

Prospects of Underground Warehousing in Bangladesh

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Abstract

Bangladesh is now facing a provocative challenge about warehouse management due to scarcity of land along with inadequate structure, low range serviceability, the sorely high land prices and improper regulatory policy. This paper initially evaluates the feasibility and acceptability of underground warehouses in Bangladesh. A study has been conducted to collect the views of market leaders. The key findings are such underground facilities can be as functional as a respective surface one and at the same time be economically competitive. And the market leaders seem to be considering underground facilities as an alternative to conventional one. Finally, in this paper, a hypothesis is formed on factors to select a suitable location for underground warehousing. So, the paper concludes that underground warehousing can be a viable and market approved solution for the above stated facility related problems of the supply chain.

Keywords

Underground Warehouse, Supply Chain, Inventory, Bangladesh

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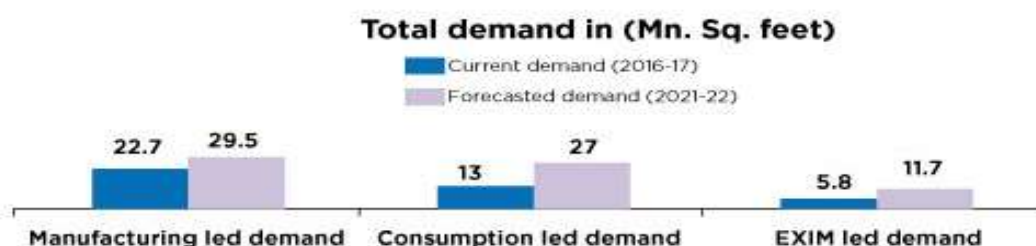
We would also like to show our gratitude to anonymous reviewers for their so-called insights, although any errors are our own and should not tarnish the reputations of these esteemed persons.

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Introduction

The warehousing market in Bangladesh is largely fragmented and consists of small-scale operations that are predominantly managed by end-user industries which are either owned or rented on long term lease. And, more than 95% of all warehouses (other than Government-owned) in Bangladesh are captive warehouses. In the current scenario of Bangladesh, leasing model is competitive since it ensures greater capacity utilization of space, specialized offerings-led better services, intensive focus on core activities like product quality and delivery by manufacturers rather than non-core business besides better utilization of scarce land currently occupied by captive facilities. But, all the studies in recent years are showing the requirements of warehousing space to grow. According to a study of 2016, the result shows this scenario:



Since Bangladesh is at the critical juncture of inclusive trade and economic development momentum, the demand for a bespoke logistics facility is mounting. Additionally, the trend rapid transformation of SME into diversified businesses requires ensuring a bundle of logistics competence to help thrive and strengthen our trade landscape. In 2018, the World Bank conducted a survey on “Bangladesh logistics study: key issues, prospects and priorities”. According to their findings, Bangladesh will need 26.74 million square feet of additional warehouse in the next four years to keep up with our economic growth. Currently, the demand for warehouse space, mainly for storing imported and exported goods near ports, is 41.5 million square feet, according to the preliminary findings. Moreover, the whole world foresees Bangladesh becoming a developed economy by 2041. Hence, a greater leap forward in our logistics ecosystem is critical to calibrate our development visions in marking a real impact in the global level-playing field.

Again, land prices in town centers and economic zones are high in relation to the permitted building volume. Because many storage facilities must be located fairly close to the town center. Recently, due to Covid-19 situation, e-commerce is flourishing in the country and these businesses are requiring more warehousing space. But the warehouse rent is too high for them to access and hence acting as a hurdle to these newly emerging businesses.

Now two problems can be pointed out. There is not enough space to meet the ever-increasing warehouse and inventory requirements. And local and international companies operating in Bangladesh can hardly bear the over-and-above cost of land while ameliorating the existing supply chain.

This paper investigates the answer to the mentioned concerns by exploring the expediency and practicality **Underground Warehousing**. Underground warehouse refers to warehouse space situated beneath the ground. These facilities in appropriate allotments can avail the same facilities as the conventional ones and in some cases are able to hold the levels of technology required for more advanced supply chains in which Bangladeshi industries are already interested in. Underground warehousing is an alternative to traditional aboveground warehouses, which are growing in cost and “just-in-time” delivery. It is primarily popular because it provides a means to keep transportation-affiliated costs down. The high ceilings (typically 20 feet or more in height) allow for various stacking options. The underground warehousing of Kansas City of the United States of America highlights one of the main benefits of underground warehousing – cost. Underground space is reportedly around \$0.50 cheaper per square foot than the \$4 average above ground in Kansas City.

