

Reimagining Last-Mile Delivery: Assessing the Feasibility, Cost-Reduction, and Efficiency of a University-Centric Gig Economy Model in Bangladesh

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Abstract:

The current conventional courier service industry of Bangladesh has the problem of high operating costs and complexities, ingrained inflexibilities, and so on. This paper aims to establish whether it is possible to adopt the gig economy-based delivery method using university students as the delivery channels and adopting university based distribution outlets. The paper goes on to uncover and evaluate the modern problems and expenses concerning the existing courier service in regional Bangladesh. It then goes further to establish a full model of a delivery framework for a gig economy which is anchored on the use of university students. The cost-reduction potentiality of this model that is proposed here is calculated in how much the traditional courier system might be expensive when adding to it the expenses on vehicle maintenance, fixed worker, and fuel that are not involved here. In addition, the study looks at the implications of this model on the students' performance, workload, and satisfaction level by nurturing the pros and cons of their engagement within the delivery network. The strategy also outlines a clear vision for the initiation and scaling of the gig economy-based delivery system, which will help ease the transition from the traditional courier delivery system to one that is more flexible, cost-effective, and focused on students.

Keywords : *Gig Economy, Crowdsourced Delivery, University Students, Delivery Cost Reduction, Qualitative Research, Mobile App Integration, Operational Efficiency, Traditional vs. Gig-based Models, Cost Comparison, Last-mile Delivery, Logistics Innovation, Crowdsourcing Platforms, Delivery Optimization, Transportation Economics, Sustainable Delivery Methods*

1. Introduction

1.1 Background and Rationale

Last-mile delivery is a process that involves the delivery of a particular product from a central location to the end customer's doorstep. This stage is important for the customers and usually the most expensive and time-consuming part of the supply chain(Saha et al., 2023). The delivery sector in Bangladesh has experienced substantial changes with the introduction of gig economy models. Regular delivery networks based on fixed full-time employees and a set supply chain process have been gradually supplemented or, in some cases, substituted with flexible crowd-sourced delivery methods. These models are accessible through an app, map freelance workers, or gig workers, who occasionally complete delivery tasks. These platforms have created a vibrant shift in the labor market especially for students looking for flexible jobs to undertake alongside their studies. The purpose of this research is to compare the conventional and the gig economy delivery system specifically targeting the student consumers in the context of Bangladesh.

That is why, the growing shift towards the gig economy especially in the field of logistics requires the investigation of its effects and the peculiarities of opportunities and threats of its implementation in Bangladesh. With students engaging more in these models, the purpose of these models is unclear in terms of the economic and social status of the students as well as the efficiency of the delivery systems that are implemented and their impact on the sustainability of the environment in urban delivery services.

1.2 Objectives of the Research

1. To determine the viability of and cost reduction effects of a gig economy delivery system involving university students as delivery agents with centralized distribution points on university campuses in Bangladesh.
2. Understanding and evaluating the existing problems and costs emerged with the conventional courier service in Bangladesh presently.
3. Analyze the potential influence of the suggested model on students' academic achievement, workload, and general contentment.

1.3 Scope and Limitations

This research examines delivery models in urban areas of Bangladesh, where traditional and gig economy platforms are most common. It focuses on the students who work on delivery platforms in the gig economy, their reasons, their stories, and their fates. The research makes a cross-sectional analysis of operational cost, worker satisfaction, and service quality between conventional supply systems and the gig economy.

It however has a few limitations: One weakness of the study is the fact that the study was confined to the urban areas only and this may not capture the rural areas where delivery models may take different dimensions. Also, the attention to students precludes generalization to other populations such as full-time gig-working or workers in their 'golden' years in conventional delivery positions. Finally, since the gig economy is a fluid sector, the findings might be outdoored as the sector transforms over time.

2. Literature Review

In the recent past, the use of the gig economy has become more rampant in operation; this has provided employment to many people, solved the problem of overcapacity and idle workers. The gig economy is a new paradigm of organizing employment; it provides the best scenario when people's resources can be combined and shared in order to quickly earn money (Du et al., 2018). Bangladesh's traditional delivery model has involved local restaurants to provide delivery services whereby they either use their employees or hire contract delivery service providers (Saad, 2020). On the other hand, the gig economy has provided room for broader range of delivery services through which the student and other gig workers can engage in flexible employment as they deliver various assignments across sectors inter alia; food and other products delivery hence transforming consumer experience and the delivery system at large (Saad, 2020) (Onee et al., 2023) (Singhal & Banerjee, 2022). Such a transition not only serves the corporate demand and the burgeoning consumerism trends but also liberates several students to earn their additions to the cash inflow alongside their studies, stressing on the disruptive propagation of the gig economy in Bangladesh's labor force.

