

## APPLICATION OF COMBINED SWOT AND AHP FOR STRATEGY DEVELOPMENT: EVIDENCE FROM POTTERY INDUSTRY OF BANGLADESH

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### ABSTRACT

This study aims to explore the appropriate strategies to revive the pottery industry development in Bangladesh. The research followed SWOT-AHP combined method that is based on Analytical Hierarchy Process (AHP) weighting methodology. SWOT analysis is one of the popular tools for environmental scanning to identify the internal and external environmental factors simultaneously for defining an enterprise's strategic actions. Due to some flaws of SWOT analysis, this study followed the AHP, which is a multi-criteria decision-making approach. The qualitative data collection consisted of a Focus Group Discussion (FGD) and in-depth Interviews. We analyzed quantitative data by the AHP to identify the relative prominence of each SWOT factor analysis. The results revealed that potters have an innovative capacity. Due to the lack of administrative coordination and fierce competition with alternatives products such as plastic, metallic products, they face some difficulties. Still reliability in the marketplace is increasing with time. These findings guide to generate useful inference and could be utilized for decision-making and policies formulation in pottery industry.

### Contribution/ Originality

This research significantly contributes to explore the appropriate strategies to revive the pottery industry development in Bangladesh. AHP-SWOT technique applied in the pottery sector to analysis the industry environment as well as strategy formulation, which would be a reference study to the academic researchers, MSMEs policy makers and small entrepreneurs.

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## 1. INTRODUCTION

As pottery is a pro-environmental, reusable and biodegradable product, its demand is increasing and getting popularity day by day to environmental concern customers, policymakers, researcher and eco-entrepreneurs. The pottery industry is one of the significant sectors in Bangladesh. MSMEs (micro, small and medium enterprises) cover about 99% of the total industrial sector in Bangladesh (World Bank, 2019). For this reason, the core economic development plan in Bangladesh is considered focusing on the MSME whereas pottery is part of it as a traditional cottage and micro- enterprises. Pottery is the alternative to the plastic, Metallic or Ceramic etc. Habitually pottery products are more frangible than the ceramic and plastic products. Pottery products like flower vase, pots, jars, sculpture, toys are very famous in the environment-conscious market as for their artistic value, degradable and environmentally friendly. Unfortunately, this sector has constantly been facing new challenges every day, being a threat to the cultural heritage as well as the economy. Market demands of pottery products are reduced because of the emergence and availability of alternative products, making it difficult for potters to perform their business. It is high time to take steps to revive the cultural heritage through strategy development to stand against the competitive field.

An organization uses SWOT analysis to analyze the strength, the weakness, the opportunities and the threats of the environment to cope with competition with the current business world. The better performance of an industry depends mostly on well interaction among the strategic factors including both the internal and external environment of an enterprise. Pottery industries are disappearing because of modernization and industrialization. Besides, competition from the organized sector also affects the business.

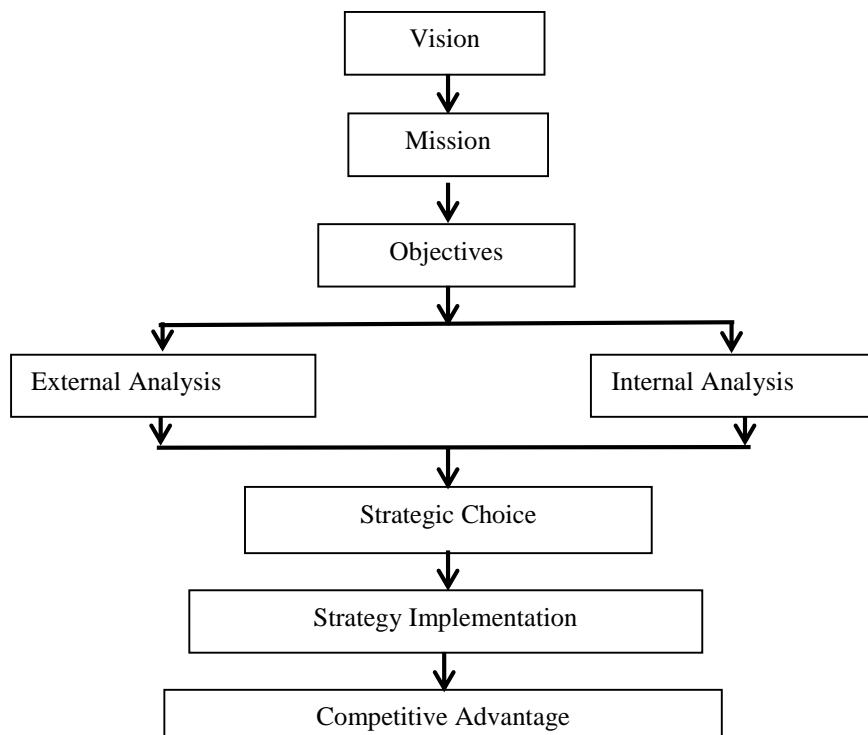
Maximum pottery is located Bauphal (Palpara) and Bakergong (Kalashkathi) under Barishal division (BBS, 2011). Most of the people of these areas are engaged with pottery industry as a traditional profession. They produced various products for decoration and household use. They have been contributing a lot to provide cultural and traditional products in the local community. These also have a distinct demand as an artistic object in urban markets (Khan, 2014). Pottery is currently a commercial product. Bangladeshi pottery products have demands both in the local and overseas market i.e. US, UK, New Zealand, Spain, Italy, Denmark, Australia, Japan, and France (Mimi, 2017; Islam, 2019;). Thus, government interventions to accelerate this industry and export pottery products might boost up rural entrepreneurship in this area. It is comparatively difficult for pottery industries to reach larger markets with lower production and marketing capacity.

