Technological Adaption and Open Innovation in SMEs: An Strategic Assessment for Women-Owned SMEs Sustainability in Bangladesh

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Abstract: Technological adaption and innovative activities foster small and medium enterprises (SMEs) growth by allowing production and process diversifications. Furthermore, open innovation practices, especially SMEs, rely on several firms’ specific attributes, and their impact varies accordingly. This study’s motivation is to explore the impact of technological adaptation and open innovation on SMEs run by women entrepreneurs and the challenges encountered in implementing open innovation. A sample of 580 questionnaires was sent to target SMEs, following the stratified random sampling technique, of which a complete 375 responses were duly received. The open innovation has been measured through eight innovative practices, reflecting the exploration and exploitation of technology in SMEs. This study found that women-owned enterprises were involved in many open innovation policies during the last five years. The result of this study indicated that there are no significant differences between manufacturing and industry regarding open innovation practices. Still, women-owned enterprises are more impressively engaged in open innovation practices. The research also identified that women-owned SMEs follow open innovation, mainly for market-related intentions, to compete with competitors and meet customers’ demands. The study contributes to the theoretical and practical implications. Further, the study is helpful for SMEs, researchers, practitioners, and decision-makers.

Keywords: open innovation; SMEs sustainability; technological adaptation; women entrepreneur; Bangladesh

JEL Classification: M10; L26

1. Introduction

Open innovation (hereafter, OI) is now a constant repetitive experience of the modern sector. The companies’ predicament is baffling and surprising, but there are fresh ideas and concepts required to render the company successful (OI). All companies are in full rivalry to develop innovative value-adding goods, systems, or facilities. However, trends so far have not been uniformly optimistic for many analysts [1]. The open invention has been an accepted word by academics the world over. Chesbrough [2] described this as a “paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology”. While the effective execution of an innovative practice by small and medium enterprises (SMEs, hereafter) also needs further research, there is more and more proof that SMEs’ innovative activities are successful based on an OI business model [3]. SMEs play a critical position in national economies because they bring positive contributions to the economy and generate job opportunities. Many SMEs rely on their creative
strength to thrive and grow [4]. As an instrument for growth, creativity is typically challenging to SMEs. SMEs are constrained by insufficient capital and skills [5], limiting their prospective growth and contribution to the national economy. The idea of open innovation allows SMEs to expand their capabilities and shift the paradigm from obstructed to thriving through diversified contributions to society [2,6]. Innovation is critical in today’s competitive and fast-paced market and needs constant creativity. A company’s competitive advantage is improved by the process of creativity, modern ways of organization, service efficiency, and new goods production. Facing multiple obstacles in fields, such as lack of financial capital, lack of knowledge on technologies, lack of qualified staff, lack of facilities, lack of innovation skills, etc., adversely impacts SMEs innovation orientations [7], eventually impeding their development and productivity [8].

The present study contributes to the existing literature in multi-folds. First, SMEs in Bangladesh, especially those managed by women, have been growing extensively in recent time. For their smooth progress, the government initiated several capacity development programs, including ICT integration, capital assistance by offering specialized financial products, and infrastructural development through sharing know-how. However, women-owned SMEs’ sustainability immensely relies on their adaptation and diffusion capacity in terms of innovation. Therefore, we firmly believe that the study’s findings will open an avenue for a strategical thinking process in formulating policies for thriving innovation in SMEs. Second, the relationship between technology and open innovation has been investigated in the literature. See Chesbrough [2], Lichtenthaler [9], Cui, et al. [10], who established that firms’ integration with advanced information technology allows a higher degree of diversification in their operations as a result of practicing innovation. Open innovation brings expected development in terms of generating novel ideas, knowledge development for innovativeness, customer integration for higher value creation, and sustainable development with competitiveness. However, the pre-perceived effects on women-owned SMEs are yet to be evaluated, especially in Bangladesh’s case. The present study’s findings can act as an alternative source of information for understating the role of technological integration and open innovation for achieving sustainability in women managed SMEs. Furthermore, it can guide the procedures in policy development in adapting technological benefits and innovativeness for surging SMEs’ growth.

Chesbrough [2] identified that open innovation has gained a growing interest in research sciences and has been studied, to date, mainly in multinational companies based on comprehensive discussions and case studies. Some other studies say that in small organizations, open innovation still occurs. However, these studies are all based on very particular sectors, such as open-source software [11]. The emphasis is on particular problems except for the complete open innovation model whenever broad samples of companies are discussed [12,13]. According to the knowledge, in the broader sample of firms, Lichtenthaler [9] has conducted open innovation empirical research. He concentrated on large and medium producers in Austria, Germany, and Switzerland as there were no surveys of small businesses and service industries.

Notwithstanding, several companies, among small- and medium-sized businesses, primarily depend on company-specific research and development to produce expertise to execute their innovation programs, which allows firms to enjoy the security of firm-specific capital, economies of reach and scale, and privacy [14]. For various reasons, a firm in an emerging economy is more conservative when engaging in research and development (R&D) for fear of losing money [2,8]. However, SMEs are an important part of the economy. Still, they are under-studied in open innovation because of their vulnerability to market loss [15–17].

The study’s prime focus is to divulge the present state of OI practices in women-owned SMEs and the impact of OI on their growth over the past three years. The present study will contribute to the present literature, especially concerning open innovation and women-owned SMEs, and understand rethinking OI practices in SMEs managed by women entrepreneurs. The study establishes a mitigated knowledge gap in OI and women
SMEs since there are inadequate studies and minimal information on accessible innovation activities in women-controlled SMEs. The study’s findings would bring realistic insights to the open innovation model’s technical and conceptual advantages in diverse situations, especially for the successful implementation of OI in SMEs operated by women.

The remaining structure of the paper is as follows. Section 2 deals with literature review, sample, data collection, and methodology is explained in Section 3. Interpretation displays are in Section 4, discussion and managerial implication reports in Section 6, and conclusion in Section 7.

2. Literature Review and Theoretical Development

2.1. Women-Owned SMEs in Bangladesh

With 99% of businesses being small- and medium-sized enterprises (SMEs) (Source: ADB Institute 2016), 25% of GDP growth in Bangladesh can be credited to the small- and medium-sized businesses (SMEs). Credit access to the entrepreneurial ventures is seen as a key contributor to the increase in small- and medium-sized enterprises (SMEs). One of the most prominent characteristics of Bangladeshi women is their desire for greater risk, which is at once both a positive and a negative trait. In general, the growth of businesses is linked to a country’s wealth and advancement in economic development. Nonetheless, in Bangladesh, where the economic and social foundations for entrepreneurship are less solid than that of developed and many developing countries, 31.6% of all business owners are female. Bangladesh, along with Uganda, shows the highest percentage of women-owned businesses of any other country in the world. Bangladesh, with regard to innovative capabilities and the desire to begin a business, ranks highly on the Female Entrepreneurship Index (FEI). However, the country ranks poorly in terms of gender parity and access to formal finance.