Last-mile delivery, the final crucial phase of transporting goods from central hubs to end-users, has long been plagued by inefficiencies and steep expenses in Bangladesh's evolving urban landscapes (Hai et al., 2023). Data analysis revealed that while time-saving and convenience are important reasons for online shopping, other factors like the worry of receiving faulty goods, difficult warranty procedures, and expensive shipping strongly discourage customers from making these kinds of purchases (Khan et al., 2022). In Bangladesh, one of the main variables influencing consumer satisfaction is the mode of delivery. Customers want their things delivered right to their doorstep wherever in the world. It matters a great deal where the buyer chooses to purchase their goods. Customer happiness is significantly impacted by the duration of a product's delivery. (Zabed et al., 2020) Some people believe that less is better. Customer happiness is influenced even by the expense of transportation (Zabed et al., 2020). Even if online options can sometimes guarantee quality and timely delivery these charges turn of consumers away from such services (Urmi et al., 2020). Logistics management in the delivery industry focuses on minimizing supply chain risks and expenses while making sure the correct products are delivered at the right time, in the right conditions, and at the right price (IANCU, 2023). The gig economy depends on independent freelancers utilizing a variety of transportation options, whereas traditional delivery companies use company-owned assets and employ operational teams. In contrast to the more uniform fleets of traditional vehicles, the variety of

vehicles utilized in the gig economy may make it more difficult to implement regulations on models that cause pollution (IANCU, 2023).

Emerging technologies such as blockchain have further enhanced the capabilities of gig economy delivery platforms, enabling real-time tracking of orders, secure transactions, and optimized logistics management. (Onee et al., 2023) This innovation improves efficiency and builds trust among consumers and service providers, which is crucial for the sustained growth of the gig delivery market in Bangladesh, as evidenced by the comparative analysis of existing systems within the region (Onee et al., 2023). The flexibility of the gig economy provides autonomy, but it also brings with it problems like unstable income and inadequate benefits, which are particularly important for student workers (Sankararaman et al., 2024).

3. Theoretical Framework

3.1 Economic Theories Related to Crowdsourcing and the Gig Economy

In the following analysis of crowdsourcing and the gig economy, several theories derived from the field of economics will be relevant. The theory of transaction costs, for instance, holds that organizations contain the means of producing goods and services at the lowest possible cost in the course of deciding where to draw the line between in-house production and purchasing from the outside. Transaction costs are low because this type of employment platform does not require applying for a job offer and using employment contracts and rather, digitally matches delivery tasks and workers.

The other related theory I want to discuss is the labor market segmentation theory, which holds that the gig economy is a type of secondary labor market presenting low-paying job offers with employment stability and few workers' rights. This theory assists in making sense of reasons why the labor market for gig workers, students inclusive, is predatory with many of them being filtered into less secure and poorly paid positions as compared to counterparts in the conventional delivery sector.

3.2 Social and Technological Theories

It is also pertinent to understand that this research on crowdsourced delivery platforms and the gig economy, requires both social and technological theory that provides an understanding of technology's social mediation and its relationship with society and work. It is, therefore, important to use the theory of social capital to appreciate how social networks and trust are vital in the gig economy. Social capital can be defined as the resources accessible to individuals as a result of the type of relationships, trust, and norms of mutual obligation. In the context of the gig economy, particularly in reed crowdsourced delivery platforms, social capital is very relevant in the ways vulnerable workers such as students source, access, and negotiate support and reputation. For example, learners may use friends' circles to exchange experiences, understand algorithms of platforms, or find higher-paying jobs.

From a technological viewpoint, the theory of diffusion of innovations offers an understanding of the way various new technologies – the gig economy platforms in this instance – are spread and adopted in society. Relative advantage, compatibility, complexity, trialability, and observability are the components proposed by the theory as determinants of the decision-making process regarding the adoption of an innovation. Bangladesh has experienced a very fast diffusion of gig economy platforms, particularly within the urban centers, this has been attributed by the relative benefits of the platform approaches over the traditional logistics primarily in the aspects of flexibility, scalability, and costs. In the case of students, their ability to fit these platforms into their academic calendar and the convenience offered by most of the mobile applications have ensured they adopt them.