To explore strength, utilize opportunities, minimize weaknesses and face challenges, it is significant to develop their strategy. Analytical Hierarchy Process (AHP) is a commonly used tool for mitigating the weakness of SWOT analysis (Kurttila *et al.*, 2000). AHP is performed through qualitative and quantitative analysis to make a decision among complex alternatives and prioritize them by the pair comparison matrix by using Saaty's scale. This prioritization helps to make strategic development of pottery in Bangladesh. There are many previous types of research comprising the application of AHP in disciplines such as agriculture, tourism, forest planning, social science, women education. However, there is few, relevant research on the application of AHP in the SME sector (Ahmad and Pirzada, 2014) especially in the pottery industry. The business, which is mainly based on the family tradition, needs an entrepreneurial approach in its development and finding new markets to compete with the substitute product as an organized sector. The objective of this study is to apprehend the best strategy to develop pottery business management through SWOT (Strength, Weaknesses, Opportunities, and Threats) analysis, and AHP is used in the amalgamation.

## 2. LITERATURE REVIEW

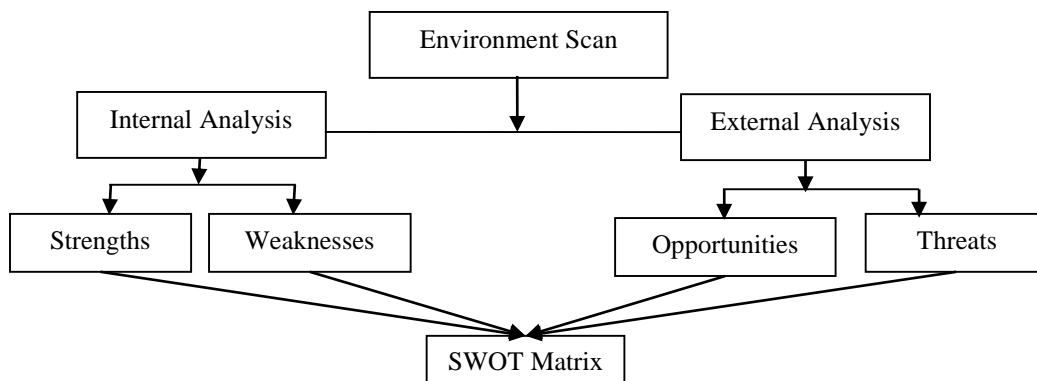
Nowadays most organizations involved in strategic planning. Strategic planning is a way to boost an organization to be more productive by allocating resources in a structured approach to achieve goals (David, 2003). Successful strategic management depends on strategic planning. Strategic planning consists of analysis (organization, person & task), decisions, and deeds an organization endeavours to develop and adapt to competitive advantages.