Although women-owned businesses are viewed as the new economic agents of change in Bangladesh, they are limited in their participation in the economy due to issues with access to financing as well as their status as a female-owned business. Studies have shown that women-owned Bangladeshi businesses are mostly found in the “small segment” and in the service sector, with a prominent trading sector following. IFC’s study of 500 Bangladesh women small and medium enterprise (SME) owners finds that the women business owners are mostly found in Dhaka (33%), followed by Chittagong (18%) and Rajshahi (8%) (15%). The study was done in 12 districts, which were in Dhaka and Tangail. These areas included the following districts: Gazipur, Rajshahi, Bogra, Rangpur, Chittagong, Comilla, Khulna, Jessore, Barishal, and Sylhet. The survey showed that women business owners concentrate in wholesale and retail trades such as textiles, electronics, handicrafts, and consumer goods (24 percent). A study done in Bangladesh found that people think “agriculture and food services” is a male-dominated industry, but “personal services” are dominated by women.

Additional survey reports show that Bangladeshi women entrepreneurs want to expand their enterprises. Seventy-five percent of the surveyed women pursued credit for growing their companies, showing a high degree of aspiration. Two-hundred and forty entrepreneurs (48%) availed themselves of a loan. Among those polled, only 75% could fund any of their company requirements. Surprisingly, companies had to offer capital up. On average, 36% of their loan conditions stayed unmet, thereby contributing to a financial crisis. Informal money lenders arrived second, then private commercial banks. A half-yearly review of the credit data for 2015 showed that over 37,000 women-owned enterprises (22 percent of the total) received credit without having any sort of collateral. Women-owned businesses in the manufacturing sector benefitted the most from collateral-free loans; 48% of collateral-free loan disbursement went to women-owned production companies, while 24% went to trade businesses.

2.2. The Open Innovation (OI) Paradigm

Open innovation requires the use of purposeful inflows and outflows of information to accelerate internal innovation and widen markets for external use of innovation, according
to Chesbrough, et al. [18]. This paradigm profoundly illustrates the porosity of a business’s transactional and knowledge borders in line with the logic of open system theory and the continuous loosening of restrictions [19]. Open innovation techniques are seen as a means of more and an ultimately durable competitive advantage such that the efficient incorporation of in-house technologies of externally sourced expertise will produce a socially dynamic and “causally uncertain” advantage that rivals cannot simply replicate [20–23]. In negating the inwardly oriented culture of closed innovation and also widening the capacity of vertical and horizontal convergence, other literature has contrasted the advantages of open innovation [24–26].

Since the inception of the concept of open innovation by Chesbrough [2], many researchers have extensively investigated the impact of open innovation considering different aspects of society. This definition is characterized as deliberate information inflows and outflows to accelerate internal innovation and increase markets for innovation’s external use [18]. In a study, Trott and Hartmann [27] suggested there has been no real paradigm change. They claimed that businesses have already pursued open innovation, and no companies in their innovation phase have adopted closed innovation at any point. Furthermore, Duarte, et al. [28] argued that the idea of open innovation is not completely fresh since, for several years, there has been cooperation between companies or organizations. Chesbrough and Bogers [26] argued for the theory and growth of accessible innovation in literature. The definition of open innovation encompasses more study domains than has been addressed in the past [29]. The implementation of open innovation, for instance, began mostly in the high-tech field at first. However, it expanded to numerous fields, including beef, machinery, and architecture [8].

In essence, the OI model has three key elements. First, it is important to recognize the creation of information by building a broad variety of knowledge sources for innovation, including establishing ties between consumers, vendors, competitors, and academic institutions [13,30]. Second, the implementation of appropriate appropriation strategies should be studied, with various internal and external appropriation strategies being investigated. It is possible to create commercialization platforms that involve conventional distribution techniques and other ways, such as licenses, the formation of spin-off companies, or the establishment of joint ventures [31]. Finally, it is important to start improving the organization’s structures and resources to recognize, assimilate, and leverage external know-how from its competitive context and incorporate it effectively into its internal knowledge base.

Large corporations traditionally depend on internal R&D to develop innovative products. Firms with larger wealth and expertise would be able to out-compete smaller rivals [32]. The creativity in the paradigm has improved, and it performed well for a long time. Jobs ought to engage in replacement innovation practices that emerge from the government’s investments and other public and private companies [33,34]. Open creativity is a term that is frequently implemented in many fields. Studies often vary across internal communication patterns and external communication patterns in terms of collecting patterns that are most successful in catalyzing internal innovation and delivering better outcomes for yourself [18]. Technology-linked and mass-changing activities of knowledge, such as e-mail addresses with inappropriate attachments, can impact a company’s practices in a manner that will affect the operational sector. Technology is increasingly integrating external knowledge that can be utilized to enhance current technological developments. To capture these advancements, companies can track technology patterns. Lichtenthaler [9] has established the business’s integration of technology and the discovery of technology in a fully open setting to derive full profit from their technological capacities and additional capabilities.

2.3. Open Innovation and SEMs

SME’s journey and growth have not been so rosy because, in every move, they encounter obstacles that hinder their normal speed of progress. These challenges include resource contracts, lack of capital access, market limitations, and incapacity to invest in
research and development. One of the ways to mitigate the challenges faced by SMEs is the extensive practice of open innovation. Business innovation initiatives have lately been distinguished by a trend towards greater transparency, with businesses progressively dependent on external input [13] and academic partnerships [35] to create innovative goods, services, and processes. Spithoven, et al. [36] postulated that the impact of OI activities in small companies varies from the size of the company; in particular, smaller companies are more likely to profit from simultaneous usage of OI practices while launching new goods on the market, whereas larger firms are less likely to do so. Turnover in SMEs is linked to how much they secure their intellectual property (IP), whereas big companies perform stronger searches.

Olaru, et al. [37] investigated Romanian SMEs’ progress with the effects of open innovation practices spanning the period over 2002–2012. Study findings exposed OI in terms of external innovation processes enhance SMEs’ performance and allow for higher turnover. The same vine of the positive association was also available in the study of Suh Suh and Kim [38], Van de Vrande, et al. [39]. OI has a huge effect on performance and does not entail significant costs or higher expenses [40]. OI, according to Chesbrough, et al. [18], includes considerations such as corporate culture, innovation mechanism, and the form of business model. This new open innovation culture relies on these principles: intelligent people from outside the business can generate and grow ideas, external research and development initiatives yield value, etc. SMEs will benefit tremendously from open innovation by learning innovative methods and developing goods through external tools [36].