The other relevant theory regarding the intricate relationship between the social and the technical part of sociotechnical systems is the sociotechnical systems theory for the relative to this, this theory suggests that both the social and technical elements need to be taken into account when designing and implementing systems. Explicitly, in the lens of crowdsourced delivery, this theory underlines the best and proper combination of technological solutions with social demands or, in other words, proper care for gig workers' social conditions and needs. For instance, applications enhance the efficiency of assigning tasks and finding routes for execution, but at the same time, they affect the working conditions and income predictability of gig workers, such as students.

4. Research Methodology



4.1 Qualitative Research Approach

The current research uses a qualitative research strategy to analyze the possibility of using a gig-based delivery model, whereby the delivery is done using university students' transit opportunities. The qualitative methodology is ideal in order to assess and compare perception, effectiveness, and some of the benefits of this new delivery model. This research is focused at

cost-saving and operational efficiency therefore seeks to confirm the hypothesis that the gig-based model of service delivery is cost-effective as compared to the traditional model.

4.2 Data Collection Methods

For this research, data were obtained from a questionnaire that was conducted online using Google Forms. The survey aimed at the university 100 students who can act as courier in the gig-based delivery model only. When it came to university students, the survey aimed at identifying their probability to take part, the incentives they would like to receive, and possible paths. We will also conduct a one to one interview with the delivery person to ascertain the existing delivery expense. Thus, for businesses, questions intended to deal with their current delivery costs were posed.

The first was the identification of data that would make it possible to compare per kilogram costs of the conventional delivery system, which were between 60-70 Tk and the proposed gig-based delivery system that was expected to be in the range of 40-45 Tk.

4.3 Data Analysis Techniques

In the analysis of the data gathered from the surveys the two statistical analysis methods employed were descriptive and comparative. For the University Student and Business self-completion questionnaires, descriptive analysis was applied where frequency counts and percentages were used to tabular and highlight certain trends and patterns of responses as to their understanding of the gig-based delivery model. And then comparative assessment was made to estimate the cost advantage of the gig-based model. This required a comparison of the current costs of conventional delivery costing 60-70 Tk per kg with the anticipated costs the use of the gig-based model would entail 40-45 Tk per kg. Special attention was paid for activity costs which can be recovered or even excluded in the adopted gig-based model, namely, vehicle maintenance, fixed workers' salaries, fuel expenses, etc.

To evaluate the viability and efficiency of the gig-based model to act as a cost-efficient solution for the delivery systems, the findings of this analysis were gathered. Furthermore, forces of open-ended responses from survey respondents were to recommend possible difficulties and other prospects of the growth of the gig-based model.

5. Technological Integration in Crowdsourced Delivery

5.1 Role of Mobile Apps and GPS:

A dedicated mobile application can be developed where use of GPS is essential in the functioning of the apps that enable the crowdsourced delivery systems particularly when undertaken by university students daily movements for deliveries. Most of the communications between the delivery system and users take place through a mobile application that is employed to place the orders. Relative to the need of the student, all the delivery services in existence are displayed by the app usually by showing their location within a kilometer radius as per GPS real time coordinate details. This feature concerns geo-location to enable students to select

those parcels that are easily accessible in their daily movements. For the merchants, the application of data entry is easy since the boxes provided include pick up and delivery locations, size and special instructions in identifying the parcels. These collected parcels have a GPS technology that assists in re-directing them to students in the same area and heading in that direction; thereby sparing time and fuel in the delivery of such items. In addition, the application also has real-time status of delivery and the merchants and the recipients can track the delivery of the shipment, which also adds credibility in the system.

5.2 AI and Machine Learning in Delivery Optimization:

Indeed, in the case of crowdsourced delivery systems, Artificial Intelligence (AI) is critical in increasing the capacity and performance of the delivery companies. This is where AVL comes as one of the key application that can help the couriers to report their real time location. Of this capability is to give the system a real time and up to date view of all active participants hence helping the traffic operations managers to track the status of deliveries all over the network.

Using AI to constantly monitor vehicles location also improves traffic flow through proper management of flow in areas of congestion and thus improving the delivery of products in the least time possible. Also the real time information can be provided to both the courier and the operator so that the latter can help the former avoid such areas and/or choose the best routes. This can be a direct outcome of more consistent delivery times and better satisfaction of all the entities engaged. (Agarwal et al., 2015). AI is also essential to provide timely information to the users among which are the expected arrival and departure times of the delivery vehicles. Such transparency also allows the delivery process to be more calculative and enticing for the couriers, which in result may result in increased participation of couriers. Furthermore, by integrating AI in route optimization means the public transport system is then more appealing and efficient where the commuters are able to have a clear sight of different available transit as much as the operators to be in a position to decide what route is best to be taken.

