



Design and Economic Analysis of a Floating Self-Propelled Convention Center in Bangladesh

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ABSTRACT

Convention centers are a noteworthy establishment of every society that is widely used to host various programs. In the perspective of Bangladesh, with its huge populace, convention centers are evident everywhere due to quite a high number of the events. But these convention centers are riddled with issues like difficulty in renting the convention center at the preferred time on an affordable budget. Often, the situation presents itself as the following dilemma, choosing a well reputed and well-furnished convention center with proper amenities by waiting a long time (around 6-12 months) with a huge sum (2-5 thousand US\$) or sacrificing any or all aspects of required amenities just to meet the preferred time or budget. In short, not only an acute shortage of aesthetic convention centers in Bangladesh exists, under a reasonable budget and availability; such modern convention centers are not being established either on a noteworthy basis. Here the maritime industry can penetrate the market of convention centers. By designing a vessel specialized for hosting events, it presents itself as an attractive offer to many people looking for their perfect venue. A floating self-propelled convention center has many lucrative features as a venue. For instance, a venue on a journey by river offers a unique experience that is impossible for a land-based convention center. Furthermore, if costs can be managed and a reasonable rental price can be offered there will be no shortage of demand. This paper explores the potential popularity and feasibility of this venture through comprehensive surveys, designing an appropriate vessel and performing an economic analysis to show that it is quite a viable business opportunity that requires further attention, in the form of a pilot project.

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1. Introduction.

Convention centers are popular venues for hosting community events like wedding ceremonies, corporate outings and seminars. Bangladesh being a densely populated country implies the need for a large number of such convention centers. But there is great deal of concern in the minds of people who are looking for the perfect venue for the desired program. This is because not all of the convention centers are up to the mark. To elaborate, some are ill-maintained and ill-managed while another few don't have the required amenities required to host the

desired event. On the other hand, the convention centers that are well-managed and well equipped have their rental prices so high that the majority of the demography cannot afford them. Furthermore, the waiting period of such venues start at a minimum of 3 months if luck favors and can lead up to 2 years. As such, more often than not, it is impossible to avail the services of these highly valued convention centers. Thus almost always, the customers of the convention center service can never get their desired combination of price, date and amenities required to fully enjoy the program. They are forced to make a compromise on one or couple of the aforementioned three attributes. To add to that, new modern and affordable convention centers are not being built on a regular basis that can revitalize the existing stagnant situation. Therefore, there is a dire need of rejuvenating the current scenario.

Surprisingly, the maritime industry can penetrate this mar-

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ket. By constructing a vessel that can effectively host the programs like weddings, seminars, picnics, etc. a new genre of convention centers can be established, the floating self-propelled convention center. On top of being just a new option, the floating self-propelled convention center has many advantages when compared to a conventional land-based convention center. For example, an event in the middle of a river journey can provide a much more unique and scintillating experience for a wedding program that cannot be found even in the most sophisticated of land-based venues. This aspect can attract customers in plenty because when choosing a venue, the experience a venue can provide to enjoy the event is given utmost priority besides budget. To add to that, Bangladesh being a riverine country with a huge demand for wedding and seminar venues positions itself as an excellent and most favorable candidate where the venture of self-propelled floating convention center can succeed should the pricing be positioned as affordable as reasonably possible.

