewpoints. Several works used quantitative approaches to explain the relationship or association with other factors and came to conflicting conclusions. These contrasting findings may be attributable to factors specific to the industry, geographical region, unit of analysis, sample size, technique, or methodology. For example, Singhry [43] researched the impact of entrepreneurial technology capabilities on nascent graduates' intention to become technopreneurs. The findings suggest a significant connection between technology entrepreneurship capabilities and the desire to become technopreneurs. A further regression test reveals a substantial association between knowledge-sharing capacities and capabilities and the intention to engage in technopreneurship. Therefore, the ability to share information served as a mediator between the relationship between technological entrepreneurship capacities and the objectives of technopreneurs. Padang and Code [51] conducted a study not too long ago on students' personalities in the context of applying science and technology for entrepreneurship learning using a production-based learning strategy in higher education. According to the study's findings, the personality conditions of students majoring in science and technology in higher education who are interested in entrepreneurship are extraordinary when combined with production-based learning methodologies. Based on the above-mentioned review, hypothesis one is stated as follows:

H3: Knowledge sharing and technopreneurship significantly affect Entrepreneurial outcomes together.

3. Methodology

3.1 Research population and sample

Technopreneurs made up the respondent population, and the owners and employees of chosen from five technology enterprises in Dhaka (ZP Technology, MUVs, Movieans, Data Soft, and e-soft) Bangladesh served as the unit of analysis for the study. A method known as simple random sampling was utilized during the selection process in order to ensure that every unit has an independent and equal chance of being chosen by the entire population as respondents. The respondents were required to respond to a questionnaire using a Likert-type scale, which they then self-administered after the validity and reliability of the instrument had been established. With a total population of nine thousand (9000), the sample size table developed by Krejcie and Morgan [52] was utilized to select four hundred and seventy-five (475) representatives to represent the population. After the data collection process, a total of 282 copies of the questionnaire that were delivered were assessed to be usable. One hundred copies of the questionnaire were not filled out, and 93 documents were not retrieved. The questionnaire has been distributed a total of 475 times.

3.2 Questionnaire design and data collection

A questionnaire in the form of a self-assessment was developed to validate the model and the hypotheses. A methodology technique derived from past empirical research was utilized in designing the questionnaire, which allowed for the development of its metrics and items. The questionnaire survey was then tested through a series of interviews with a random sample of owners and employees who had previously worked in SMEs. These interviews aimed to ascertain whether these individuals could interpret the questionnaire survey and whether or not it was suitable for the research objectives. The pilot study's findings helped adjust the questionnaire's first edition, which included testing every section of the questionnaire (e.g., content, phrasing, design, and layout). In addition to the poll being shared on Facebook, participants in the target sample were also sent an email and messages through Whatsapp with an explanation of the purpose of the study. For people to participate in the study, the URL to the survey questionnaire was made public online for one month. The individuals who responded were informed multiple times through various online connections and emails. Even though English is one of the most common languages spoken in Bangladesh, our inquiry was initially drafted in English and then backwards translated into Bengali, utilizing the approach of translating Bengali into English. Before beginning the primary data collection period, pilot tests were conducted on the instrument's English and Bangla versions. At last, the respondents were presented with a choice between the two survey iterations. Then collected data were analyzed by the SPSS, STATA, and Smart PLS the statistical data analysis tool.

3.3 Measurement items

Due to the measurable nature of the variables, a quantitative research approach was taken for this study. The process involves collecting and analysing numerical data to identify trends, formulate hypotheses, put relationships to the test, and extrapolate conclusions to cover more extensive populations. This strategy is consistent with the findings of earlier researchers such as [53-55]. Afolabi and Raifu [56] each contributed one variable, and Technopreneurship altered five of those factors. The knowledge-sharing measure was obtained from Nwagwu and Ibeku [48] to understand perceived internal information sharing as a moderator. On the other hand, the entrepreneurial outcomes were derived from [57,58]. The research considered technopreneurship to be a construct that comprised five different components, and as a result, it measured five different aspects. The items that measure the various variables (Y, X, Z) were evaluated using Cronbach's alpha () to determine whether or not they have individual internal consistency and reliability. According to the findings, the values of the scores and scales on the reliability scale were satisfactory and ranged from 0.80 to 0.90. The models that were used for the research were predicated on the linear relationship that exists between entrepreneurial outcomes (EO) and technopreneurship (TECHP):