5.3 Platform Design and User Experience

The design of the platform and the user experience is a key factor in crowdsourced delivery since this model depends on public acceptance and engagement. The mobile app should have an easy to understand and simple interface so that the users: the students and the merchants, are able to complete their work quickly. For students, the application should make the parcel opportunities easily noticeable together with the parcel details such as size, destination and the reward for delivering the parcel. Simplified procedures of accepting and making delivery will ensure that more of them sign up for the services more often. It should also be easy to use for a merchant where the interface enables easy input of parcels' details and monitoring of delivery. The choice of types of parcels should be available in the app; the app should include clear options on how to fill in delivery requirements. Also, feedback systems whereby the students and merchants can rate their one on, with the platform will assist in constantly receiving and implementing feedback on the service being offered. In addition, safety and trust have to be the guiding principles of the design of the application. This can be attained by including aspects like, profile verification with NID card and university Identity Card

also enhanced payment modes as well as favorable customer care services. Making all the transactions and all the interaction processes secure and transparent will create confidence in the system hence leading to increased participation for the courier services and the merchants. Those features including push notification, in-app message and real time update will add on the convenience to users and ensure all parties involved are updated and active throughout the delivery life cycle. Finally, a flexible but effectively useful platform that serves the purpose of integrating the gig economy principles into the students commute-based delivery system.

6. Legal, Regulatory, and Ethical Considerations

In Bangladesh, there is no specific provision that recognizes crowdsourced delivery as a legal entity but as the gig economy and digital platforms are expanding, the laws are gradually changing. Here are some important factors to take into account and elements of the legislative framework that are pertinent to crowdsourced delivery in Bangladesh: The following are some salient points and facets of the legal landscape pertinent to crowdsourced delivery in Bangladesh:

6.1 Ethical Issues in the Gig Economy

Here are some of the key ethical concerns:

1. Worker Exploitation Fair Wages: Some people conduct gigs as freelance works and since they are independent; they receive irregular payment and do not get paid a reasonable amount for their services. Some gig firms have pricing strategies that work such that the earnings they generate fall below one's minimum wage once costs and time spent in performing the gigs have been considered. **Lack of Benefits:** Freelancers especially do not have access to employee benefits such as medical care, sick days or pensions, meaning they can become sick or be financially broke.

2. Job Security and Stability Precarious Employment: Freelance work is unstable as a worker is always at liberty and vulnerable to lack of employment and regular income. This often causes problems for workers to have a vision and or stability into the future or even to attain loans and housing. **Termination and Deactivation:** Lack of fair working conditions and employment rights: The workers can be deplatformed from the service providers without any reasons or legal procedures that can make them lose their income source instantly or abruptly.

3. Health and Safety Workplace Safety: With one's independent contractor status, gig workers may receive less safety provisions and guidelines than other workers. For example, delivery personnel or Uber drivers are more vulnerable to contract dangers with no overhauling employment security laws.

5. Transparency and Fairness

Algorithmic Bias: Open platforms have various computational algorithms for the assigning of tasks, pricing, and rating. These algorithms are often somewhat obscure and can introduce bias in terms of how work is apportioned and how people are rated as workers.

Fee Structures: The fee structures that platforms place tend to be complicated and as such may at times create confusion between the actual earnings and actual expenses.

6. Economic Inequality

Income Disparity: The gig economy helps create opportunities that will mostly favor the rich as opposed to the poor and other disadvantaged groups in the society.

Market Saturation: When demand for giggers is high, too many of them push wage rates and employment terms to new lows and thus intensify economic stratification.

7. Legal and Regulatory Compliance

Legal Protections: They have no rights as provided to standard employees, such as minimum wage provisions, anti-discrimination clauses, and the right to join unions.

8.Regulatory Evasion: Certain gig business models will have the architecture of avoiding labor laws and thereby offering benefits and protection that are customary when engaging workers legally.

9. Ethical Business Practices

Corporate Responsibility: Some of the companies in the gig economy have been accused of placing the interest of the owners above the welfare of the employees. At the center of ethical business practices that have been highlighted, there should be equitable treatment, reasonable wages that have been earned and recognition of workers' liberties.

10.Accountability: Policies within these platforms should ensure that they take responsibility in relation to the different policies in relation to workers and engage in solving of ethical concerns of accumulated working conditions.

11. Impact on Traditional Employment

Job Displacement: Gig work may take away jobs from workers that seek traditional employment hence insecurity in labor market and joblessness.

12.Shift in Work Culture: It must be stated that gig work is likely to transform the conventional standards and framework concerning jobs, affecting workers' rights and the work process as a whole.