It commences with vision (Figure 1). Concept shows the picture of the desired future position of the organization. The next step in the strategic management process begins with a mission. An organization's mission is its time-consuming purpose which defines both what an organization years after the desired period and what it wants to eliminate to catch the mission. The third step of the strategic management process includes objectives. An organization aspires to reach its concrete goals by setting objectives. The next phase of the strategic management process is environmental scanning which includes the external and internal analysis, also called SWOT Analysis. SWOT is a tool of situational assessment applied by strategic planners of the project or business organization to evaluate the current status to choose the best alternatives for the future direction (Zavadskas *et al.*, 2011). It aims to identify the key internal and external factors seen as essential to achieving the goal (figure 2 and 3). SWOT gathers and organizes information (see figure 4) concerning the internal and external environment of an organization facing the immediate and near future (Osuna and Aranda, 2007).



**Figure 1: Strategic management process**

The following figures show internal and external environmental dimensions of environmental analysis at a glance for exploring strategic options.



**Figure 2: Strength, weaknesses, opportunities and threats matrix**

In addition, another model of SWOT analysis is Threats, Opportunities, Weaknesses, and Strengths (TOWS) Strategic Alternative Matrix (see below table)

	<b>Internal Strengths (S)</b>	<b>Internal Weaknesses (W)</b>
External Opportunities (O)	SO: “ <i>Maxi-Maxi</i> ” Strategy Strategies that use strengths to maximize opportunities	WO: “ <i>Mini-Maxi</i> ” Strategy Strategies that minimize weakness by taking advantage of opportunities
External Threats (T)	ST: “ <i>Maxi-Mini</i> ” Strategy Strategies that use strengths to minimize threats	WT: “ <i>Mini-mini</i> ” Strategy Strategies that minimize weakness and avoid threats

Source: Wehrich (1982)

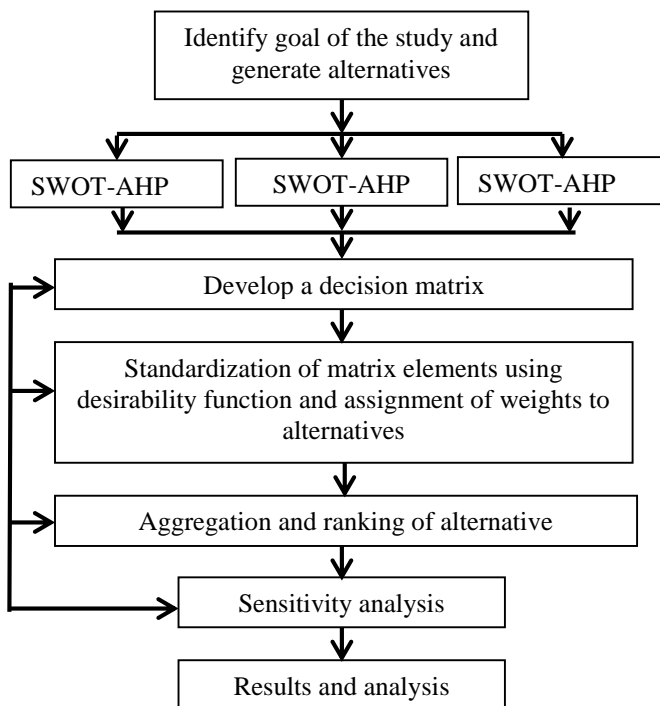
The AHP is a tool for complex decision making to help the decision-makers to set priorities effectively and make the best decision among the sophisticated alternatives. Thomas Saaty introduced it in 1980 (Saaty, 1994). Moreover, it is a useful technique to check the consistency of the decision maker’s appraisalment which reduces the bias in the decision-making process in a perplex situation (Al-Harbi, 2001). AHP accomplishes pair-wise resemblance to find out the relative importance of the variable in each hierarchy level to make the best decision among substitutes (Saaty,1990). Thomas Saaty developed a comparison scale to perform the prioritization mechanism in 1980 to represent the relative importance of the criteria. The value of pair comparison matrices of these factors is used to provide the means for decision making evaluations (Triantaphyllou and Mann, 1995). It has wide application in many areas like economic (Cervelló-Royo *et al.*, 2015), social (Westhues *et al.*, 2001), and management science (Ansary *et al.*, 2009).

AHP moulds decision-making problem and exhorts the decision-making process by identifying objectives, criteria, and alternatives, by comparing criteria and alternatives between pairs and defining priorities of alternatives (Oreski, 2012). The AHP includes both qualitative and quantitative decision attributes proportionately, and its pliancy concerning the setting of objectives (Kurttila *et al.*, 2000).