A study performed by Huang and Rice [41] covered 114 SMEs in Taiwan, and study findings revealed that OIs positively accelerate SMEs’ growth by reducing the organizational inertia and establishing the bridge between innovation practice and operational performance. They also postulated that an innovation-based business model injects critical forces for causing the prospects of SMEs to thrive. In another study, Huang, et al. [42] investigated OI’s role in performance over 294 SMEs in Australia. They established a negative association between OI and SMEs performance and suggested that great care must be taken with the adoption of open strategies, particularly for SMEs, as they might detract from innovation output rather than contribute to it. Furthermore, in addition, the absence of absorptive potential might be correlated with a negative relationship. The ability to recognize and exploit external opportunities and assimilate and integrate exogenous know-how into the existing information base are two important elements of absorptive capability. The absence of the above factor could prolong the period taken for a business to profit from novel outputs, which are commercialized more slowly on the market due to a lengthening learning method.

OI activities are still more successful for small- and medium-sized companies (SMEs). Companies who collaborate would have better potential to commercialize their inventions [36,41]. OI allows businesses to remain successful in a diverse world that affects them [37]. Pilav-Velić and Marjanovic [43] established that SMEs had progressed transparent innovation processes both in the industrial and service industries. It has been discovered that small companies follow open innovation mainly for market-associated reasons; however, for the implementation of open innovation, they are confronted with cultural issues. More analysis is needed to establish a systematic approach and implementation. The summary literature findings are displayed in Table 1.

Hypothesis 1 open innovation practices positively correlated with SMEs performance.
Table 1. Summary of literature survey on Open Innovation and SME.

| Author/s                  | Remarks                                                                                     |
|---------------------------|---------------------------------------------------------------------------------------------|
| Sadat and Nasrat [44]     | In the sense of inbound open innovation operations, partnerships with organizations have been found to be a crucial factor in the internal production and invention of food SMEs for new goods. |
| Santoro, et al. [45]      | Open innovation involves a number of obstacles and enabling requirements that SMEs must contend with in order to maintain their path and remain successful. Furthermore, significant managerial ramifications occur that are important to SMEs that are able to initiate new methods of creativity. |
| Popa, et al. [46]         | Organizational variables, such as commitment-based human resources activities, provide a positive effect on the environment of innovation, and the climate of innovation leads to open innovation. |
| Olaru, et al. [37]        | Romanian SMEs could improve the efficiency of their innovative processes by embracing the open innovation principles and concentrating on activities involving capitalizing on external innovation tools. |
| Parida, et al. [4]        | Innovation assists SMEs to expand their capabilities                                           |
| Bianchi, et al. [47]      | The research offers an outline of a fast and easy-to-use approach for finding feasible alternate technology application licensing opportunities. |
| Demil and Lecocq [48]     | The analysis discovers that implementing an open system approach raises the amount of potential entrants in the market when they prefer to utilize open platforms more readily than incumbents. Often, the open framework migration into the low-tech sector decreases the overall scale of all companies in that industry. |
| Christensen, et al. [49]  | SMEs use open innovation by making use of new technology considering their location inside the innovation environment and their level of technical maturity. |
| D’Angelo and Baroncelli [50] | Collaborating with numerous horizontal R&D collaborators provides a range of potential outcomes in innovation in business processes. |
| Radziwon and Bogers [51]  | Diverging understandings of the concept of innovation are correlated with open innovation (that is, externally sourced innovation), as well as getting various degrees of research extended to it, SME, inter-organizational, and ecosystem. |
| Wynarczyk [52]           | The competitiveness of small- and medium-sized companies is very reliant on the long-term consequences and relationships between two main internal elements, such as management and innovation, as well as transparent innovation approaches and the capacity of the business to receive government grants for R&D and technical development. |

2.4. Technology Adaption and Open Innovation

Researchers in the empirical literature, including Chesbrough [2], Lichtenthaler [9], and Cui, et al. [10], advocated that the outflow and inflow of information in the role of intellectual property (IP) is important in open innovation. To gain more profit, companies can out-license their IP [53]. The out-licensing helps to take advantage of the IP as they discover profitable, external routes to the market for other businesses with different business models. Companies’ licensing decisions are focused on expected profit-dissipation revenues and benefits [54], i.e., international license revenue is created by licensing fees. Still, current
profits will decline if licensees use technology to compete in the same field. The importance of establishing a reputation as a knowledge provider has been demonstrated by previous studies to boost the monetary and strategic benefits of out-licensing technology [55].

Hervas-Oliver, et al. [56] postulated that inbound OI is linked to internal interfacing tools to spur creativity and the form of innovation preferred by companies. It indicates that innovation output by externally-generated open innovation does not rely on SMEs’ particular form of innovation. It suggests that the form of technical advancement selected (product or process) would be linked to a particular innovation plan or a mix of internal and external sources of information for SMEs [57].

Chesbrough and Bogers [26] identified another significant dimension that is frequently correlated through open innovation: external networking. This requires complete operations, including individuals and organizations, to preserve and acquire relationships through exterior bases of social capital. As such, it involves both formal joint ventures and events for more general and informal networking. Networks help companies easily discover unique knowledge without spending tremendous amounts of time and money internally creating or acquiring the knowledge through vertical integration. Networks, such as R&D alliances, can also grow into structured collaborative efforts. These alliances have become a common mechanism for acquiring technological capabilities from non-competing companies [5].

External involvement enables technologies that were initially discarded or did not appear promising to be recovered. To keep an eye on potential opportunities, enterprises can invest in start-ups and other companies [58]. In the end, their inventions proving useful, such investments offer opportunities to raise external cooperation. To acquire external expertise, businesses can also outsource R&D activities. The belief that companies do not carry out all R&D activities on their own is at the core of the open model, but instead, they have to draw on external expertise that can be approved or purchased [4,6]. In the innovation process, technological service providers have also become more relevant, for example, engineering firms and high-tech organizations. It is considered entirely valid to create key information beyond the open model’s organizational boundary [59]. Finally, to benefit from external innovation opportunities, companies should externally obtain intellectual property through the licensing of patents, copyrights, or trademarks [12]. A brief summary of the literature survey is displayed in Table 2.

Hypothesis 2 open innovation practices positively influences by technology adaptation by firms.