$$Y = \beta_0 + \beta_1 Xi + \epsilon_i \quad (1)$$

Here, Xi denotes the technopreneurship. Y indicates the dependent variable proxy by entrepreneurial outcomes. β uses beta coefficient. ϵ uses as an error term.

The establishment of this relationship further informed the decision to determine the moderating effect of knowledge sharing (*KS*) into the equation:

$$Y = \beta_0 + \beta Xi + \beta_z Z_i + \beta_z Xi*Z_i + \epsilon_i \quad (2)$$

Here, Y indicates the dependent variable proxy by entrepreneurial outcome. Xi denotes the technopreneurship and Zi indicates Knowledge Sharing. β uses beta coefficient. ϵ uses as an error term.

By the two hypotheses, the anticipated relationship between technological innovation and the results of entrepreneurial endeavours, mediated through information exchange, was discussed. Based on the empirical viewpoints, it is expected that technopreneurship will positively influence entrepreneurial outcomes and that information sharing will have a positive moderating effect on the relationships between the variables. Preliminary tests or treatments were carried out to ensure that certain assumptions

regarding the data's normality, linearity, and multicollinearity were satisfied. This study utilized statistical analysis. For this particular purpose, numerous hierarchical regression analyses were carried out. Ethical requirements and standards were always followed when conducting, analysing, and interpreting the research.

3.4 Construct reliability and validity

According to Gursoy and Aydogan (2002), the value of the AVE must be at least 0.50 in order to be considered appropriate and to demonstrate all of the components of this study. According to the findings of this study (**Table 1**), a value of Cronbach's Alpha no lower than 0.736 is considered to be acceptable. According to Gursoy and Aydogan's (2002) research, the lowest acceptable criterion for dependability in this examination was set at 0.70 across all constructs; however, the total reliability score was higher than that [59].

Table 1. Construct reliability and validity.

	Cronbach's alpha	Rho_A	Composite reliability	Average variance extracted
X	0.815	0.919	0.819	0.696
X*Z	0.848	0.827	0.904	0.808
Y	0.770	0.904	0.842	0.715
Z	0.736	0.749	0.811	0.699

Note: X denotes the Technopreneurship, Z Knowledge Sharing; X*Z indicates Technopreneurship, Knowledge Sharing; Y indicates Entrepreneurial Outcome.

3.5 Discriminant validity

Table 2 provides an illustration of the value that corresponds to the Discriminant Validity. In the Discriminant Validity Test, the fact that the value of each construct of the square route is higher than the value of the inter-item correlation coefficient is proof that the discriminant validity test has successfully completed the requirements outlined in 2. The findings that have been reported thus far offer irrefutable evidence that the study construct measurements are dependable as well as valid for the purpose of carrying out structural model analysis.

3.6 Collinearity statistics (VIF)

It's possible for the value of VIF to fall anywhere between 1.102 and 4.489. On the sign indicating the maximum amount, the number 10 will not be present. Because they are so low, the VIF values suggest that the findings of the structural model investigation have not been adversely affected by the problem of collinearity [60,61]. This is indicated by the fact that the VIF values are so low. According to Gujarati (2003), if the value of the VIF on the independent variable is high, this suggests that the relationship between the independent variable and the other variables is strongly collinear [61]. Bootstrapping and intelligent PLS algorithms are being used in this research to ensure the reliability and validity of the constructs that are being studied. **Table 3** presents the value of the collinearity statistics for your reference. The indication of R Square, which can be seen in **Table 7**, lends credence to the structural model study that was carried out.

Table 2. Discriminant validity.

	X	X*Z	Y	Z
X	0.735			
X*Z	0.625	0.926		
Y	–0.556	–0.736	0.863	
Z	–0.540	–0.703	0.779	0.816

Table 3. Collinearity statistics (VIF).