Moreover, AHP and SWOT are the most well-known tool to analysis the environmental factors for exploring strategies formulation in the SMEs sector. It is also one of the best techniques to policy makers and researchers to the appropriate strategy development of informal and unstructured sector (Khatri and Metri, 2016). In Bangladesh, pottery industry comprises under MSMEs category. In this context, AHP-SWOT technique applied in the pottery sector to analysis the industry environment as well as strategy formulation.

### 3. COMBINED AHP-SWOT METHODOLOGY

The limitations of SWOT analysis to prioritize for future strategy can be overcome by using combined AHP-SWOT. It was first proposed by Kurttila (Yavuz and Baycan, 2013). The AHP is a commonly used decision-making tool to perform the pair-wise comparison and prioritized them using Eigen value analysis (Triantaphyllou and Mann, 1995).



**Figure 3: Combined analytic hierarchy process strengths, weaknesses, opportunities and threats analysis**

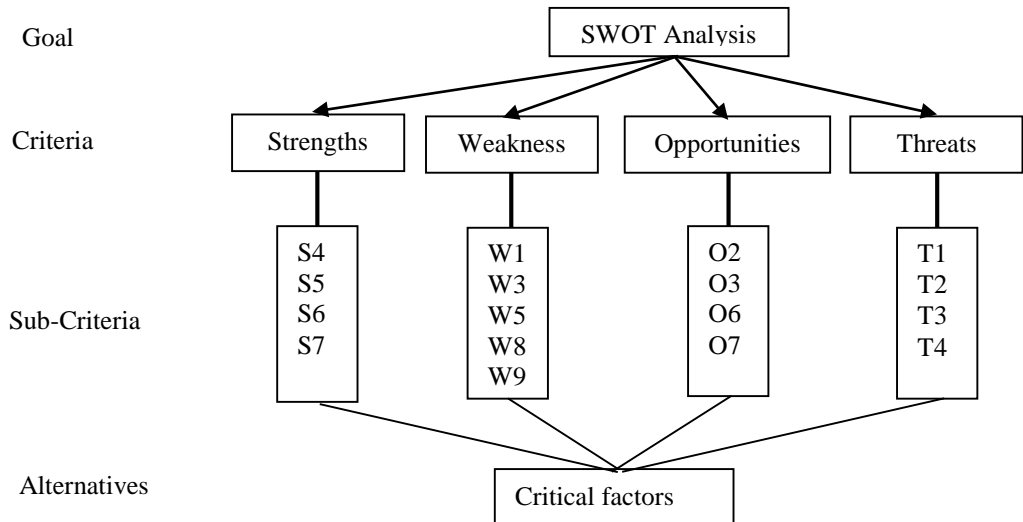
The combined AHP-SWOT has wide applications in various sectors. Like milk sector (Erdil and Erbiyik, 2015), manufacturing firm (Görener *et al.*, 2012), tourism sector (Jeon and Kim, 2011) (Görener *et al.*, 2012), forest certification (Kurttila *et al.*, 2000), management (Subramanian and Ramanathan, 2012), marketing plan (Nganga and Maruyama, 2015), education (Lee *et al.*, 2013), agriculture (Wota and Wozniak, 2015).

Some researchers elaborated SWOT-AHP by adjoining it with a fuzzy analytic hierarchy process which is called fuzzy AHP-SWOT or multiple criteria group decision-making (MCGDM) (Yavuz and Baycan, 2014). The fuzzy AHP-SWOT provides fuzzy judgment in pair-wise comparisons in lieu of strict judgment with the aim of reflecting a style of human thinking in real-world decision-making problems (Kahraman *et al.*, 2004). They performed combined AHP-SWOT analysis by scanning the external and internal environment of an organization. In order to determine the relative importance of SWOT factors, then the AHP performs pair-wise comparisons among factors (Chang and Huang, 2006). To ascertain the weight of each SWOT group, the pair-wise comparison is performed. In the third step, the Analytical Hierarchy Process is applied. Finally, they attained the overall factor rank by multiplying the factor’s local weight with the specific group weight (Ramadhan *et al.*, 1999). AHP is also useful if many interests are involved and a number of people participate in the decision-making process. AHP is a straightforward and transparent method that is

also able to consider subjective and judgmental information (Salo *et al.*, 2003). AHP can deal with qualitative as well as quantitative attributes (Kamal and Alsudairi, 2009).