Underground warehousing has not yet been our regular warehousing system. Thereupon, it can have both unambiguous merits and demerits. For this reason, this research focuses on the investigation to observe and detect whether this is suitable exposition under the existing and presumable conditions of Bangladesh. And if it is, the next question follows as to how it will impact the emerging supply chain management in and between the local and to some extent the multilateral businesses and industries of the country along with the probabilistic approach towards the implementable places of the suggested underground warehousing infrastructure upon considering the exclusive variables of Bangladeshi landscape and industry requirements.

Value of the Study

In urban and semi-urban areas of Bangladesh resources as space and the ability to adjust infrastructure are scarce. For example, **the scarcity of physical space** in cities causes high land prices and development costs, making urban city sites difficult to have warehouse spaces. Knowing that the growing middle-class consumers are not always willing to pay more, this poses many challenges for the still growing supply chain of Bangladesh.

Moreover, logistic movements that relate to **increased fast-paced activities** from **port to manufacturing zone to inventory to selling point** contribute to the viability of businesses. The increased traffic movements not only cause traffic congestion but are also polluting to the

environment. These happen because **warehouses are not in the optimum places** for the raw materials coming and finished products going out.

As a result, both the businesses, industries and government struggle with the question on how to set up next-generation urban logistics and where to set it as there is severe lack of on ground spaces. The existing properties (on ground warehouses and spaces) in question are either much differentiated, too static or on wrong location, to contribute maximally to the supply chain.

One of the few viable solutions for these complications can be having **underground warehouses in optimal locations**. Therefore, this research comes into existence to try to understand the need of underground space as warehouses particularly in Bangladesh and whether it is a **feasible complementary alternative of space-scarce on ground warehouses** or not.

A Preliminary Literature Review

This literature review follows a methodological approach **to find the prospects of underground warehousing** in an emerging Supply chain renovation scenario **in the context of Bangladesh**.

Heretofore, there have been analytical and methodological researches published which reinforced the necessity and feasibility of underground warehousing in connection with intelligent measurement and control systems. Further studies involved warehousing guidance, access mode and transmission system, data integration ⁽²⁾ in this framework **on the basis of countries already in entrenched position, i.e. European Scandinavian Countries**.

Quite the opposite scenario was observed in the light of this research when considering developing countries with emerging or semi-established supply chain management in their industrial framework. More often than not, countries like Bangladesh who are obtaining technological and industrial blooms with concentrated infrastructure planning need to focus on making every element of the supply chain to be upheld to make the progression perpetual and sustainable. Notwithstanding, there have almost no notable works done centralizing developing economies especially South Asian countries.

On that account this research **uniquely focuses on the prospects of underground warehousing in Bangladesh while being on the lookout for the viable options for such settlements**. The investigative nature of this paper addresses some of the **exclusive constraints of this particular region**, namely, the lack of space for inventories for the local industries, port to warehouse distancing, longer lead times in supplying and at the very least the ever-increasing population needing more and more space in the industrial and port regions of this country.

Objective

The main objective of this study was to explore the possibilities and check the feasibility of underground storage facilities for inventory management in the context of Bangladesh. It investigates the lurking opportunities in different sectors and suggests probable areas to implement and build the infrastructure as the scarcity and demand for surface area in case of warehousing keeps on increasing. The aims of the study can be explained as follows:

1. To assess the possibility and feasibility of **underground warehousing in the context of Bangladesh**. In this study both the situational demand and the industry leader's perspective has been taken into consideration. The study shows the market leaders' view on underground warehousing.
2. To identify the potential area and location for underground warehousing systems to be implemented. As our upper ground area is not going to expand, this study has worked on finding pertinent areas for warehousing to minimize lead time and maximize customer satisfaction.