To add to the unique experience, the changing trends in wedding ceremonies also provide a good pretext as to why this new prospect has more chances of being successful. Previously, the trend of wedding ceremonies was a more family-centered wholesome programs that usually took place at the home of the bride or a nearby convention center while the reception ceremony, in a similar fashion, took place at the home of the groom or a nearby convention center. In short, only the family aspect was given priority while the aesthetic element of the venue was mostly neglected. But that was at least a couple decades ago and since then the trend has largely shifted to a more wedding couple-centric marriage ceremony unlike the entire family centered ceremony of the past. Nowadays, the couple wish for a memorable ceremony in a more aesthetically pleasing venue. For this purpose, renting an aesthetically pleasing convention hall with good decoration, enough space to accommodate the invited people, etc. are highly sought for. In this respect, the prospect of the floating self-propelled convention hall is already a lucrative offer to the wedding couple as the scenic beauty the vessel will provide cannot be found in any land-based convention center. Furthermore, for seminars on topics related to climate, river erosion, environment, etc. the background setting on a river journey will help instill the importance of the topic even more than what would have been possible on a more traditional center on land. Besides, as a picnic or a corporate gateway, the new experience can be a very nice change to the monotonous nature of the more conventional venues.

2. Present Scenario of Bangladesh.

The clientele wishing to reserve their ideal venues currently confront a serious problem in the context of choosing the location for wedding celebrations. They frequently discover that their preferred community center is either fully booked and they have to wait a long time to acquire a date there or that it would be too expensive to book there, forcing them to explore elsewhere.

Additionally, wedding and other event patterns are evolving as a result of the changing times. As a result, an immersive environment's aesthetic component and experience have

taken precedence. To back up this claim, wedding photography's development demonstrates once more how weddings have changed from being centered on the union of two families to a much more personal setting between the wedding couple. The convention center's aesthetic quality is a key factor to take into account in order to emphasize this part of weddings.

In another situation, the recent lockdown brought on by the corona virus outbreak had a profound and long-lasting effect on the populace. One of the main concerns for people today is their health and cleanliness. As a result of their reputation as unsanitary, several of the current convention venues are currently losing patronage. Additionally, people's preferences for venues for important events are evolving. People have been effectively taught the value of fleeting moments by the lockdown. People now want to have memorable experiences; thus, they seek out individuality. One of them would undoubtedly be a wedding between a couple in a beautiful place like a river with the sun setting.

With a minimum draft of 1.5 meters and a navigable waterway length of 5968 kilometers (about 3708.34 miles) in the monsoon and 3865 kilometers (about 2401.6 miles) in the dry season, Bangladesh is a riverine nation. The majority of the country's cities can utilize the service of self-propelled floating convention halls. The majority of the market should have access to this service in order to benefit from this element and keep cost in mind. Therefore, it is important to prioritize appealing to middle-class demographics during client segmentation rather than only the top class.

3. International Scenario.

There are many other styles of wedding reception programs visible when looking outside Bangladesh. Taking destination weddings as an example. Additionally, ship weddings are becoming more and more common. Additionally, over the past ten years, the market for wedding tourism has grown due to a variety of factors, such as cheaper prices than domestic weddings, more frequent foreign flights, and a gradually declining cost of getting married abroad. Furthermore, seminars are given in settings that give the subjects they are covering a fully immersive experience for the attendees. For instance, conferences on climate change and sea level rise are conducted in the nations that will be most severely impacted. Such a conference was held on 17th October 2009 in the form of an underwater cabinet meeting between the then President of Maldives and 13 government officials in Girifushi, Maldives.

4. Methodology.

An extensive amount of data is collected through various means including comprehensive literature reviews, surveying of potential stakeholders in the potential venture, route, demography analysis, etc. Stakeholders, namely people who are looking to get married, and their concerned relatives, were approached and a detailed survey is conducted. Furthermore, other primary stakeholders, for instance, various multinational companies, banks, etc. are approached about another survey regarding

a potential seminar hosting conference or a picnic spot is also carried out. Moreover, shipyards are visited along with contacting manufacturers of ship parts in order to account for construction cost of vessel. All of these count for primary data. As for secondary data, the market situation around convention halls, marriage, seminar halls, picnic spots, etc. is carried out. Furthermore, information on wedding trends, the importance of the environment in which the seminar or conference is conducted, etc. is taken from the detailed literature review and article review. A professional attitude is ensured in the collection of data through the above-mentioned methods.