	VIF
T1	1.842
T2	2.217
T3	2.301
T4	2.059
KS1	2.069
KS2	2.031
KS3	2.371
KS4	1.148
T*KS1	1.535
T*KS2	1.515
T*KS3	1.232
T*KS4	1.622
EO1	1.413
EO2	1.820
EO3	1.711

4. Analysis and findings

The first premise that was put to the test concerned technopreneurship and the results of entrepreneurial outcomes. The second stage of the investigation focused on how Knowledge Sharing helped to mitigate the effect among the MSMEs that were chosen by 5 SMEs (ZP Technology, MUVs, Movieans, Data Soft, and e-soft) in Dhaka, Bangladesh. The following three phases were utilized to conduct the analysis, which tested the essential assumptions:

In the first step, we examined how the presence of technopreneurship affected the outcome of the entrepreneurial endeavour. The second phase involved testing the effects that Knowledge sharing had on the result of the entrepreneurial endeavour, and the third step involved determining the effects of the interaction term. The interaction term was conceived of as the end result of applying standard scores to technopreneurship and Knowledge sharing. To verify that moderation is occurring, the influence of the interaction term must be considerable.

4.1 Findings

Table 4 presents a summary of the hierarchical regression analysis used to test how knowledge sharing moderates the effect of technopreneurship on the entrepreneurial outcome of five MSMEs in Dhaka, Bangladesh. This analysis was carried out in order to test how knowledge sharing moderates the effect of technopreneurship. The aggregated entrepreneurial result is the dependent variable, and the predictors are aggregated valued technopreneurship (TEC), knowledge sharing (KS), and the interaction of aggregated technopreneurship and knowledge sharing (TEC*KS).

According to the findings presented in **Table 4** about $R^2 = 0.433$ and adjusted $R^2 = 0.431$ for Model I, technopreneurship is responsible for explaining 43.1% of the variation in the entrepreneurial outcome. A change in R^2 of 0.084, or 8.4%, occurred when the knowledge sharing variable was included in Model II as a moderating variable. As a result, the value of R^2 increased from 0.433 to 0.517. Therefore, technopreneurship and the sharing of knowledge account for 51.7% of the diversity in the outcomes of entrepreneurial endeavours. In model III, where the interaction term/variable has been incorporated into the model, the R^2 value is 0.517, whereas the adjusted R^2 value is 0.512. The R^2 change statistics were not affected in either direction by the introduction of the interaction variable, which was set at 0.000. This suggests that there has not been a significant advance in the model's ability to explain the data (remains constant). The interplay of the moderator, which entails the sharing of knowledge and technopreneurship, makes it possible for the entrepreneurial outcome to keep its position. This lack of change in the explanatory power of the interaction term may have been caused by the probable level of managerial skill already demonstrated by the owner/managers or the tacit hoarding of knowledge within the technopreneurship ecosystem.

Table 5 reveals that the F-statistic for Model 1, in which technopreneurship serves as the independent

Table 4. Goodness of fit model.

Model summary									
Model	R	R^2	Adj. R^2	Std. error of the estimate	Change statistics				
					ΔR^2	ΔF	df1	df2	Sig. F
1	0.658[a]	0.433	0.431	16.30163	0.433	214.26	1	280	0.000
2	0.719[b]	0.517	0.514	15.0772	0.084	48.324	1	279	0.000
3	0.719[c]	0.517	0.512	15.1038	0.000	0.016	1	278	0.899

a. Predictors: (Constant), Technopreneurship

b. Predictors: (Constant), Technopreneurship, Knowledge Sharing

c. Predictors: (Constant), Technopreneurship, Knowledge Sharing, Interaction term (TECHP*KS)

Source: Field survey, 2022.