Research Questions

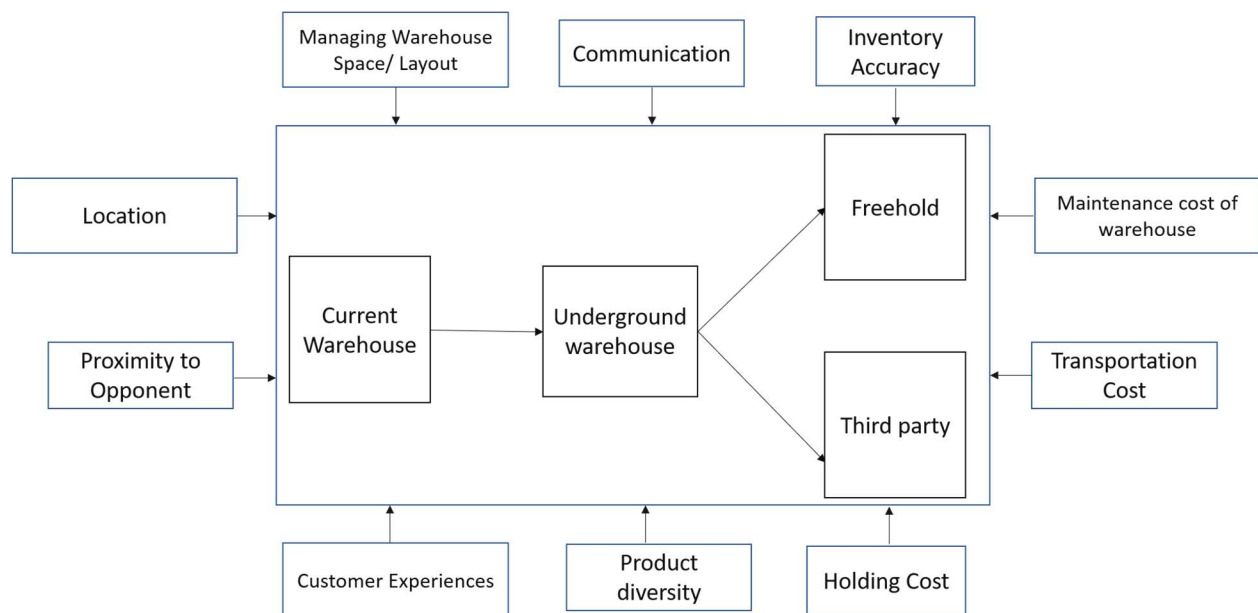
The main concept of the paper is to assess the possibility and feasibility of **underground storage facilities for inventory management in the context of Bangladesh** with three strategic questions. Hence, this research intends to find the following queries-

1. Is underground warehousing feasible for Bangladesh?
2. What will be the benefits of underground warehousing in smoothening the flow of supply chain management?
3. What could be the probable locations for setting up underground warehouses to maximize supply chain and industry outputs?

Hypothesis

This research is basically optimizing the warehouse considering the space scarcity in Bangladesh. The concept of this research can be divided into many studies a final valuable output can be obtained.

First a study needs to be considered only analyzing the problem of current warehouses, why there are risks of warehouse construction spaces overall. Then our main hypothesis is to build and collocate underground warehouses to leverage the effectiveness of it and solve the location issue. After that more studies should be done finding the compatibility of freehold underground warehouses and third-party warehouses.



These studies should be done placing the variable mentioned below:

1. **Location:** After measuring the competence value of constructing underground warehouses on a specific location. When choosing a warehouse location, research the demographics

and focus on educational attainment, population characteristics & income levels. There should also be findings of proximity whether it should be at a production unit or selling unit or near a port area. The creation of availability should be the main concern here.

2. **Communication:** Safe work space implementing tools and technologies and necessary protocols which will be more accurate and reliable to access information access.
3. **Managing warehouse Spaces and layout:** The first objective should be the reduction of any cross-flow crashes and potential traffic. Affordable maximization with defined objective and specific inventory needs to be contemplated.
4. **Inventory Accuracy:** The effective or accurate inventory can be verified through right processes and proper management procedure. Prime Usage of space and equipment with finest better order and demand management is the basic requirement.
5. **Maintenance Cost of Warehouse:** Accurate design about strategic characteristics of warehouse facilities and compiling a proper and regular preventive maintenance are prerequisite. Construction compatibility and freight transition are a relevant factor of breakdown maintenance because of impairment.
6. **Holding Cost:** Holding costs are the enumeration of the price of goods damaged or spoiled storage space, labor, and insurance. Strategic downturn of these costs to avail cashes for other purposes is the current urge of a business
7. **Transportation Cost:** Transportation cost is a significant cost of supply chain management. As the strains of transportation are increasing day by day it is one of main challenges to deprecate any kind of uncertainty and risk to transportation decisions.