**Table 2. Summary of literature survey on open innovation and technology.**

| Authors          | Final Remarks                                                                 |
|------------------|-------------------------------------------------------------------------------|
| Andrade, et al. [60] | Open innovation has a lesser impact on the detrimental effects of technical deficiency on innovation than does information technology (IT) for closed innovation. |
| Chege, et al. [61] | With the usage of information technologies in small enterprises, small businesses are granted a comparative edge over other small businesses, as well as more opportunities to enter foreign markets. |
| Yun, et al. [62] | Open innovation has replaced the conventional model for linking markets and technologies, enabling new business configurations to evolve. |
| Park [53]        | The emergence of new technologies will open up a new blue ocean with a combination of removal, reduction, growth, and creativity, as well as new innovation initiatives aimed at opening up new ecosystems. |
| Cui, et al. [10] | IT flexibility and breadth enhances innovation radicalness and innovation volume. |
2.5. Innovation in Women-Owned SMEs

Scuotto, et al. [63] pointed out that very few articles on innovation, concentrating on women-owned SMEs, have been published. Many experiments have since been carried out based on testing theories of variables, such as a company’s “smallness” impact on creative performance. However, in recent times, the relationship between open innovation and women-owned SMEs creates interest in the empirical literature.

Setini, et al. [64] established that OI for women entrepreneurs remains very restricted by finances due to lack of capital guarantees and lack of entrepreneurial expertise in the technical age, consumer entry, red tape, and legalization. In addition, management expertise, access to computer technologies, and a perception that men must be dominant in Balinese culture and traditions make businesses small for woman entrepreneurs. Tipu [65] has identified several challenges facing women entrepreneurs when accepting and practicing innovation in their operations, such as stereotypes, attitudes, and routines that discriminate against gender; inadequate structural and institutional support for structural and institutional support (e.g., micro-financing schemes, legal enforcement and monitoring, training and development); and severity in access to finance.

In another study, Matroushi, et al. [66] investigated OI practices’ key determinants in UAE women-owned enterprises. Study findings exposed that internal and external funding come with considerable difficulties for female-owned companies. Furthermore, Pillai, et al. [67] revealed that women entrepreneurs continue to face unique social obstacles, such as history; conventional perceptions; competitiveness; lack of expertise; institutional delays; lack of mentoring; and lack of role models that prohibit them from engaging in leadership, entrepreneurship, and large-scale entrepreneurship.

2.6. Technology, Innovation, and SMEs Sustainability

Sustainability has been a major consideration for SMEs, offering both rewards and obstacles. Increased understanding concerning non-renewable resource use, such as fossil fuels, has affirmed the need for communities to move towards more sustainable goods and processes. With the emphasis on creativity and entrepreneurship, this capacity can be achieved [68,69]. Traditionally, invention is a reasonably discreet activity, method, procedure, or organizational structure to be disseminated or added to consumers around the scheme. This method takes place in three phases: initiation, incorporation, and institutionalization. A shift to agents or agents of transition fosters understanding of creativity and encourages its usage by a dissemination approach that blends and encourages a range of benefits. Because processes aim to preserve order, creativity experiences differing degrees and modes of opposition as it diffuses. Encouraging innovation to meet the sustainable...
development agenda’s aims was the target of a rising array of governance policies adopted by both public and private sector players [70]. The critical position of innovation to achieve the aims of the sustainable development agenda has been recognized at least since the publication of the Brundtland study in the 1980s. Since then, there has been an extensive discussion between policymakers and scholars on governance mechanisms to promote such creativity [71–74].

Hall, et al. [75] claimed that the sustainability panacea is an excessively positive perception about what can be achieved to cause a sustainable transition by entrepreneurship. Critics claimed that it is just a broad definition of creativity. Sánchez-Medina, et al. [76] conducted a study to evaluate the impact of environmental innovation on sustainability by taking into consideration 168 handicraft firms in Mexico City. They postulated that their study was shown to be more in line with the neo-classical perspective than with the evolutionary view, as the commitment on the part of craftsmen to make improvements that favor the world and community is related to a willingness to gain greater consumer participation and, most recently, an interest in compliance with such environmental requirements to be able to sell their goods. Loredo, et al. [77] argued that business production approaches place strong importance on product creativity. The marginal impact for informalized soft, downstream practices is far higher. Products may be created by reverse engineering by introducing certain new design functionality. Conversely, certain technical implementation sectors—external R&D and external equipment—play a vital role in technological advancement [62,78].

3. Research Methodology

3.1. Sample

To scrutinize the perception, growth, and challenges about open innovation in SMEs owned by women-owned in Bangladesh, the study accumulated survey responses from 357 respondents by circulating questionnaires through online facilitates. The data collection procedure was conducted over four weeks, precisely from 1 December 2020 to 31 December 2020, and all the responses were requested through email and phone calls for sending feedback. In the sample selection procedure, the study considered readily available sample information from SME foundation in Bangladesh and considered business operation duration 03 years with a staff of up to 100. Data were collected from five Bangladesh cities, namely Dhaka, Khulna, Chittagong, Sylhet and Rajshahi. Furthermore, it is worth mentioning here that, in terms of formal registered women-owned SMEs operating in Bangladesh, there are about 16000 across the country, but due to contract address unavailability, they are utterly difficult to reach. Table 3 reports the technical details of the research sample.

| Category               | Remarks                                      |
|------------------------|----------------------------------------------|
| Sector                 | Women-owned SMEs                             |
| Geographical location  | Bangladesh                                   |
| Methodology            | Structured questionnaire                      |
| Procedure              | Stratified sampling                           |
| population             | 1600 (Manufacturing Base-SME)                |
| Sample size (response) | 350 (375 or 68.18%)                          |
| Period of data collection | From 1 December 2020, to 31 December 2020   |

The survey was stratified into two groups (10–50 workers and 51–100 staff) throughout the manufacturing and service industries. The database of the SME Foundation of Bangladesh was the source of the sample. A total of 570 respondents, 375 (65%), were prepared to participate and sent their feedback by giving their opinions. The final sampling rate was 28%. The distribution of these respondents was across groups and sectors. Table 4 displays the demographic composition of respondents.
Table 4. Distribution of respondents across industries and size classes.

| Type of Industry               | Size Class       |
|-------------------------------|-----------------|
|                               | 10–50 Personnel | 51–100 Personnel | Total |
| Food and beverages           | 25              | 15               |       |
| Chemicals, rubber, and plastics | 35          | 10               |       |
| Machinery and equipment      | 27              | 15               |       |
| Other manufacturers          | 35              | 12               |       |
|                              | **122**         | **52**           | **174** |
| Services IT                  | 25              | 14               |       |
| Business services            | 52              | 25               |       |
| Other services               | 50              | 35               |       |
|                              | **127**         | **74**           | **201** |

Source: Authors’ data collection 2020.

3.2. Variables

Following Van de Vrande, et al. [39], the survey proceeded with questions on the nature of the firms’ innovation processes. More specifically, eight open innovation practices were distinguished, which are defined in Table 5.