variable, is 214.262, with a significance level of less than 0.05. It can be deduced from this that technopreneurship has a major impact on the entrepreneurial outcome of selected MSMEs in Dhaka, Bangladesh. The F statistic for Model II, which incorporated knowledge sharing as a moderating variable, reveals a value of F (2, 279) 149.399, which is significantly different from 0.05. This finding suggests that the adjusted model of technopreneurship, in which information sharing is included as an independent variable and acts as a moderating variable, substantially affects the entrepreneurial outcome of selected MSMEs in Dhaka, Bangladesh. Model III consists of the interaction term with the independent variable, and its F statistic is F (3, 278) = 99.254, which is significant compared to the 0.05 threshold. This finding suggests that the fitted combination model of technopreneurship and information sharing with the interaction term (moderating variable) has a strong positive significant effect on the entrepreneurial outcome of selected MSMEs in Dhaka, Bangladesh.

The results of the regression coefficient for the three models are shown in **Table 6**. In the first model, the entrepreneurial outcome of certain selected MSMEs was regressed against the independent variable. This was done using regression analysis (technopreneurship). The regression analysis results showed that technopreneurship had a favourable and statistically significant effect on the entrepreneurial outcome ($b = 0.811$, $t = 14.638$, $p < 0.05$). It suggests that one unit change in the entrepreneurial outcome of selected MSMEs is associated with 0.811 changes respectively in the entrepreneurial outcome. The total model showed that technopreneurship significantly impacted entrepreneurial outcome ($F (1,280) = 214.262$, $p=0.005$). The fact that the model corroborated this. This finding was consistent with the first assumption that technological entrepreneurship affects the entrepreneurial outcomes among the respondents of the survey.

According to model II's findings, knowledge sharing ($b = 1.310$, $t = 6.952$, $p < 0.05$) and technopreneurship ($b = 0.648$, $t = 11.503$, $p < 0.05$) had an individual favourable and significant effect on the entrepreneurial outcome. It suggests that one unit change in either knowledge sharing or technopreneurship is related to 0.648 and 1.310 changes, respectively, in the outcome of entrepreneurial activity. Knowledge sharing and technopreneurship were found to have a positive and statistically significant effect on the entrepreneurial result of MSMEs, as revealed by the regression coefficients for both factors. The overall model confirmed that technopreneurship and information sharing substantially impacted the

Table 5. ANOVA results.

ANOVA[a]						
Model-1		Sum of squares	Df	Mean square	F	Sig.
1	Regression	56938.580	1	56938.580	214.262	0.000[b]
	Residual	74408.044	280	265.743		
	Total	131346.624	281			
2	Regression	67923.669	2	33961.834	149.399	0.000[c]
	Residual	63422.955	279	227.322		
	Total	131346.624	281			
3	Regression	67927.350	3	22642.450	99.254	0.000[d]
	Residual	63419.274	278	228.127		
	Total	131346.624	281			
a. Dependent Variable: Entrepreneurial Outcome						
b. Predictors: (Constant), Technopreneurship						
c. Predictors: (Constant), Technopreneurship, Knowledge Sharing						
d. Predictors: (Constant), Technopreneurship, Knowledge Sharing , Interaction term (TEC*KS)						

Source: Field survey, 2022.

Table 6. Regression, co-efficient for technopreneurship and entrepreneurial outcome on knowledge sharing.

Coefficients[a]						
Model-2		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.561	6.755		2.007	0.046
	Technopreneurship	0.811	0.055	0.658	14.638	0.000
2	(Constant)	2.060	6.463		0.319	0.750
	Technopreneurship	0.648	0.056	0.526	11.503	0.000
	Knowledge Sharing	1.310	0.188	0.318	6.952	0.000
3	(Constant)	0.222	15.855		0.014	0.989
	Technopreneurship	0.664	0.138	0.539	4.819	0.000
	Knowledge Sharing	1.407	0.785	0.341	1.793	0.074
	Interaction term (TEC*KS)	–0.001	0.006	–0.032	–0.127	0.899
a. Dependent Variable: Entrepreneurial Outcome						

Source: Field survey, 2022.

entrepreneurial outcome of MSMEs (F (2,279) = 149.399, $p < 0.05$). This was determined by testing the significance of the relationship between the two variables. The technical aspect of the findings is that a favorable effect of knowledge sharing and technopreneurship on entrepreneurial success was found.