Afterwards, the data is analyzed and the requirements for an appropriate vessel that can serve the purpose effectively is set. Following, a preliminary vessel design is carried out.

Then, an economic analysis is carried out utilizing the expected cost obtained from vessel design, determining operating cost and setting a competitive rental fee. The criteria of analysis are Net Present Value. Net present value (NPV) is the present value of difference between cash inflows and cash outflows over a period of time after discounting them.

$$NPV = \frac{Cash\ flow}{(1 + i)^t} - initial\ investment \quad (1)$$

where:

i = Required return or discount rate.

t = Number of time periods.

After coming to a decision regarding the profitability of the venture by judging the obtained NPV, a sensitivity analysis is carried out by regression analysis. Sensitivity analysis is a method of determining how the key economic parameter is influenced by changes in some key variables. For this venture of self-propelled floating convention center, the key variables include the number of event bookings per month, discount rate and fuel price.

5. Survey.

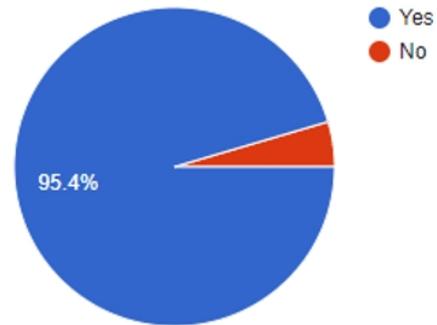
To get an initial understanding of the rich prospect of the venture of a Self-propelled floating convention vessel, an extensive survey is conducted to assess the demand. A total of 2032 participants filled out the survey form.

Figure 1 represents the position of the participants in considering the self-propelled floating convention vessel as an alternative to existing convention centers. It is seen from Figure 1 that about 95.4% of the respondents are positive.

Figure 2 illustrates the perspective on whether the self-propelled convention vessel is a suitable venue for hosting marriage ceremonies. From Figure 2, it is noticed that about 89.1% of the participants think so.

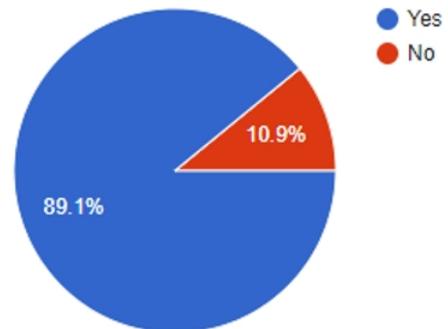
Figure 3 depicts the opinion on whether the self-propelled convention vessel is a suitable venue for hosting picnics and seminars. It is seen from Figure 3 that about 93% of the participants find it suitable.

Figure 1: Capability of Self-propelled floating convention vessel as an alternative to traditional convention centers.



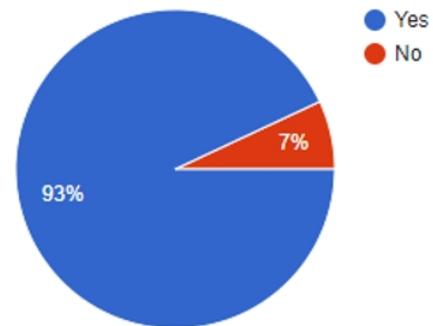
Source: Author.

Figure 2: Suitability of self-propelled convention vessel for hosting marriage ceremonies.



Source: Author.

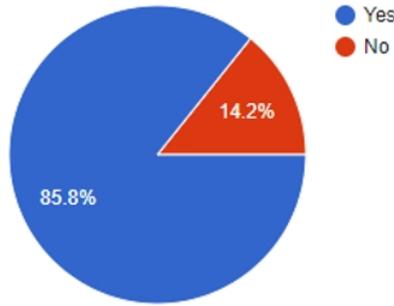
Figure 3: Suitability of self-propelled convention vessel for hosting picnics and seminars.



Source: Author.