The combined AHP- SWOT is performed through four steps-

- i. The foremost step is to environmental scanning to identify the internal and external issues for strategic planning and creating the hierarchy of criteria and sub-criteria



**Figure 4: SWOT sub factors through AHP to reach critical factors**

- ii. The second step is to make pair-wise comparisons between the factors to capture the weights according to Saaty’s scale (1980).

	A1	A2	.....An
A1	1	x	.....y
A2	1/x	1	.....z
A <sub>n</sub>	1/y	1/z	.....1

Pair-wise comparison

Intensity of Importance	Definition
1	Equally important
3	Moderately more important
5	Much more important
7	Immensely more important
9	Entirely more important
2,4,6,8	Interior values

Source: Saaty (1980)

- iii. In the third step, normalization of each matrix is used to find the relative weights. The relative weights are given by the right eigenvector (Lambda max), as:

$$Aw = \text{Lambda-max} \times \text{relative weights}$$

- iv. The final step is to check the consistency level. The calculation of the Consistency Index (CI):

$$CI = (\text{Lambda max-n}) / (n-1)$$

We obtained the Random Index (RI) is obtained by [Saaty and Forman's scale \(1993\)](#)

N	2	3	4	5	6	7	8	9	10
RI	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.51

Source: [Saaty and Forman \(1993\)](#)

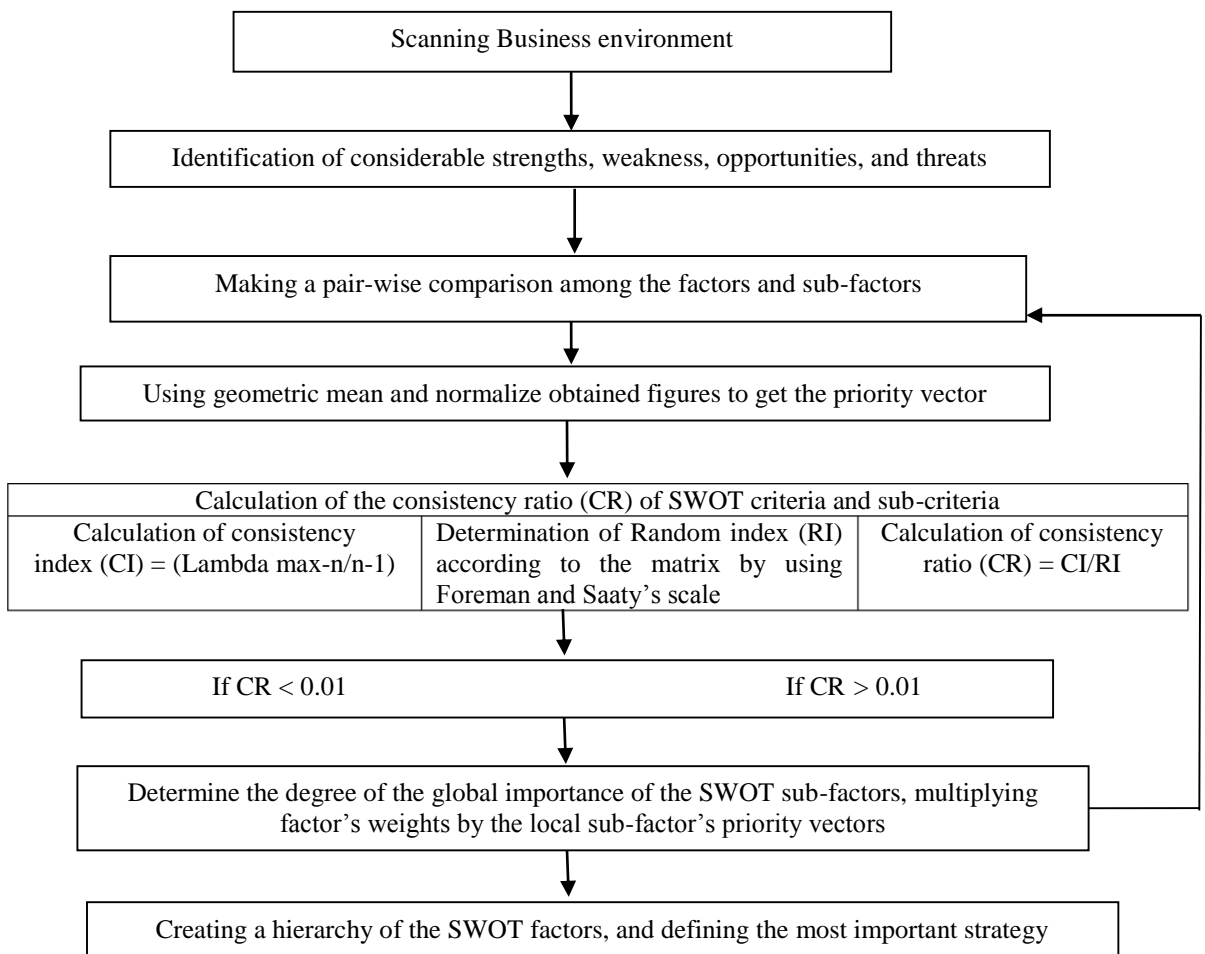
Consistency Ratio (CR) = Consistency Index (CI) /Random Index (RI)