7.Challenges in Implementing Crowdsourced Delivery:

7.1 Operational Challenges

Crowdsourced delivery systems present major operational issues and the operation of this system calls for complexities especially in terms of the relations in the system. When more people are involved, then there is a challenge in the organization of activities and harmonious performance of their activities. The crowd is diverse and not everyone may be committed and its management can be cumbersome since it brings in inefficiencies. To these we would like to add that in order to avoid such risks, platforms should have long-term mechanisms that can retain trust and positive attitude among the participants. Here, incentives can be employed in an endeavour to cultivate appreciable rapport, with participants also as expected being in harmony with the goal of the platform. Furthermore, internal enthusiasts that can help to navigate the crowd make the participants understand the expectations and standards to ensure successful accomplishment of delivery assignments.

7.2 Workforce Management and Motivation

Supervising and stimulating a crowd employing workers is not the simplest thing, especially in light of the intricate distinction between authority and liberty. As described in this paper, the concept of control measures characteristic for the traditional approach to workforce management should not be used in the new environment created by crowdsourcing. Rather, it is desirable to achieve a reasonable level of control that would ensure effective monitoring of the process, while still encouraging more people to contribute. The monitoring tools and the processes of solutions' evaluation should be designed in a way that they ensure the crowd does not get discouraged. In addition, reward and incentives play an important role to motivate the workforce and a big consideration must also be given on this aspect. In this way, it is possible to enjoy active and continuous participation in the work of platforms, which will improve overall service in general.

7.3 Risk Management and Liability

Risk management for a Crowdsourced delivery system involves the various competitors' risk, the risk of knowledge leakage, and the risk involved since they were uncertain of the outcome of the delivery system. The very essence of cooperation is that parties involved can also be rivals in the formal sense; the implication of this is that information may be disclosed accidentally. Such risks make it necessary for platforms to have laid down strict measures and conditions that have to be followed to avoid any odd occurrence of cross over of services, and where there is, it should be clearly conducted within set boundaries. Further, crowdsourcing entails its own set of risks the main of which depend on a diverse crowd that at times could be unparalleled and inconstant in terms of deliverables. In contrast with traditional employees, the participants of crowdsourcing do not necessarily have much at risk, which means that the quality of the work they provide may be of different quality and the level of engagement may also differ. To minimize these risks, there are ways by which platforms can agree to higher qualification criteria or use multiple participants to deliver outcomes in the platform(Kannangara & Uguccioni, 2013).

8. Proposed Solutions and Best Practices

The saying that the cure is worse than the disease appears to bear more weight than usual when it comes to the implementation of proposed solutions and best practices in organisational workplaces for employees.

Collaborative Partnerships:

Universities and Delivery Platforms: Connect universities and delivery platforms so that the latter sets up distribution centres in the universities. This could cover such areas as sharing of equipment, facilities and means of transport among others.

Flexible Scheduling and Incentives:

App-Based Scheduling: Employ adaptable mobile application-based delivery schedules where students can book for the delivery time convenient to them. This way there can be high participation while at the same time the operations are made efficient.

Incentives and Benefits: Reward the students with money, with credits in the subjects they teach, and stimulate them with food or reduced charges to motivate the students to become delivery agents.

Optimizing Distribution Hubs:

Centralized Hub Locations: High traffic areas in campuses should be used to store the distribution points in forms of libraries, cafeteria, or students' centre respectively. These should be easily accessible by the delivery agent carrying out deliveries as well as by the recipients of the deliveries.

Sustainability Initiatives:

Eco-Friendly Packaging: Formulate appropriate sustainable multi-layer packaging approach to abate wastage odds of using reusable or biodegradable materials.

8.1 Approaches to Mitigating Exogenous Operational Risks

Student Availability and Retention:

Flexible Work Hours: Perform the challenge related to the students' availability by giving the students the opportunity to work in shifts. Predict the number of assignments to be made and correlate that with potential students to ensure that an ideal number of students is reached at peak periods.

Retention Programs: Students should be supplied with training, performance bonuses, and opportunities to progress in order to retain excellent ones. Another way, by which turnover can be minimized, is to establish a positive work culture.

Demand-Supply Balancing:

Demand Forecasting: Implement data analytics to make a prognosis of the delivery demand and distribution of the resources. Try to pin point out some of the busy moments in the week so that many students are available to offer their services to handle the busy docket.

Dynamic Pricing: Introduce elastic pricing strategies whereby delivery fees change depending on the availability of its surrogates in a bid to either target supply and demand during the peak sessions of intervals of student engagement.

Logistics Coordination:

Hub Coordination: Adopt an efficient means of arranging deliveries from distribution centres. geographical location and free periods could be used to automate the delivery assignment to students.