Figure 4 shows whether the potential customers are willing to pay an extra amount of money (about 5 ~10 thousand Bangladeshi Taka) to acquire the venue provided by a self-propelled floating Convention Vessel. About 85.8% of the participants are willing to pay additional amount which is shown in Figure 4.

Figure 4: Willingness to pay additional amount of cost for the use of self-propelled convention vessel.



Source: Author.

From the survey results shown in Figures 1-4, it is noticeably clear that the self-propelled floating convention vessel has garnered interest in the sample space of the surveyed lot. Participants of the survey have also agreed to pay a definite amount greater than what they would pay traditional convention halls of similar capacity provided that the pricing is made affordable.

6. Subsequent Design.

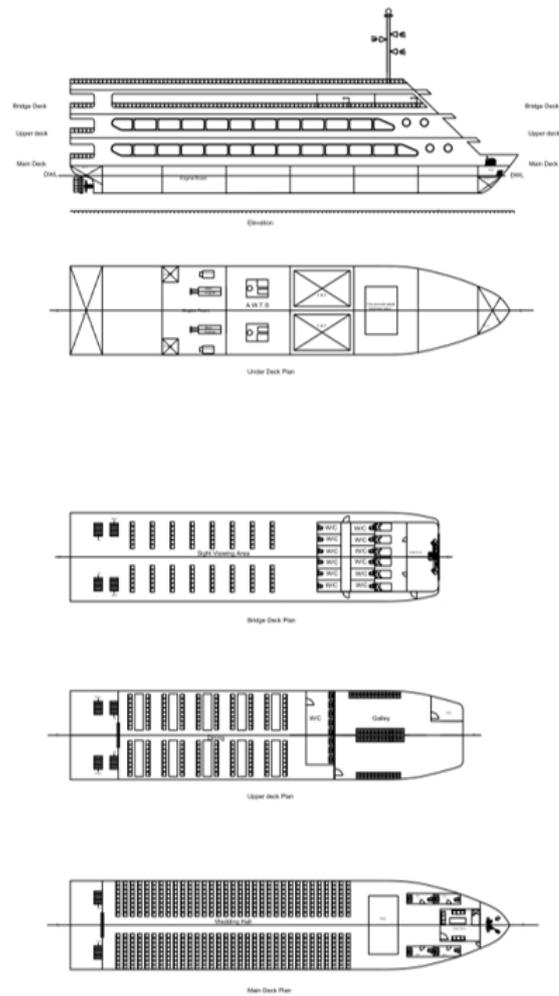
The actual design of a vessel that is well-equipped with the facilities required for the service sought by the customers is the next major obstacle to the fulfillment of this endeavor. That is, in terms of the vessel’s overall layout, she must be able to accommodate a number of guests as needed, host the event for a specified period of time, provide adequate space for the event to occur, and have the necessary kitchen space for the required amount of food preparation and other necessities as needed for the event. Furthermore, the vessel must also meet the stability criterion of International Maritime Organization (IMO) and vibration guidelines of international classification society in order to ensure the safety and comfort of the people aboard the ship. Keeping all these aspects in mind a preliminary General Arrangement (GA) Plan of the vessel is developed, which is shown in Figure 5. Table 1 shows the principal particulars of the vessel.

Table 1: Principal particulars of the Vessel.

Item	Symbol	Value	Unit
Length Overall	L _{OA}	56.03	[meter]
Length Between Perpendiculars	L _{BP}	51.00	[meter]
Breadth Moulded	B _{MLD}	11.10	[meter]
Depth Moulded	D _{MLD}	3.40	[meter]
Draft Design	T	2.20	[meter]
Block co-efficient	C _B	0.61	--

Source: Author.

Figure 5: General Arrangement Plan.



Source: Author.

7. Economic Analysis.

With data obtained from the design, customer responses as to how much they are willing to pay for availing the venue offered by a floating self-propelled convention center and investigating the state of the market for operational cost, a preliminary economic analysis can be conducted.