Model III took into account the possibility of an interaction effect. As a result, the factors that were judged to be independent were Technopreneurship (TECHP), Knowledge Sharing (KS), and the Interaction between TECHP and KS. When the interaction was included in the model, the percentage of variance in the entrepreneurial outcome that could be explained remained the same at 43.3% ($R^2 = 0.433$), and the adjusted R^2 value was 0.517. The R^2 changes (R^2) increased by 0.084 in Model II, while in Model III, R^2 was given a value of 0.000. Despite this, the entire model was significant according to the statistical tests ($F = 99.254$, $p < 0.05$). At a significance level of $p > 0.05$, the ratio of change in F ($F = 0.016$) was statistically significant as a positive value. The findings were verified even further by the beta coefficient of the interaction term, which showed that the results were statistically significant ($b = 0.664$, $t = 4.819$, $p < 0.05$). It indicated that the moderating effect of knowledge sharing, which had a total effect of –0.001 at a 95% confidence level, was not significant. MacKinnon and Fritz [62] proposed that a variable has a moderating influence if the coefficient of the variable is significant both before and after moderation. This would indicate that the variable is having a major impact on the relationship. According to the moderation rule [62], the data did not support the significance of using knowledge sharing as a moderating variable. As a result, the following is how the model that illustrates the link between the independent factors and the dependent variable was put together:

Entrepreneurial Outcome = 0.222 + 0.664TECHP + 1.407KS + (–0.001TECHP*KS) (3) (Predictive Model)

Entrepreneurial Outcome = 2.060 + 0.648TEC + 1.310KS (4) (Prescriptive Model)

The established regression equation demonstrates that the entrepreneurial outcome of selected MSMEs would be 0.222 if all components, including technology entrepreneurship, knowledge sharing, and the interaction of TECHP and KS, were held constant at zero. This indicates that the outcome is positive. The entrepreneurial result of chosen MSMEs in Dhaka would be 2.060 if the predictive regression equation created to include all elements (technopreneurship and knowledge sharing) was deemed constant at zero. Conclusions reached with the use of analysed data. It also shows that an increase in the implementation of technopreneurship would lead to a 0.648 improvement in the entrepreneurial outcome. A unit increase in knowledge sharing leads to a 1.310 in-

crease in the entrepreneurial outcome. It is shown when all other independent variables are taken from zero.

When the interaction term is included in the model, the results of Model III showed that the effect of any improvement in technopreneurship, knowledge sharing, and the interaction variable (TEC*KS) by a single unit results in a corresponding increase in entrepreneurial outcome by 0.664 units, 1.407 units, and –0.001 units respectively. This was found to be the case when the model was run with the interaction term included. The findings suggested that the sharing of knowledge has a statistically negative moderate influence of technopreneurship on the entrepreneurial outcome, but this effect is statistically inconsequential. According to the findings, the effect of technopreneurship on entrepreneurial outcomes is negligible when information sharing is considered a moderating factor among the companies studied in Dhaka, Bangladesh.

The R-squared value is utilized by researchers for X*Z, Y, and Z indicators. For the purpose of determining whether or not a given model is suitable for usage, the saturated model and the estimated model make use of the standardized root-mean-square-residual (SRMR), the normed fit index (NFI), d_ULS, d_G, and Chi-square statistics. Calculating the R-squared value is one way to determine whether or not the path model is a good fit for the data [63,64]. The values for the SRMR range from 0.0 to 1.0, with well-fitting models generating values of less than 0.05 [65]. Although values as high as 0.08 are considered acceptable [66]. It is recommended the model is fit for this study, as the SRMR threshold values be less than 0.08, and the NFI should be greater than 0.80 [67]. The results are presented in **Table 7** and show that both the SRMR and the NFI are smaller than 0.05 and larger than 0.80, respectively. R-square values of 0.325, 0.418, and 0.215 are presented, respectively, in **Table 7**. As a consequence of this, the model is best served by these particular data. The structural model of this research is presented in **Figure 2**.