Last-Mile Challenges: Solve the last mile delivery problem and congestion, especially in many institutions within urban settings, by making effective efficient routes to delivery and using the knowledge of shortcuts by the students.

8.3 Technology-Driven Solutions

Mobile App Development:

User-Friendly Interface: Develop an intuitive and easy to use a mobile application for both students and customers with the functionality of delivery requests, tracking and payments.

Gamification Features: To ensure that the students' engagement is optimized, should include use of games such as leader boards, achievements and incentives.

9. Future Trends and Predictions

Increased Adoption of Gig Economy Models: Increased Adoption of Gig Economy Models:

Increasing its reach all around the world, it is predicted that more organizations in Bangladesh will adopt gig-based delivery schemes in the near future. The positive result of such programmes in cities could mean replication in other areas, especially in university cities.

Sector Diversification: Besides food and parcel delivery, there is a probability of seeing more specific sectors based in the gig economy models aimed at grocery shopping, pharmacy, and document delivery that can be plugged into the university-based distribution facilities.

Student-Centric Gig Platforms: University-targeted apps might appear, creating gigs suited to the university timetables. Such Web sites could offer not only delivery jobs but also other services that students are willing to do within or in close proximity to campus.

Integration with Educational Institutions: Universities could consequently subsume gig platforms into the student employment services, which provide jobs that could be done flexibly without conflicting with class schedules.

Sustainability Focus: Delivery structures within the gig economy could also begin leaning more into sustainability in the future. Bicycle delivery options or Ev fleets could become the norm especially if the delivery services are sited in an environmentally sensitive university environment.

Circular Economy Practices: As the sustainability trends develop, it is possible to assume that the crowdsourced delivery platforms will employ the principles of the circular economy, including the recycling process and the minimization of waste in delivery packaging.

9.1 History of the Gig Economy

Rise of Micro-Entrepreneurship:

The gig economy is gradually maturing into what could be referred to now as micro-entrepreneurship, in which people – for instance students – run their own delivery services. This kind of change enhances the freedom of gig-worker interactions which range from delivery personnel to freelance sellers who manage a small network of buyers.

Platform Specialization: Another possibility is that different gig economy platforms might develop for specific delivery requirements as the market gets more and more established. For instance, delivering platforms that are specifically for academic-related products which include books, stationery, etc. could be created for university students.

Changing Labor Dynamics: Gig economy's nature is evolving and becoming something people see as a regular source of income, not just side hustle. This might result in higher worker rights, wages, and labour rights of a nation, which could affect your model's student workers.

Gig Economy as a Mainstream Workforce: Freelance working is becoming more and more the norm for workers around the world. The students may become dependent on the gig economy for jobs, especially in nations such Bangladesh, where youth employment might be a challenge.

9.2 Urbanization is possibly one of the most important factors of economic growth.

Expansion to Tier-2 and Tier-3 Cities:

Despite the fact that the systems first could target large cities, the delivery system based on the use of gigs could expand its locations of operations to small cities and towns with universities. It is in these regions that the need for traditional delivery options is limited and thus the place for gig-based solutions.

Hub-and-Spoke Model: They may be points of concentration for a large regional delivery of the programs and services. This strategic model could also help in extending delivery services to other towns and sub urban areas, thus improving coverage and delivery models.

Population Density and Demand Growth:

The increasing population of the country and people moving towards cities which are including Dhaka and Chittagong for the new living facilities is also a great chance for the growth of the gig economy-based delivery systems. With increased urbanization, there will be more demands for effective and cheap ways of producing and delivering the services.

Urban Infrastructure Improvements: Popper: ‘further enhancements in infrastructures in these urban centers including enhanced roads and increased internet connectivity shall continue boosting the crowdsourced delivery platforms’. This will help delivery agents to maneuver in urban environment and the overall traffic without much of a hassle.

Localized Delivery Models:

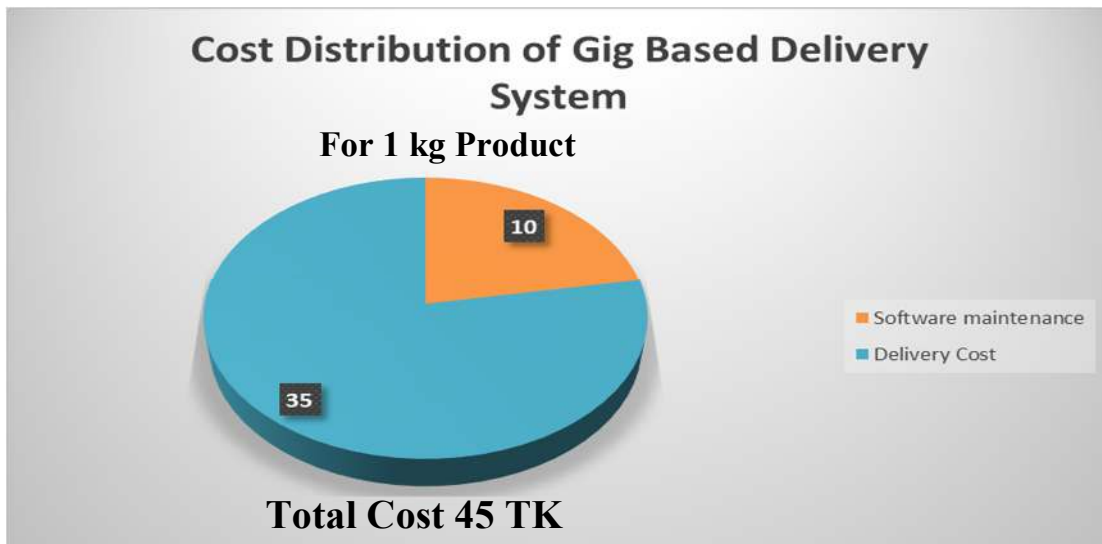
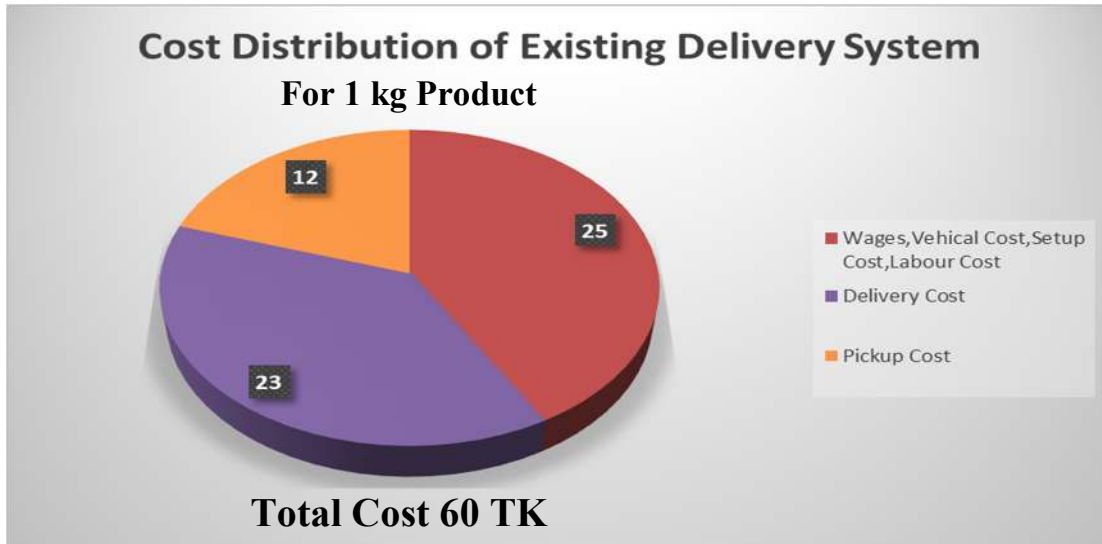
In high density urban environments, other specific variants, such as delivery ‘around the corner’ (i. e. a few small blocks) may become feasible. This would clearly help trim delivery timelines and woo other clients who may be willing to do business with SS because of the need to access their products faster.

Smart City Integration: With transformation of Bangladesh’s cities into smart cities, flexibility and configuration of gig delivery platforms can subsequently synchronize and align with the smart systems such as smart traffic networks and maps, real-time data collection and analysis tools.