Table 5. Open innovation practice survey.

| Variables                    | Definition                                                                 |
|------------------------------|---------------------------------------------------------------------------|
| Venturing                    | It may be beneficial to launch new organizations building on existing expertise and support from enterprise. |
| Outward IP licensing         | The sale or providing licenses or trademark privileges to other companies to benefit from intellectual property. |
| Employee involvement         | Taking advantage of the experience and initiatives of workers who are not interested in R&D, such as providing recommendations, exempting them from introducing proposals, or establishing autonomous innovation teams |
| Customer involvement         | Customers are interested in the production phase by providing reviews on goods, and they may even provide specifications for future products. |
| External networking          | Collaboration with external parties for innovation in the process.       |
| External participation       | Equity investments in new or established enterprises to gain access to their knowledge or obtain other synergies. |
| Outsourcing R&D              | Buying R&D services from other organizations, such as universities, public research organizations, commercial engineers, or suppliers. |
| Inward IP licensing          | Buying or using intellectual property, such as patents, copyrights or trademarks, of other organizations to benefit from external knowledge. |

4. Results and Discussion

The results of the present trend in open innovation and entrepreneur perception are displayed in Table 6. Survey results reveal that several innovation initiatives have been imitated over the past three years and become a success in their endeavor. In terms of the success rate of open innovation, it is utterly established that SMEs managed by women are heading towards innovative SMEs by displaying their keen interest and efforts for innovation through technology adaptation. Furthermore, the growth of innovation’s stability also signifies the SMEs’ propensity to grow by mitigating their operation’s inherent limitations. This finding postulates that women-owned enterprises are approaching to
drag out every alternative for success by adapting technological benefits and augmenting innovation in their enterprises.

**Table 6. Present trend in open innovation perception.**

| Incidence               | Perceived Trends | Increase % | Stable % | Decrease % |
|-------------------------|------------------|------------|----------|------------|
| **Technology exploitation** |                  |            |          |            |
| Venturing               | 23               | 10         | 90       | 1          |
| Outward IP licensing    | 54               | 10         | 88       | 2          |
| Worker Involvement      | 14               | 53         | 46       | 1          |
| **Technology exploration** |                |            |          |            |
| Customer involvement    | 78               | 38         | 61       | 1          |
| External networking     | 57               | 45         | 53       | 2          |
| External participation  | 37               | 25         | 73       | 2          |
| Outsourcing R&D         | 41               | 35         | 62       | 3          |

Source: Authors’ calculation.

The next survey results in Table 7 explain the relative comparison between the manufacturing and service industries regarding open innovation over the past three years. The nonparametric test of Mann–Whitney testing was less acceptable since most dependent variables were in breach of the required normal distribution. We regularly checked whether the findings for the selected test were robust. Study findings revealed that open innovation, both in manufacturing and service enterprises, happened through customer involvement, employee participation, external networking, and external participation. These findings are supported by the empirical studies of Van de Vrande, et al. [39], Vrgovic, et al. [79] and Freel and Robson [80].

In contrast, other variables do not expose asymmetric effects in different industries. However, no systematic trend of industrial variations is revealed in the other measures. In processing, technology exploration, i.e., producers also participate in research and development externalization, and inland IP licensing seems to have a slightly greater emphasis [81]. By comparison, service firms do a better job (22% versus 32%, \( p < 0.05 \)). Moreover, regarding the output of the perceived trend towards open innovation in SMEs, it is palpable that positive growth in manufacturing and service industries and their significant difference is negligible. For findings supported by existing literature, see Huizingh [82]; Ferraris, et al. [83]; Cohen and Levinthal [84]. However, the open innovation penetration through venturing in particular, a coefficient of 0.48 in manufacturing SMEs and a coefficient of 0.14 in services with the \( p \)-value of \(<1\%\), is more prominent than SMEs involving services. Furthermore, the same line of evidence was also established in open innovation through outsourcing of R&D.

It is established that open innovation practices are unconditionally present in both form operations manufacturing and services focused on women-owned SMEs in Bangladesh. In a study, Cui, et al. [10] postulated that extremely creative small- to medium-sized companies that had no internal R&D and were based solely on innovation of minor changes in the design and production of currently developed goods and procedures as a consequence of their educational levels, were able to adjust to fluctuations in consumer demand generated by business groups, trade shows, or trade publications.
Table 7. Open innovation practices between industries.

| Technology exploitation | Incidence Manufacturing \((n = 220)\) (%) | Perceived Trends | Services \((n = 155)\) (%) | Mann–Whitney \(Z(U)\) | Incidence Manufacturing \((n = 220)\) (%) | Perceived Trends | Services \((n = 155)\) (%) | Mann–Whitney \(Z(U)\) |
|-------------------------|------------------------------------------|-----------------|--------------------------|-------------------------|------------------------------------------|-----------------|--------------------------|-------------------------|
| Venturing               | 22                                       | 32              | 2.35                     | 0.48                    | 10                                        | 7               | 1.15                     | 0.03                    | 0.14                    | 0.1                        |
| Outward IP licensing    | 10                                       | 7               | 1.15                     | 0.38                    | 86                                        | 85              | 0.67                     | 0.38                    | 0.38                    | 0.2                        |
| Worker Involvement      | 86                                       | 85              | 0.67                     | 0.38                    | 86                                        | 85              | 0.52                     | 0.22                    | 0.24                    | 0.38                       |
| Technology exploration  |                                          |                 |                          |                          |                                            |                 |                          |                          |                          |                            |
| Customer involvement    | 88                                       | 87              | 0.71                     | 0.32                    | 86                                        | 85              | 0.52                     | 0.22                    | 0.24                    | 0.38                       |
| External networking     | 39                                       | 44              | 1.15                     | 0.12                    | 39                                        | 44              | 0.15                     | 0.12                    | 0.13                    | 0.26                       |
| Outsourcing R&D         | 50                                       | 34              | 4.0 **                   | 0.21                    | 50                                        | 34              | 4.0 **                   | 0.21                    | 0.11                    | 2.5 ***                    |
| Inward IP licensing     | 28                                       | 18              | 3.1 ***                  | 0.04                    | 28                                        | 18              | 3.1 ***                  | 0.04                    | 0.03                    | 0.5                        |

Sources: Author estimation; Note: ***, and ** explain the level of significance at a 1% and 5% level, respectively.

The study investigated the present state of open innovation in terms of firm size. The results are displayed in Table 8. Study findings reveal that SMEs with many employees are more concentrated on open innovation than SMEs with smaller workforces. In particular, in open innovation in terms of employee involvement, customer engagement, and external networking, both groups of SMEs are in the same stage. As of the perceived trend, study findings established that the coefficient of open innovation dimension in SMEs with higher employees is greater than that of SMEs with lower employees. These findings are in line with Van de Vrande, et al. [39]; De Jong, et al. [85] but not with the study findings of Lichtenthaler [86]. In sum, we find that medium-sized enterprises apply and adopt open innovation more often than their smaller counterparts, as expected.