8. **Customer Experiences:** Delivering customer promises is the most highlighted part of the whole supply chain management. There should be enough flexibility with proper responsive manners to ensure customer satisfaction and create brand value.
9. **Product Diversity:** Allocation of products is essentially dictated by designing network processes and significant operational framework with segmentation highlighting product value density and availability.
10. **Proximity to Opponent:** The opponents of rival are best when coming up with collaboration in the warehouse, nevertheless the contiguity will dominate a better market ground for every. Scheme warehouses with reserved equal human rights will cease the probability of the rise of adjacent rivals.

Afterwards, the affinity analysis of freehold facilities whether it will cut down the space problems or the third party warehouse should be brought under consideration fortifying the variable will be a valuable exploration for the current state of Bangladesh based on both private and public ownership.

Methodology

This research methodology intended to gather data from multiple sources such as observations, documents and interview and asking questions in a semi structured manner to conduct a qualitative research on convenience and practicality of using **Underground Warehousing** in supply chain logistics in the context of Bangladesh.

The study sampled both international and local customer based business organizations (Noor group, Chevron, Kafco, Bashundhara Group etc.) which are currently registered in Bangladesh. The participants can be DGM, engineers (sub-divisional/process), directors, operation specialists etc. of the aforementioned companies.

The study was conducted online and the questionnaires (attached below) were provided in Google forms and will be mailed to the participants. The questionnaire covered both third party and free hold/ sole ownership of warehousing for the participating companies.

It was made sure everyone who participated in the study freely consented to participation, without being coerced or unfairly pressurized. They were well-informed about what participation entails, and reassured that declining will not affect any services they receive. A consent form (attached below) was mailed to them for this purpose.

This study focused on the perspective of participants on the given context and collected information and used the information in descriptive statistics which includes percentage distribution.

Conclusion

This study investigated the lurking opportunities in different sectors and suggests the probability of implementing and building underground infrastructure in Bangladesh. As the scarcity and demand for surface area in case of warehousing keeps on increasing, alternative options need to be assessed to increase the efficiency in the supply chain of Bangladesh. This study hopes to reflect underground warehousing as a possibility for a better and coherent logistic system. Lack of knowledge and research, data unavailability is a challenge in this sector for proper and thorough evaluation. More research and innovation is needed to make this concept a reality in a third world country like Bangladesh.

INFORMED CONSENT RELEASE

Investigator:

“My name is -----and I am an underground student of -----at -----
 ----. I am inviting you to participate in a research study as I am participating in a research article
 writing competition with my team of 4 members (-----,-----,-----,-----) focusing on
 Supply Chain Management in.....

Involvement in the study is voluntary, so you may choose to participate or not. I am now going to
 explain the study to you. Please feel free to ask any questions that you may have about the
 research; I will be happy to explain anything in greater detail.

“I am interested in learning more about the **prospects of Underground Warehousing in the
 context of Bangladesh to smoothen the Supply chain drivers of transportation and inventory.**
 You will be given a set of questions in the form of interview and this will take approximately 30
 minutes of your time. All information will be kept as you will have stated with your given
 permission. If anonymous, this means that your name will not appear anywhere and no one except
 me will know about your specific answers. If confidential, I will assign a number to your
 responses, and only I will have the key to indicate which number belongs to which participant.

“The benefit of this research is that you will be helping us to understand the prospects of
 Underground Warehousing in the context of Bangladesh. This information should help us to better
 understand the feasibility of our research idea. If you do not wish to continue, you have the right
 to withdraw from the study, without penalty, at any time.”

Participant - “All of my questions and concerns about this study have been addressed. I choose,
 voluntarily, to participate in this research project. I certify that I am at least 18 years of age.

 Name of participant

 Signature of participant

 date

 Name of investigator

 Signature of investigator

 date

Questionnaire

10/9/2020 Underground Warehouse Survey

Underground Warehouse Survey

*** Required**

1. Name *
2. Company/Organization *
3. Designation *
4. E-mail Address *
5. What is the current ownership method of your warehouse management? *
 - Third Party
 - Freehold or sole ownership

Third Party Warehouse

6. Which position for inventory seems more suitable to you? *
 - at the production point
 - at the selling point
 - Other:
7. How long does each consignment stay at your inventory? *
8. What is the type of your company? *
 - Local
 - Global
9. What is the market destination of your final goods? *
 - Only Local Market
 - Both Local and International Market
 - Only International Market
10. What problems do you face due to the current warehousing system?
 - Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent