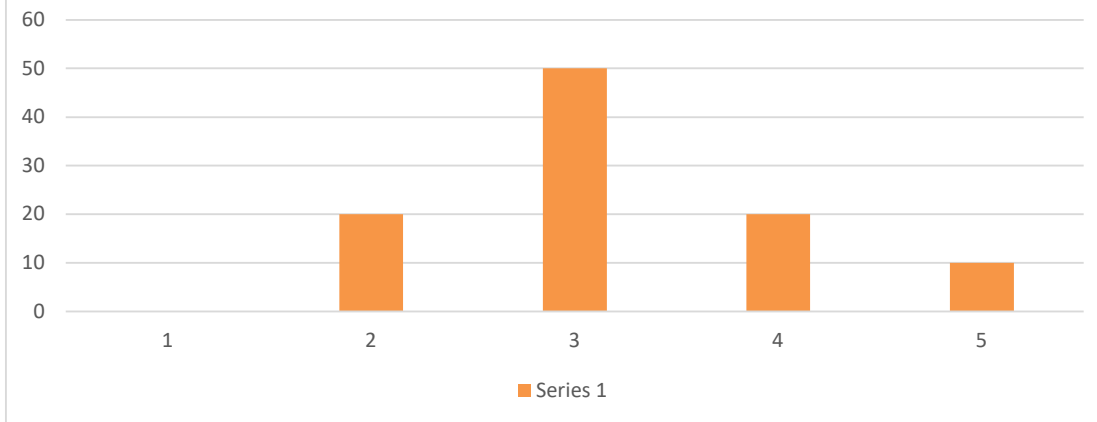
10 . Summary of Key Findings

Feasibility and Cost-Reduction Potential:

It was revealed that it is operationally possible to act with university students as delivery agents in the context of the urban areas of Bangladesh. Delivery cost is another area where cost effectiveness can be achieved: students are cheap and always around distribution warehouses. Applying the centralized cross-distribution center located at the university campus can rationalize operation, reduce transport expenses and improve delivery time, especially when delivering to communities which are close to this campus.



**On a scale Of 1-5 (1 being very low, 5 being very high),
how available would you be to pick up and deliver parcels
during your commute? 100 Responses**



To investigate the possibility of using university students' daily travel to implement a gig economy-based delivery system, we offered an online survey of 100 university students. The survey results are as follows:

- 80% of the students rely on public transport in getting to and from the university.
- Seventy percent of students are ready to deviate slightly from the usual, to deliver parcels.
- Students with 87% have been found to be able to carry medium sized parcels.
- Nine out of ten students indicated that they would like a fixed delivery price which depends on the weight of the shipment.

Operational Challenges and Solutions:

Despite the risks like availability of the students and demand and supply problem, there are possible solutions like flexibility in scheduling, flexibility in prices, and application of better technology like artificial intelligence technology to help optimize for better results. Introducing cooperation with local businesses and universities can also help to diversify and expand the given model of operations.

Technology-Driven Enhancements:

They are retail-based delivery models which could not be effective without using technology such as mobile apps, Artificial Intelligence and data analytics. They can enhance productivity, rationalization and develop a perfect environment for utilizing education and buying services by students and customers.

11. Conclusion

Some of the Consequences for Both the Academic and Industrial Sciences

Academics:

Therefore, our research adds to the existing literature on the gig economy models especially in a context like Bangladesh. It can provide a mechanism for understanding how gig based delivery structures can work for university contexts and may offer important suggestions for mobility, workforce, and IT management.

The results can be useful for continued theoretical investigations of the effects of gig work on students' socio-economic conditions and means to optimize the use of university services to benefit the society.

Industry Professionals:

A viable solution for the industry specialists in the field of logistics, e-stores and delivery services, this research provides a more effective and efficient delivery model, especially for the high population density regions. Engaging the university students as the flexible workforce lowers its cost and enhances the operational efficiency, particularly for the last mile delivery.

We think that our evidence can help to advance the research on partnerships between educational institutions and gig platforms and stimulate innovation in delivery services.

11.1 Suggestions for Future Studies

Comparative Studies on Gig-Based Delivery Models:

The future study could also be directed towards the comparison of the impact of student-based delivery models with other kinds of gig-based delivery models in other cities. These studies might consider such factors as differences in cost effectiveness, organizational barriers, and students' interest within the region and country.

Longitudinal Studies on Student Participation:

It might also be important to do a follow-up study doing comparative analysis of the effects of the gig work model over the long-term on the students' performance, income, and employment opportunities and career trajectories.

Also, finding out the student retention and turnover along with the job satisfaction of the employees of the gig economy may contain useful data for enhancing the conditions of the worker and coming up with better incentive plans.

Technological Innovation and Automation:

Ideally, future studies could examine how some of the newer technologies, for instance Artificial Intelligence, machine learning, and self-driving delivery systems, can improve student delivery systems. This could be done through articles such as examples of how these technologies are being implemented in other countries and their applicability to Bangladesh.

Researching the potential of blockchain and smart contracts in guaranteeing non-tainted transactions in gig platforms may also be an interesting avenue to study.

Sustainability and Environmental Impact:

Exploratory work in the future could look at the sustainability effects of gig based delivery systems especially, addressing green delivery options and delivery bags and boxes. This would be especially relevant for the densely populated areas where cases of pollution and congestion are felt.

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