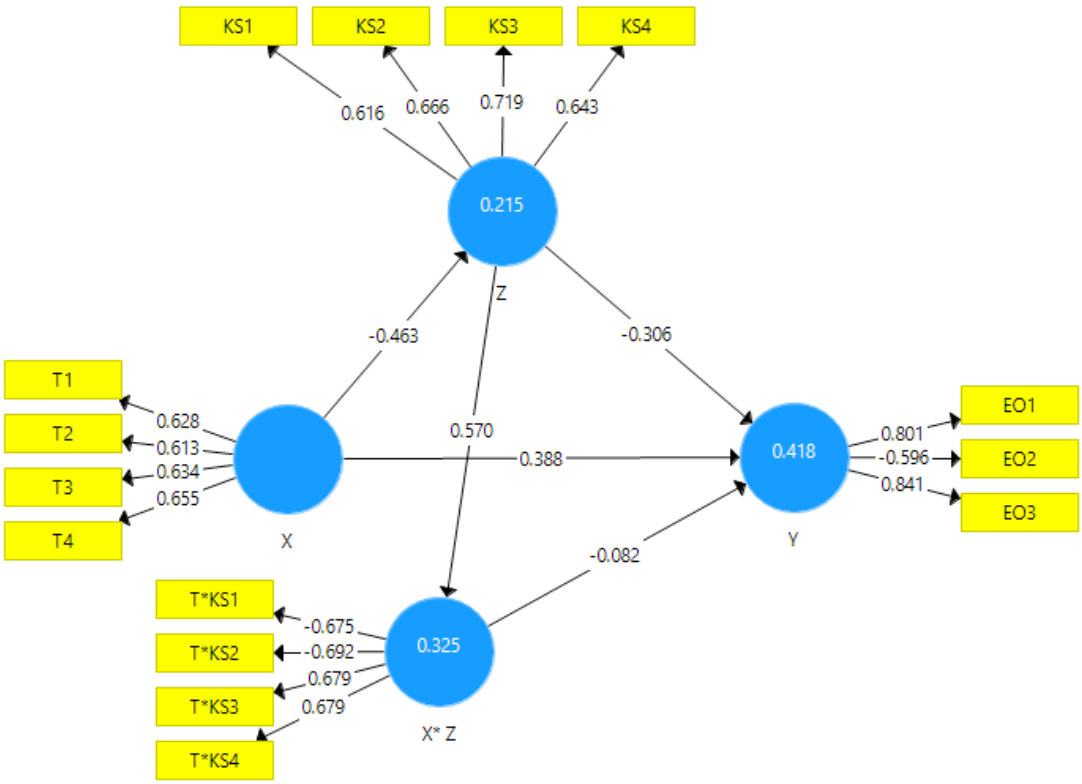

Figure 2. Structural model of this study.

Table 7. Model fitness test.

	Saturated model	Estimated model	R-square
SRMR	0.046	0.048	
D_ULS	2.565	2.623	
D_G	0.665	0.666	
Chi-square	308.076	310.637	
NFI	0.830	0.834	
X*Z			0.325
Y			0.418
Z			0.215

5. Discussion

The test of hypotheses using hierarchical multiple regression results for technopreneurship on entrepreneurial outcome and knowledge sharing as moderators revealed that technopreneurship affected entrepreneurial outcomes, and knowledge sharing also affected entrepreneurial outcomes, but the moderating effect was not statistically significant. This was determined by the fact that the moderating effect was not statistically significant. This discovery has consequences that can be drawn philosophically, empirically, and theoretically. When viewed from a conceptual standpoint, the definitions and clarifications provided for the topics being studied provide a useful conceptual outlook. The empirical findings of this study lend support to Singhry [43] contention that there is a substantial association between the capabilities of technology entrepreneurship and the ambition to engage in technopreneurship. Additional regression tests revealed a substantial connection between the ability to share one's expertise and the inclination to engage in technological entrepreneurship. Kusumaningrum and Hidayat [68] also confirmed that the personality conditions of students who implemented science and technology for entrepreneurship with production-based learning approaches in higher education were excellent. They found that these students performed very well.