- Transportation Cost
 - Maintenance cost of warehouse
 - Other:
11. What advantages do you get from your current warehousing system? *
- Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent
 - Transportation Cost
 - Maintenance cost of warehouse
 - Other:
12. How do you get your raw materials? *
- via import
 - via local supply
13. If you are to use underground warehousing, what will be your preferred method?
- Sole ownership of warehouse
 - Warehouse sharing
 - Other:
14. Would you choose to shift towards an underground warehouse? *
- Yes
 - No
 - We had already
15. What is the reason behind your previous answer? *
16. What do you think are the advantages of sole ownership of underground warehouses? *
- Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent
 - Transportation Cost
 - Maintenance cost of warehouse
 - Other:
17. What do you think are the disadvantages of sole ownership of underground warehouses? *
- Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent

- Transportation Cost
 - Maintenance cost of warehouse
 - Other:
18. What do you think are the advantages of a third party underground warehouse?
- Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent
 - Transportation Cost
 - Maintenance cost of warehouse
 - Other:
19. What do you think are the disadvantages of third party underground warehouses? *
- Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent
 - Transportation Cost
 - Maintenance cost of warehouse
 - Other:
20. Do you think underground warehousing can be helpful for space maximization? *
- Yes
 - No
 - Maybe
21. Where do you think underground warehouses should be placed? *
- near manufacturing unit
 - near production unit
 - Other:
22. Underground warehouses should be * .
- Government Property
 - Private Property
 - Both
23. Do you think underground warehousing is a feasible option for Bangladesh? *
- Yes
 - No

- Maybe

Freehold

24. Which position for inventory seems more suitable to you? *
 - at the production point
 - at the selling point
 - Other:
25. How long does each consignment stay at your inventory? *
26. What is the type of your company? *
 - Local
 - Global
27. What is the market destination of your final goods? *
 - Only Local Market
 - Both Local and International Market
 - Only International Market
28. What problems do you face due to the current warehousing system?
 - Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent
 - Transportation Cost
 - Maintenance cost of warehouse
 - Other:
29. What advantages do you get from your current warehousing system? *
 - Managing Warehouse Space/ Layout
 - Communication
 - Inventory Accuracy
 - Customer Experiences
 - Product diversity
 - Holding Cost
 - Proximity to Opponent
 - Transportation Cost
 - Maintenance cost of warehouse
 - Other:
30. How do you get your raw materials? *
 - via import

- via local supply

31. If you are to use underground warehousing, what will be your preferred method?

- Sole ownership of warehouse
- Warehouse sharing
- Other:

32. Would you choose to shift towards an underground warehouse? *

- Yes
- No
- We had already

33. What is the reason behind your previous answer? *

34. What do you think are the advantages of sole ownership of underground warehouses? *

- Managing Warehouse Space/ Layout
- Communication
- Inventory Accuracy
- Customer Experiences
- Product diversity
- Holding Cost
- Proximity to Opponent
- Transportation Cost
- Maintenance cost of warehouse
- Other:

35. What do you think are the disadvantages of sole ownership of underground warehouses?

*

- Managing Warehouse Space/ Layout
- Communication
- Inventory Accuracy
- Customer Experiences
- Product diversity
- Holding Cost
- Proximity to Opponent
- Transportation Cost
- Maintenance cost of warehouse
- Other:

36. What do you think are the advantages of a third party underground warehouse?

- Managing Warehouse Space/ Layout
- Communication
- Inventory Accuracy
- Customer Experiences
- Product diversity
- Holding Cost

- Proximity to Opponent
- Transportation Cost
- Maintenance cost of warehouse
- Other:

37. What do you think are the disadvantages of third party underground warehouses? *

- Managing Warehouse Space/ Layout
- Communication
- Inventory Accuracy
- Customer Experiences
- Product diversity
- Holding Cost
- Proximity to Opponent
- Transportation Cost
- Maintenance cost of warehouse
- Other:

38. Do you think underground warehousing can be helpful for space maximization? *

- Yes
- No
- Maybe

39. Where do you think underground warehouses should be placed? *

- near manufacturing unit
- near production unit
- Other:

40. Underground warehouses should be *.

- Government Property
- Private Property
- Both

41. Do you think underground warehousing is a feasible option for Bangladesh? *

- Yes
- No
- Maybe

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