Table 8. Incidence and perceived trends in open innovation practices.

| Incidence |
|-----------|
| 10–50 Personnel \((n = 275)\) (%) | 51–100 Personnel \((n = 100)\) (%) | Mann–Whitney \(Z(U)\) | 10–50 Personnel \((n = 275)\) (%) | 51–100 Personnel \((n = 100)\) (%) | Mann–Whitney \(Z(U)\) |
| Technology exploitation |
| Venturing | 26 | 30 | 1.2 | 0.9 | 0.11 | 1.1 |
| Outward IP licensing | 5 | 12 | 3.3 ** | 0.02 | 0.03 | 1.2 |
| Worker Involvement | 90 | 92 | 1.6 | 0.34 | 0.44 | 2.4 * |
| Technology exploration |
| Customer involvement | 87 | 88 | 1.06 | 0.26 | 0.45 | 4.2 ** |
| External networking | 84 | 85 | 0.3 | 0.22 | 0.28 | 3.1 * |
| External participation | 34 | 34 | 4.2 ** | 0.11 | 0.16 | 2.1 * |
| Outsourcing R&D | 32 | 54 | 4.1 ** | 0.11 | 0.22 | 2.2 * |
| Inward IP licensing | 24 | 48 | 3.7 ** | 0.16 | 0.06 | 2.1 * |

Note: ** and * explain the level of significance at a 5% and 10% level, respectively.

5. Cluster Analysis

To investigate the occurrence of open innovation in more depth, we agreed to cluster the respondents in categories of SMEs that are homogenous in their open innovation policy and organization of innovation activities; for more details, see Lichtenthaler [9], Van de Vrande, et al. [39] for a related approach. The study was focused on the eight dichotomous variables of technical exploitation and discovery. We began with principal component analysis to reduce the number of dimensions in our results and then implemented cluster analysis for further analysis techniques to find homogeneous groups of enterprises. The differences between clusters were explored with nonparametric tests, nonetheless. The
Principle Component Analysis (PCA) display results (see, Table 9) are manifested from PCA assessment; the first group of dimensions consists of worker engagement, customer participation, and external networking. The second dimension includes outward IP licensing, outsourcing R&D, and inward IP licensing. Finally, the third component is formed by venturing and external participation, respectively.

Table 9. Results of PCA for open innovation practices.

| Component | Component-1 | Component-2 | Component-3 |
|-----------|-------------|-------------|-------------|
| Venturing | 0.02        | 0.08        | 0.83        |
| Outward IP licensing | 0.04        | 0.82        | 0.04        |
| Worker involvement | 0.75        | 0.13        | 0.01        |
| Customer involvement | 0.79        | 0.08        | 0.1         |
| External networking | 0.81        | 0.17        | 0.01        |
| External participation | 0.11        | 0.07        | 0.81        |
| Outsourcing R&D | 0.21        | 0.91        | 0.13        |
| Inward IP licensing | 0.02        | 0.87        | 0.06        |

Source: Authors’ calculation, survey data.

The study conducted a non-hierarchical analysis of k-means for each group (k). SMEs were divided into groups by iterative means according to their distance from our original hierarchical solution [87]. Additionally, the study measured the probability of the corrected agreement coefficient between each first solution and the final one to determine which solution was the most stable—the tests by Kruskal–Wallis for all variables is established in Table 10.

Study findings with cluster analysis expose that Cluster 2 establishes a higher propensity towards open innovation. They use a wide variety of innovative methods, which are on average broader and disproportionately more concentrated on sectors that produce goods than the others. Cluster 1 exhibits the practice of open innovation with workforce involvement, customer participation, and inward IP licensing. Finally, Cluster 3 SMEs open innovation immensely relies on venturing and customer involvement but is not focused on complex and interacted innovative tasks, such as IP-trading, outsourcing of R&D, and other firms’ participation.

Table 10. Incidence of open innovation practices across three clusters.

|                  | Cluster 1 (n = 125) (%) | Cluster 2 (n = 145) (%) | Cluster 3 (n = 105) (%) | Kruskal–Wallis χ² (df = 2) |
|------------------|-------------------------|-------------------------|-------------------------|---------------------------|
| Technology exploitation |                          |                          |                          |                           |
| Venturing        | 15                      | 40                      | 75                      | 26.5 *                    |
| Outward IP licensing | 40                      | 50                      | 25                      | 175.3 **                  |
| Worker involvement | 74                      | 94                      | 48                      | 145.5 **                  |
| Technology exploration |                          |                          |                          |                           |
| Customer involvement | 85                      | 96                      | 87                      | 89.3 **                   |
| External networking | 86                      | 98                      | 54                      | 275.2 **                  |
| External participation | 34                      | 39                      | 21                      | 74.4 **                   |
| Outsourcing R&D | 75                      | 80                      | 11                      | 42.5 **                   |
| Inward IP licensing | 85                      | 12                      | 10                      | 145.9 **                  |

Source: Authors’ calculation, survey data. Note: ** and * explain the level of significance at 5% and 10% level, respectively.
Table 11 shows that Cluster 1 (open innovators) firms’ tendency for broader organizations is tangible. These results indicate that when businesses grow, the methods of open innovation are adopted. Cluster 3 encompasses various small enterprises with limited open innovation applications, although most firms also include customers in the innovation phase. Cluster 2 mostly distinguishes that both of these SMEs are involved in tasks that can be informally organized and do not necessarily require large expenditures, such as staff interaction and external networking. Over-represented medium-sized enterprises often specifically exercise their innovation efforts through practices that usually involve considerable spending, including venturing, foreign engagement, IP certification, and outsourcing of R&D.

Table 11. The perceived trend in open innovation practices across three clusters.

|                        | Cluster 1 (n = 125) | Cluster 2 (n = 145) | Cluster 3 (n = 105) | Kruskal–Wallis w² (df = 2) |
|------------------------|---------------------|---------------------|---------------------|---------------------------|
| Technology exploitation|                     |                     |                     |                           |
| Venturing              | 0.27                | 0.21                | 0.0.2               | 6.2                       |
| Outward IP licensing   | 0.21                | 0.06                | 0.02                | 28.0 **                   |
| Worker involvement     | 0.43                | 0.33                | 0.05                | 30.1 **                   |
| Technology exploration |                     |                     |                     |                           |
| Customer involvement   | 0.62                | 0.30                | 0.03                | 30.3 **                   |
| External networking    | 0.49                | 0.24                | 0.03                | 13.5 *                    |
| External participation | 0.43                | 0.12                | 0.04                | 12.6 *                    |
| Outsourcing R&D        | 0.41                | 0.14                | 0.05                | 4.4                       |
| Inward IP licensing    | 0.27                | 0.04                | 0.02                | 44.4 **                   |

Note: ** and * explain the level of significance at a 5% and 10% level, respectively.