The study by Odumosu and Binuyo [69] showed in the analysis that a combined significant effect of social innovation, educational innovation, and digital innovation has a positive and significant effect on graduate entrepreneurs. In contrast, entrepreneurship education and agricultural innovation have positive but insignificant effects on graduate entrepreneurship in Bangladesh. According to Wongthongtham and Zadjabbari [70], the participants in a simulated network were separated into three groups. Members of the blue group have a high level of trust in each other regarding their benevolence and competence, but their level of trust regarding participants in the other groups is low. Members of the red group and the green group, just like members of the blue group, have a high level of trust in the other members of their own group but place a low level of trust in members of other groups.

In contrast to the findings presented above, Singhry [43] discovered that the effect of technology entrepreneurial capabilities on technopreneurs' intention of graduates revealed no mediation effect of knowledge-sharing on the relationship between technological relational capabilities and a mindset of technopreneurship intention to achieve a successful entrepreneurship outcome. This result was the case when examining the effect of technology entrepreneurial capabilities on technopreneurs' intention of graduates. There are various schools of thought on the moderating effect of knowledge sharing on the connection between technological entrepreneurship and the results of entrepreneurial endeavour. In light of this previously collected data and contrasting findings. Based on other research there is a significant awareness and knowledge gap regarding technological innovation between the owners of internationalized techs-based tea SMEs and the workforce in the other region of Bangladesh. Similarly, the research findings exposed the neglect of appropriate attention to the operational factors of technical and vocational education in Bangladesh. These factors are known to affect the youths' ability to digest knowledge and be successful in running small businesses.

6. Conclusions

The creative destruction theory is relevant to this study because it lays the theoretical framework for

establishing the new innovativeness of MSMEs and how it promotes a better business outcome. It has the goal of resolving existing issues that are experienced in the market and with the incumbent offerings, intending to develop a new solution that will eventually supplant the existing product or service in the market, thereby making way for new ways of thinking and destroying the old [71]. The findings of this study are unable to establish the dependability of the Creative Destruction Theory because information sharing is a moderator for the effect of technopreneurship on entrepreneurial outcomes.

According to the findings of the hierarchical multiple regression analysis that was carried out to test the hypothesis presented in this article, technopreneurship had a positive and statistically significant effect on entrepreneurial outcomes. Additionally, knowledge sharing and technopreneurship had a positive and statistically significant individual effect on entrepreneurial outcomes. However, the moderating effect of knowledge sharing was statistically insignificant on both technopreneurship and entrepreneurial outcomes. Because of this, it was possible to conclude, based on the findings, that knowledge sharing is not a moderating factor in technopreneurship and entrepreneurial outcome among technopreneurs from five selected technology companies in Dhaka, Bangladesh. This was the conclusion that could be drawn from the findings. Therefore, concerns relating to the exchange of knowledge ought to be subjected to stringent controls and considered by MSMEs regulatory bodies in the process of knowledge Sharing and other MSMEs amenities to boost the rate at which knowledge is shared.

6.1 Implication for regulations

The cooperative efforts of micro, small, and medium-sized businesses (MSMEs) enhance the general level of competence because of the adaptability and creativity of these businesses. This work seeks to contribute to the existing store of knowledge on the technopreneurship dimensions and entrepreneurial outcomes of micro, small, and medium-sized businesses. As a result, MSMEs have the potential to generate significant benefits in the form of creating a skilled industrial base and industries, as well as developing a well-prepared service sector that is capable of contributing to GDP through higher value-added. Additionally, this work aims to contribute to the existing store of knowledge. In addition, it is necessary for micro, small, and medium-sized enterprises (MSMEs) to ensure that the dimensions of technopreneurship are favourable to business and the government to ensure the supply of a conducive business climate for MSMEs to operate in and grow.