If CR < 10%, then the decision maker pair-wise comparisons are relatively consistent. If CR > 10%, then inconsistency exists in decision maker evaluations.

At the last stage, the overall priority vector is calculated by multiplying the factor's local weights by the specific group weight to find out the priority ranking of SWOT factors.

#### 4. CONCEPTUAL FRAMEWORK

The following conceptual framework has been illustrated after rigorous literature review which will lead to exploring strategic options for the pottery industry development.



## 5. COMBINED AHP-SWOT IN POTTERY INDUSTRY

Selecting appropriate strategies is very important for the pottery industry in the Barishal Division. Here SWOT analysis in combination with AHP is utilized for the selection of the best strategy for the pottery industry in the Barishal Division. Pre-survey, In-depth Interviews and four Focus group discussions were performed to identify the internal (Strengths, Weakness) environment and the external (Opportunities, Threats) environment of Palpara (Bauphal) of Patuakhali district and Kalaskathi (Bakergong) of Barishal district under Barishal Division in Bangladesh during January-April, 2019. In this study, firstly strength, weaknesses, opportunities, and threats of the pottery industry in the Barishal Division were identified and then pair-wise comparisons were determined. In this way, we identified five strength, five weaknesses, four opportunities, and four threats.

**Table 1: SWOT Matrix of the pottery**

Strength	Weakness	Opportunities	Threats
S1 = Availability of resource	W1 = Insufficient Technology	O1 = Increasing international reputation as eco-product	T1 = Competition
S2 = Availability of skilled craftsman	W2 = Poor coordination with the local administration	O2 = Increasing reliability in the marketplace	T2 = Changing international market
S3 = Innovative capacity	W3 = Inadequate Marketing Promotion	O3 = Increasing government intervention	T3 = Negative perception regarding safety and security
S4 = Quality of the product	W4 = Lack of the facility to work in the rainy season	O4 = Increasing demand for household and interior decoration's usage	T4 = Modernization of alternative industry
S5 = Good Benefit-Cost Ratio (BCR) comparatively	W5 = Inadequate training facilities		

Source: Field Survey, 2019

## 6. DATA ANALYSIS

In this study, we made the pair-wise comparison of the SWOT groups using Saaty's (1980) scale. The value of comparison tables is shown in the appendix. We performed Focus Group Discussions (FGD) to make all pair-wise comparisons of this analysis. We entered data obtained from Focus Group Discussion in excel to prioritized using the Multiple Attribute Decision Making (MADM) approach (AHP method).

## 7. RESULTS AND DISCUSSIONS

In this study, significant strategic forces were ascertained in the pottery industry in the combined SWOT-AHP method. The SWOT group priority rank: Strengths-44.25%, Weakness-16%, Opportunities-30%, and Challenge-9%. According to this analysis, the most significant factor in the SWOT group is competition from threat groups. The overall priority vector is 1.98. In Kalaskathi and Bauphal, most of the family members are leaving countries because of their failure to cope with the competition. In the case of the manufacturing firm (Görener *et al.*, 2012) combined AHP-SWOT also showed that the most significant factors were rising of living standards and modern equipment from the opportunity's group. In Strength's group, the most important factor is the innovative capacity (0.34) of the potter, and artisans. They have innovative capacity but due to some constraints, this is also going in vain. Most of the potters said, they are finding it difficult to afford the cost of clay, coal, labor and other materials. Maximum potters have no modern equipment. In Bauphal, only a few families have some modern machinery. However, in



Kalaskathi, nobody has any kind of modern equipment. Because of these constraints, they cannot apply their innovative capacity in the production process.