The next survey outcome derives from adapting OI activities in their SME and are displayed in Table 12. Study findings reveal that OI practices in SMEs are significantly guided by innovativeness in their production process. This suggests that process innovation plays a pivotal role in cost reduction by lessening production wastage. In particular, when responding to IO practices, SMEs owners replied, “we tried to integrate and implement new production processes to reduce the cost of production and thus allow customer penetration”.

The second factor is established from findings that it is to reach the target market with each, indicating that SMEs are subject to the incapacity to reach customers through formal marketing channels; therefore, innovativeness in connecting to desired customers will increase turnover and customer involvement [88]. Furthermore, to achieve quality, technical capacities require a range of financial and human resources [89]. Technological skills provide realistic and theoretical expertise that will allow an organization to produce innovative technologies and enhance them [90–92]. Innovations have significant consequences for SMEs in accessible innovation systems as they will fulfil consumer demands and produce more outstanding corporate financial success with this organizational link [93–95].

“We needed to develop a new product based on a recommendation from our customers, but we realized that we did not have the know-how at the time, so we consulted a private university for ideas and know-how in developing the product to meet our customer’s need”.
Table 12. Motives to adopt open innovation.

| Motive to Adopt Open Innovation | Overall | Venturing Worker Involvement | Customer Involvement | External Networking | External Participation | Outsourcing R&D |
|--------------------------------|---------|------------------------------|----------------------|---------------------|------------------------|-----------------|
| Better control of complex organization process | 10      | 2                            | 8                    | 2                   | 2                      | 4               |
| Improve innovation process (integration of new technologies) | 9       | 6                            |                      | 2                   | 6                      | 5               |
| Innovation process | 25      | 20                           |                      | 20                  | 26                     | 20              |
| Insufficient marketing capability | 12      | 6                            |                      | 8                   | 30                     | 10              |
| Access new complementary technology | 5       | 10                           |                      | 5                   | 5                      | 15              |
| Lack of infrastructure | 2       | 2                            |                      | 10                  | 6                      | 10              |
| To expand existing market share | 7       | 4                            | 10                   | 44                  | 20                     | 25              |
| Expand internal R&D | 13      | 20                           |                      | 20                  | 11                     | 10              |
| Policy | 4       | 12                           |                      | 2                   | 12                     | 4               |
| Gain access to the expertise and bring expertise inside | 8       | 40                           |                      | 40                  | 40                     | 8               |
| Effective intellectual property right protection | 5       | 21                           | 10                   | 11                  | 9                      | 10              |

The survey findings of key management and organizational attributes of SMEs block them from embracing the open innovation reports in Table 12. Study findings established that the critical blockades manifested by the respondents to innovation are venture production (56%), external involvement (58%), and R&D outsourcing (50%). The most evident obstacles for businesses to participate in projects, i.e., 35%, involvement in other companies (75%), and external parties and consumers' engagement, are considered to hamper factors when implementing open innovation practices, which arise when two or more companies operate together. Such open innovation involves collaboration among various organizations or personnel, leaving the company in a venture. These inter-organizational interactions also lead to difficulties separating duties and responsibilities, balancing creativity and everyday handling of tasks, and communication issues between organizations. Another barrier is the availability of time and money. This is a barrier to virtually all forms of open innovation practices. Still, Table 13 relatively low scores suggest that time and money are not the primary obstacles to open innovation practices. The issues associated with administration arise even more often, generally in the form of the venture (34%), participation in other companies (22%) and external partners (18%), and, in particular, collaboration with governmental or other non-profit organizations. Also, as government subsidies and assistance are provided to the company, the administrative burden is prominent. Government support is incredibly inflexible, not least because partners cannot adjust, and services cannot end early.
Table 13. Obstacles for adopting open innovation practices.

|                      | Venturing | Worker Involvement | Customer Involvement | External Networking | External Participation | Outsourcing R&D |
|----------------------|-----------|--------------------|----------------------|---------------------|------------------------|-----------------|
| Administration       | 20        | –                  | –                    | 8                   | 10                     | 20              |
| Finance              | 15        | –                  | –                    | 9                   | –                      | 5               |
| Knowledge            | 10        | –                  | –                    | –                   | 8                      | –               |
| Marketing            | 20        | –                  | –                    | –                   | 12                     | –               |
| Organization/culture | 23        | –                  | 35                   | 45                  | 66                     | 35              |
| Resources            | 8         | 20                 | 15                   | 8                   | –                      | 15              |
| IPR                  | –         | –                  | 5                    | 6                   | –                      | –               |
| Quality of partners  | –         | –                  | –                    | 20                  | –                      | 19              |
| Adoption             | –         | –                  | 18                   | –                   | –                      | –               |
| Demand               | –         | –                  | 20                   | –                   | –                      | –               |
| Competences          | 30        | –                  | –                    | –                   | –                      | –               |
| Commitment           | 38        | –                  | –                    | –                   | –                      | –               |
| Idea management      | 12        | –                  | –                    | –                   | –                      | –               |
| Other                | 5         | –                  | 7                    | 2                   | 4                      | 6               |
| Total                | 100       | 100                | 100                  | 100                 | 100                    | 100             |

6. Discussion, Managerial Implication, Suggestion

6.1. Managerial Implication

The research on the factors that lead SMEs to innovate has proved interesting and significant, particularly in making comparisons between companies to come up with the best way to tackle a particular issue [96]. Innovation is commonly linked to “creativity”, which may be thought of as a practice that attempts to gain a more lucrative or more sought-after commodity that can make the company more competitive [97]. This finding confirms the value of user innovation for many small- and medium-sized companies, which would make our perception of OI seriously less oriented for SMEs on scientific innovation. Also, external networking to obtain new or incomplete information is a key open activity among women-held SMEs in innovation. A minority of respondents are interested in external and inward IP licenses, venture operations, and external involvement. Informal, unstructured activities that do not require significant investment are the most common practices, such as customer engagement and outside networking. In comparison, IP licensing, venture, and external collaboration require financial commitment, formalized contracts, and a structured risk management strategy for the innovation portfolio. This result is consistent with previous innovation research in small- and medium-sized companies [5,98,99].

One of the survey’s key purposes was to know whether SMEs are gradually practicing open innovation in the last three years. The respondents unequivocally sensed a rise in the spread of open innovation and popularity. The results showed that innovation is increasingly open in small- and medium-sized enterprises. It is not surprising that small- and medium-sized companies play an increasingly important role in innovation. In reality, small businesses frequently lack capital for in-house production and promotion of new goods and are, thus, more inclined or compelled to partner with other organizations. Open innovation activities enable companies to boost their output in a relevant sector. In addition to its significance, teamwork is a fundamental open innovation activity for companies that has been implemented widely. The company is working with its clients. To the business, organizations such as colleges are not that relevant, but they respect research and growth. Inventing a new idea is never a simple task. It helps to have someone to collaborate with that is experiencing the same difficulty [100].
The outcome is not surprising given businesses’ technical participation, although they are no different from service companies for other open innovation activity. Manufacturing companies are more involved in the outsourcing of R&D and IP licensing. Open innovation is as relevant for service companies as for manufacturing businesses, and open innovation research must not only be restricted to small- and medium-sized enterprises owned by women, which have formal R&D operations. The results are consistent with the findings [9,36,101,102]. The study closely examined the variations between industries and found no major differences.