6.2 Limitations and further prospective

It was difficult to access particular pieces of data and information. One possible explanation for this behaviour is a concern about divulging the information to rival companies operating in the same industry. As a direct consequence of this, the study made use of aggregate data in order to an analysis of the mentioned parameters. In addition, information was collected from proprietors, managers, and employees of MSMEs in Dhaka. As a consequence of this, generalizing the findings requires extreme caution, and it is possible that the conclusions do not apply to other firms operating in Dhaka, Bangladesh that are involved in a different industry. In the decision, the researchers acknowledged that there are extra drivers of technological entrepreneurship in addition to those provided in this study and that additional variables contribute to entrepreneurial results beyond those revealed in this study. Nevertheless, the characteristics that were utilized are incredibly pertinent to the context of the investigation. Therefore, the lack of additional factors has not lessened the significance and usefulness of this work in the field of management. Rather, the opposite is true.

In future research, it should be made a point to investigate other aspects and variables that are essential for successful entrepreneurship. In addition, it is important to note that although the need for knowledge sharing to improve organizational outcomes is critical, there is still widespread skepticism, particularly among owners and employees of SME businesses, regarding the possibility of combining this

concept with technopreneurship to achieve entrepreneurial outcomes. For this reason, it is impossible to overstate how important it is to promote knowledge sharing, technopreneurship, and organizational agility among owners and managers to achieve a sustainable outcome for entrepreneurial endeavour. As a consequence, additional investigations need to be carried out to uncover the impression technopreneurs have about sharing knowledge. In subsequent research, we might try to reproduce the findings of this study in a variety of other fields and locales to disseminate the idea of information sharing further.

Abbreviations

MSME = Micro, Small and Medium Enterprises.
GDP = Gross Domestic Product.
TKS = Technopreneurship and Knowledge Sharing.
SME = Small and Medium Enterprises.
SIDA = Survey of Enterprises in Bangladesh.
BSCIC = Bangladesh Small and Cottage Enterprises Corporation.
DFID = Department of International Development.
BBS = Bangladesh Bureau of Statistics.
MIDAS = Micro Industries Development Assistance and Services.
ICG = International Consultancy Group.

Author Contributions

All of us worked on this research equally. Md. Abdul Halim (MAH) led this research. Mst. Ismot Jahan (MIJ) wrote the original draft. Methodology design, analysis, data curation MAH & MIJ. Review and edit by MAH, MIJ, Md. Golam Mustafa Chowdhury (GMC) and Tazin Mahmud (TM). MAH and MIJ, Project Administration. All authors have read and agreed to publish the final version of the manuscript that has been made public.

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Conflicts of Interest

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Appendix

Appendix 1. Questionnaire.

Variable	SA	A	N	D	SD
Technopreneurship					
T1: Technopreneurship have an effect on my business.					
T2: My business thinking is affected by Technopreneurship					
T3: My business funding is affected by Technopreneurship					
T4: Technopreneurship is very modern way to earn.					
Entrepreneurial Outcome					
EO1: My Entrepreneurial outcome is more for Technopreneurship.					
EO2: Technopreneurship is easy way for gaining Entrepreneurial outcome.					
EO3: Entrepreneurial outcome was not closed at Covid time for Technopreneurship					
EO4: Knowledge sharing is easy way for gaining Entrepreneurial outcome.					
EO5: My Entrepreneurial outcome is more for my knowledge sharing activities.					
Knowledge Sharing					
KS1: My business mind was setting for knowledge sharing.					
KS2: My business is always affected by knowledge sharing.					
KS3: My new business idea comes from knowledge sharing.					
KS4: My Entrepreneurial outcome is affected by knowledge sharing					
KS5: Knowledge sharing is vital part of my business outcome.					
Technopreneurship and Knowledge Sharing					
TKS1: My Entrepreneurial outcome is affected by Technopreneurship and Knowledge Sharing in together.					
TKS2: Knowledge Sharing affects my Technopreneurship and Entrepreneurial outcome.					
TKS3: Technopreneurship and Knowledge Sharing both are always interacting in my business.					
1. SA = Strongly Agree, 2. A = Agree, 3. N = Neutral, 4. D = Disagree, 5. SD = Strongly Disagree.					