Table 2 is a breakdown of the cost of construction of the vessel as designed above. The highest expenditures include cost of procuring steel, hull fabrication and overhead costs. To ensure safety standards, due attention is provided to have enough life-saving appliances, fire-fighting equipment, etc.

Thus, it is evident that the total cost of construction of a vessel that is to be employed for the venture will cost a little more than **706 thousand US dollars**. The next data required to carry out the analysis is operational cost. It is assumed that there will be **16 events in total per month** and the vessel will be operational for a total of **5 hours per event**. Furthermore, the specific fuel consumption of the engine that is selected for the vessel is **220g/KWh**. Thus, with a total engine brake power of 550KW, fuel consumption is calculated to be **712 liters per**

Table 2: Construction Cost of Vessel.

Sl.	Item	Price (US\$)
1	Steel Cost	332940
2	Painting, Valves and Fittings	37200
3	Propulsion System	61846
4	Anchoring and Mooring System	2570
5	Navigation Lights and Siren	2346
6	Doors and Windows	1958
7	Life Rafts and Jackets	23400
8	Pumps	3980
9	Firefighting Equipment	7870
10	Accommodation	20190
11	Hull Fabrication and Overhead cost	133526
12	Waste Treatment System	2900
Total=		630725

Source: Author.

event. Accounting for monthly maintenance cost and salary to be provided to the crew Table-3 provides a summarized account of operational cost for the self-propelled floating convention vessel per month

Table 3: Operational cost for a Self-Propelled Floating Convention Center per month.

Sl.	Item	Price (US\$)
1	Fuel cost per month	10253
2	Maintenance	186
3	Salary	2976
Total=		13415

Source: Author.

Lastly, we have to account for the revenue to be obtained from the venture. For this purpose, the hiring fee per event is set at a reasonably affordable price of **1.5 thousand US dollars**. As a result, with a reasonable assumption of 16 events per month, the monthly revenue equates to **24 thousand US dollars**.

So, as mentioned above, with an outlay cost of 706 thousand US dollars, a monthly net income of around 10.5 thousand US dollars and a yearly discount rate of 10%, the **NPV obtained is almost 335 thousand US dollars**. That is, by undertaking the project we can have an instantaneous monetary gain of over 335 thousand US dollars per vessel. As such, the venture is deemed profitable.

8. Sensitivity Analysis.

At the moment, the main variables affecting NPV are identified to be the number of events per month, discount rate of the venture and the price of fuel. A sensitivity analysis is hereby carried out to determine the degree of influence of these factors over the NPV of the venture. Table-4-6 illustrates the sensitivity analysis. Here, a dataset is created by changing the **variables; increasing and decreasing by 10 percent** respectively and conclusion was drawn by a regression analysis.

$$Y = f(X_1, X_2, X_3) \tag{2}$$

Where,

Y= NPV (Dependent Variable)

X₁= Events per Month (Independent Variable)

X₂= Discount Rate (Independent Variable)

X₃= Fuel Price per Liter (Independent Variable)

Microsoft Excel is used to perform the regression analysis. It is to be mentioned here that in regression analysis, null hypothesis, H₀ is equal to zero means variable has no effect and alternate hypothesis, H_a is not equal to zero means variable has an effect.

Table 4: Data set for Sensitivity Analysis.

Events per month (X ₁)	Discount rate (X ₂)	Fuel Price (X ₃)	NPV (Y)
16	0.1	1	334305
17.6	0.1	1	579495
14.4	0.1	1	89114
16	0.11	1	271934
16	0.09	1	404014
16	0.1	1.1	217921
16	0.1	0.9	450689
17.6	0.11	1	501278
17.6	0.1	1.1	463112
16	0.11	1.1	163073
14.4	0.09	1	141112
14.4	0.1	0.9	205498
16	0.09	0.9	528805
17.6	0.11	1.1	392416
14.4	0.09	0.9	265903
17.6	0.11	0.9	610140
17.6	0.09	1.1	542125
14.4	0.11	1.1	-66271
17.6	0.09	0.9	791707
14.4	0.11	0.9	151452
14.4	0.09	1.1	16321

Source: Author.