In the weakness group, poor coordination in administration (0.26) is considerable. In Kalaskathi, potters said that the government does not provide any supportive facility to carry out their profession. At the time of shipping their products, they face some problems. In Bauphal, at the time of clay collection, local police deter them from collecting clay. They have a negative perception of safety and security about the canal. However, according to the potter of Bauphal Upazilla, there is no risk to the environment.

In the opportunity's group, the most significant factor is improving reliability in the marketplace (0.29). Potters are working their best to enhance reliability in the national and foreign market. Based on this intimation potter must adopt substitute plans and select the most desirable strategy according to its demands. The concern authority should restructure the pottery industry i.e. its mission, vision and goal to cope with competition and save them from disappearing.

## 8. CONCLUSION

Pottery is one of the primitive sectors in Bangladesh. Poor and unemployed people are becoming self-dependent (Survive driven) through pottery activities in rural Bangladesh. Potters of the study areas have the innovative capacity, expert artisan but are bound with a lot of difficulties. They are suffering from insufficient technology, modern equipment, and inadequate training facilities. Competition from structured organizations hinders them from making a profit. Besides, many pottery families are disappearing because of substitute products occupy the market. Integrated SWOT-AHP brought up a structured way and analytical means for pottery resurrection strategic planning. Despite many constraints, reliability in the marketplace is increasing day by day because of the pro-environmental and quality products in the industry. The use of AHP-SWOT has assisted in realizing the idiosyncrasies of pottery industry qualitatively and quantitatively. Finally, to revive this sector, the government and private organizations are needed to follow policies guidelines of this research in decision making and policies formulation for the pottery industry development.

### 8.1. Policy Implications

From the analysis, some policy implications for overcoming the constraints of the pottery industry have been pointed out below-

- Many potters of the study areas are leaving their profession because of inconsistency in their supply-demand coordination and new generations are reluctant to develop their career as a potter. The entrepreneurial opportunities of this industry need to explore and let to know the members of potters families. Notably, they face difficulties at the time of collecting clay from the canal. The local administration restricts them because of their anxious about the safety and security of the environment. Thus, the local administration should inform them about the appropriate sources and collecting approach of the clay.
- Many potters suffer from working capital. Due to working capital, they cannot expand their business. The government organization such as BSCIC should provide a special financial assistance for the pottery sector like as the agriculture sector.
- Many potters said that they do not have a training facility in locally. Sometimes it becomes difficult, especially for women to get need-based training from remote places. The concern government organization should arrange regular training programs in the Barishal Division to train them to make world-class products. Besides, BSCIC, BARD, SME Foundation Bangladesh, PKSF and other government and non-government organizations (NGOs) such as Banglacraft, Aarong, Caritas, Heed Bangladesh should provide training facilities to enhance their innovativeness and capability to add value to their existing products or to design new products.

- Potters of the study areas said that they do not find any special loan facility. The Bank, NGO, and other financial institutions should provide loan support with a small interest rate. This will help them continue and expand their business.
- Most of the potters use traditional equipment to produce pottery. It is costly and time-consuming. Most of the potters should use modern equipment to increase production rates and improve product quality.
- The ICT division should provide support such as training on e-business, e-marketing to operate their business in the digital market. It would be an effective approach for entrepreneurs to receive and delivery of the order from the rural area.
- Export promotion bureau (EPB), SME Foundation, and local administration should organize product exhibition or trade fair at home and abroad. Besides, they can also organize awareness programs highlighting the bad effects of plastics products on environment and motivate people to purchase environmental friendly products such as diversified pottery products.