In comparison, when observing major variations between size groups in the adaptation of open innovation methods, medium businesses, more often than small enterprises, participated in and embraced open innovation. These businesses have the size and resources needed for a wider variety of innovation activities. They can be viewed as a broader repository of information that can be intentionally outsourced to small companies. The survey findings also showed that open innovation exists in small companies and is gradually embraced. Still, the adaptation rate for all exploration activities for medium-sized firms is rising higher than for small companies. This finding demonstrates a divergent transition between small- and medium-sized enterprises.

Three clusters of women-owned SMEs were disclosed, grouping organizations into groups with common open practices for innovation, i.e., cluster research. Lichtenthaler [9] conclusion is supported by their characterization that corporations seldom concentrate on either technology or technology exploration. Instead, these two dimensions of open innovation appear to be combated by open, creative businesses. Moreover, for instance, the cluster of open innovators has comparatively extra medium-sized enterprises. Clustering indirectly implies a sequence for acceptance of open innovation, beginning with customer involvement, resulting in staff participation and external networking, and culminating with more “advanced” activities such as IP licensing.

The document also looked at reasons for small- and medium-sized companies to engage with open innovation and knowledge of barriers for managers in their organization. The findings showed that market-related goals primarily power open innovation in small- and medium-scale enterprises; small- and medium-sized firms use many open innovation practices concurrently. Higher-order firms aim to secure profits and continue increasing their market share. This finding is in line with Gans and Stern [103]; Lichtenthaler [55]; Hung and Chou [104]. The literature suggests that innovation and commercialization were the big problems for small enterprises. Cooperation with incumbents in business may be one way to address marketing difficulties. Awareness and the productivity of innovation processes, typically in technology exploration activities, are often referred to. Considerations of cost and control have less frequently been discussed. Ebrahimi, et al. [105] argued that firms use inbound open innovation to incorporate at a modest level and said that firms that follow open inbound innovation should be mindful that they have a community that has evidence of climate turmoil and is well-prepared.

Management and organizational barriers to open innovation are very complicated; however, as women-owned SMEs enter into interactions and work with external partners, the key obstacle of open innovation in small and medium enterprises lies in the organizational and cultural matters emerging. These challenges are tackled in various innovation practices, including risk management, customer engagement, outsourcing, external networking, research and development, and external involvement. This research informs us about the enhanced cooperation (R&D), a creative company concerning companies and venturing within the area of revolutionary goods and services. Open innovation is a fast-rising phenomenon. Therefore, there is a need to study free policies. It is promising that smaller firms can innovate in order to succeed and to protect the development [106].
6.2. Limitations

The following is possibly not the full list of indicators of open innovation. Many other activities not included in the study have been suggested in previous studies. Therefore, the study cannot claim the survey data capture the entire area of exploitation and discovery of external technology. Second, while the study has a wide sample of women-owned SMEs, certain types of companies might still be ignored. The manufacturers are substantial operators of the innovation policy, and the commissioner called for comprehensive coverage of these groups for “political” reasons. However, the sample represents a wide variety of creative SMEs, which go beyond previous open studies on innovation.

Finally, only if the respondents stated they took the required practice, were the motivations and the perceived obstacles investigated. Since these study findings are limited to the number of respondents, no results could be published for external and inward IP licenses. This is regrettable because IP-licensing is quiet in the developing phase Chesbrough and Crowther [12] and potentially most needs thorough research Lichtenthaler [9]. According to the research parameters, accuracy cannot, however, be ensured at 100 percent. We could not extend the analysis due to a limited period. An individually adapted interview approach could not generalize the analysis.

6.3. Suggestions for Future Research

As a qualitative analysis methodology, most research has been done, but quantitative approaches can still research open creativity. There are several innovation measures, but a few of them have been used in this study, while others could be taken up in its development. In potential research, businesses can further investigate how and what management implications are involved in transparent innovation in these development processes. The current survey often fails to examine the partnership between small and large open innovation firms. The need for accessible innovation could also be focused on potential studies into cultural, structural, and decision-making differences between stakeholders of various sizes and industries. A final piece of advice is to examine the factors and problems of open innovation in greater detail.

7. Conclusions

The motivation of the study was to explore the fresh and new insight relating to the present state of open innovation practices by the SMEs in Bangladesh, especially SMEs that are managed by women. Gaining the underlying state from study, we proceeded with two hypotheses in alignment with the existing literature.

**Hypothesis 1.** Open innovation practices positively correlated with SMEs performance. Study findings suggest that firms with good intention invested their time and capital for adapting innovativeness in their operation, eventually experiencing positive changes in the overall firms’ growth. However, innovative skills depend on the opportunity to allow use of external information. This argument says that the most applicable previous knowledge we have, the stronger we are at assessing and utilizing outside knowledge. For the most part, prior awareness may be seen as simple things like basic skills or a common language, but it can also be described as the most recent advances in a given area. The capacity to understand the importance of new material, to assimilate it, and to adapt it to commercial purposes is supported by prior relevant experience, the firms’ absorptive power.

**Hypothesis 2.** Open innovation practices positively influence technology adaptation by firms. Technology and innovation practices move side by side, indicating that those firms are technologically sound when they claim their readiness to accept innovativeness in their operation. Open invention has been rendered easier by the development of information technology (IT). Theoretically, people are involved in this phenomena, but no scholar or professional has studied or experienced it. A detailed investigation was undertaken. Strategic IT alignment implies a correlation between IT strategies and the transparency of open innovation strategies, which results in different outcomes for open innovation.
Author Contributions: Conceptualization, L.M., M.Q. and A.H.E.A.; data curation, M.Q.; formal analysis, L.M., M.Q. and A.H.E.A.; methodology, L.M., M.Q. and A.H.E.A.; writing—original draft, L.M., M.Q. and A.H.E.A.; writing—review and editing, L.M., M.Q. and A.H.E.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available in the form of readily used for research rather need to collect different sources and managed accordingly.

Acknowledgments: We would like to express our heartfelt thanks and gratitude to the associate editor and academic editor for their valuable consideration in revising the manuscript. Furthermore, we extend our sincere respect to three anonymous reviewers for their constructive comments, which helped us revise the manuscript’s present form and developed it with standard acceptance.

Conflicts of Interest: The authors declare no conflict of interest.

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