Tables 5-7 are the results of regression analysis.

From Tables 5-8, the following points can be addressed.

1. The value of Multiple R is 0.9982, which indicates a strong correlation between the variables and NPV. As in

Table 5, the Multiple R will not tell us if the correlation is positive or negative.

2. R-Squared indicates the ‘fit’ of the model or regression line. The adjusted R-square is 0.9957, which indicates that 99.57% variance in NPV can be explained by the independent variables which was chosen.
3. The t-value and p-value illustrates that the chosen variables are highly relevant in determining NPV.

Table 5: Results of regression analysis.

<i>Regression Statistics</i>	
Multiple R	0.998184998
R Square	0.996373291
Adjusted R Square	0.995733284
Standard Error	14259.51355
Observations	21

Table 6

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	9.49659E+11	3.16553E+11	1556.81516	6.17671E-21
Residual	17	3456673351	203333726.5		
Total	20	9.53116E+11			

Table 7

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-295022.9	58297.32	-5.06	9.6536E-05	-418019.48	-172026.27	-418019.48	-172026.27
Events per month	153695.68	2425.59	63.36	1.2389E-21	148578.13	158813.24	148578.13	158813.24
Discount rate	-6601266	388094.80	-17.01	4.1469E-12	-7420074.2	-5782457.3	-7420074.20	-5782457.28
Fuel Price	-1168070	38809.48	-30.10	3.4602E-16	-1249950.75	-1086189.1	-1249950.75	-1086189.06

From the analysis, the NPV function of floating self - propelled convention center can be defined by equation (3).

$$Y = -295022.873 + 153695.6829X_1 - 6601265.741X_2 - 1168069.907X_3 \tag{3}$$

It is conclusive that the NPV of the venture is highly sensitive to all of the above variables. Among these, the venture is **most sensitive to the number of events per month** for which the vessel will be hired. So, it is of utmost importance to advertise the venture so that it attracts enough event bookings and a loss is not incurred. Moreover, if fuel price rises in the future, then the owner may have to increase the rental fee in the case that the number of events do not increase appreciably.

Conclusions.

The business venture of the floating self-propelled convention center is very unique with a multitude of advantages that

Table 8

Variables	Sign	Calculated t-value	Comparison with t-test tabular value	Status of Null Hypothesis, Ho	Effect of Alternate Hypothesis
Events per Month	X ₁	63.36	High	Rejected	Yes
Discount Rate	X ₂	-17.01	High	Rejected	Yes
Fuel Price	X ₃	-30.10	High	Rejected	Yes

Source: Author.

can be leveraged. These include, as mentioned above, are unparalleled scenic beauty, experience of river journey, beholden natural presence of forever-cherished events like wedding, etc. Adding a competitive rental fee only adds to the points leading to its potential success. And so far, as observed from the preliminary economic analysis, it promises to be a profitable business venture. Furthermore, it is to be noted that the venture is very sensitive to number of event bookings it receives among other notable ones. If the challenges associated with the venture (Time Management, Catering Management, etc.) can be well-manuevered after proper advertising and gaining customer satisfaction and acknowledgement, then the prospects of the venture remain boundless.

Recommendations.

Since the initial analysis suggests a favorable business venture so far, the next step would be to go for a small-scale pilot project to assess how accurate the analysis is so far and whether the venture truly proves to be a favorable one. Moreover, the design should also be improved if any opportunity arises. For instance, green technologies like solar panels, sails, sky-sails, etc. may be implemented. Lastly with proper marketing and advertising, the venture should be implemented in Bangladesh at first and internationally afterwards.

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