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### Appendix

**Table 2: The pair-wise comparison of strengths, weaknesses, opportunities and threats (SWOT) groups**

	S	W	O	T
S	1	2.71	1.86	4.36
W	0.37	1	0.34	2.45
O	0.54	2.94	1	2.63
T	0.23	0.4	0.38	1
SUM	2.14	7.05	3.58	10.44

Source: Field Survey, 2019

**Table 3: Normalized value of SWOT factors**

	S	W	O	T	PV
S	0.46	0.38	0.51	0.42	0.4425
W	0.17	0.14	0.09	0.24	0.16
O	0.25	0.42	0.28	0.25	0.3
T	0.1	0.06	0.1	0.1	0.09

Source: Field Survey, 2019

**Table 4: Priority vector of SWOT factors**

	S	W	O	T	PV
S	1	2.71	1.86	4.36	0.4425
W	0.37	1	0.34	2.45	0.16
O	0.54	2.94	1	2.63	0.3
T	0.23	0.4	0.38	1	0.09
SUM	2.14	7.05	3.58	10.44	
SUM*PV	0.94	1.13	1.07	0.94	
Lambda Max	4.08				
CR	0.03				

Source: Field Survey, 2019

**Table 5: Pair-wise comparison of the SWOT sub criteria- strength**

	S1	S2	S3	S4	S5	PV
S1	1	1.57	2.06	3.66	2.91	0.34
S2	0.64	1	2.21	3.31	2.06	0.27
S3	0.49	0.45	1	1.57	3.31	0.176
S4	0.27	0.3	0.64	1	3.66	0.132
S5	0.34	0.49	0.3	0.27	1	0.08
SUM	2.74	3.81	6.21	9.81	12.94	
SUM*PV	0.93	1.03	1.09	1.29	1.04	
Lambda max	5.38					
CR	0.08					

Source: Field Survey, 2019

**Table 6: Pair-wise comparisons of the SWOT sub criteria- weakness**

	W1	W2	W3	W4	W5	PV
W1	1	1.32	1.57	0.84	1.11	0.23
W2	0.76	1	2.06	2.06	1.32	0.26
W3	0.64	0.49	1	1.32	0.76	0.15
W4	1.19	0.49	0.76	1	0.64	0.16
W5	0.90	0.76	1.32	1.56	1	0.20
SUM	4.49	4.05	6.71	6.78	4.82	1.00
SUM*PV	1.02	1.05	1.02	1.06	0.99	
Lambda-max	5.14					
CR	0.03					

Source: Field Survey, 2019

**Table 7: Pair-wise comparisons of the SWOT sub criteria- opportunity**

	O1	O2	O3	O4	PV
O1	1.00	0.90	1.46	0.76	0.25
O2	1.11	1.00	1.11	1.86	0.29
O3	0.69	0.90	1.00	2.59	0.28
O4	1.32	0.54	0.39	1.00	0.18
SUM	4.11	3.34	3.95	6.21	
SUM*PV	1.03	0.96	1.09	1.15	
Lambda- max	4.23				
CR	0.09				

Source: Field Survey, 2019

**Table 8: Pair-wise comparison of the SWOT sub criteria- threat**

	T1	T2	T3	T4	PV
T1	1.00	3.66	2.06	1.19	1.98
T2	0.27	1.00	0.97	0.71	0.74
T3	0.49	1.03	1.00	1.97	1.12
T4	0.84	1.41	0.51	1.00	0.94
Sum	2.60	7.10	4.54	4.86	
Sum *PV	1.04	1.08	1.09	1.02	
Lambda- max	4.22				
CR	0.08				

Source: Field Survey, 2019

**Table 9: Overall priority scores strengths, weaknesses, opportunities and threats (SWOT) analysis**

SWOT	Group-wise Priority	Factors	Priority vector within the group	The overall priority vector	Rank
Strengths	0.4425	Innovative capacity	0.34	0.15	1
		Availability of expert artisans	0.27	0.11	2
		Resources and skills availability	0.176	0.08	3
		Product quality	0.132	0.05	4
		Good Benefit-Cost Ratio (BCR)	.08	.04	5
Weakness	0.16	Insufficient Technology	0.23	0.037	2
		Poor coordination in administration	0.26	0.041	1
		Inadequate Marketing Promotion	0.15	0.024	5
		Lack of shed facility to work in the rainy season	0.16	0.026	4
		Inadequate training facilities	0.20	0.032	3
Opportunities	0.3	Increasing international reputation	0.25	0.075	3
		Increasing reliability in marketplace	0.29	0.087	1
		Increasing government intervention	0.28	0.084	2
		Increasing demand for household and interior decoration's usage	0.18	0.054	4
		Competition	1.98	0.18	1
Threats	0.09	Changing international market	0.74	0.067	4
		Negative perception regarding safety and security	1.12	0.10	2
		Modernization	0.94	0.08	3

Source: Field Survey, 2019