

MediRide: An Integrated Mobile Platform for Optimizing Emergency Medical Response in Bangladesh

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Abstract

In developing countries, access to emergency medical transport remains a critical issue. Patients often have to suffer from price bargaining and fraud. Sometimes they even have to face delays which can take their lives. In this paper we came up with a solution to solve these medical transport issues. Our approach focuses on creating a platform that links patients in urgent need with nearby and available ambulance drivers, bridging a gap that often costs lives. Our app, MediRide, comes with an AI-powered ambulance booking system which is available through both web and mobile platforms, designed to bridge the gap between patients in crisis and idle ambulance drivers. The platform ensures fair pricing, real-time tracking, secure online transactions and SOS-based emergency activation. Unique features such as online bidding, driver-patient matching and event-based standby coverage optimize ambulance utilization and reduce emergency response time. As MediRide bridges the gap between patients in crisis and idle ambulance drivers, it empowers ambulance drivers with steady income and operational efficiency. This paper explores the design, functionality and social impact of MediRide, along with preliminary feedback from drivers collected through field research. Our goal is to help people in need.

Keywords

AI-powered ambulance booking system, real-time tracking, online transactions, SOS-based emergency activation, online bidding.

1. Introduction

Getting timely medical assistance during emergencies remains a significant challenge in Bangladesh, especially in rural and remote areas. Barriers such as inadequate transportation, lack of trained personnel, and poor communication infrastructure often result in critical delays, contributing to preventable deaths and increased morbidity. Even in urban centers like Dhaka, factors such as traffic congestion and suboptimal ambulance distribution further hinder rapid access to emergency care, disproportionately affecting vulnerable populations.

The rapid expansion of smartphones and mobile internet in low- and middle-income countries presents a promising opportunity to address these systemic gaps. Mobile-based solutions, including real-time ambulance tracking, automated dispatch, and integrated hospital information, have demonstrated potential to reduce response times and improve patient outcomes by streamlining coordination and resource allocation populations. These technologies can connect individuals in need with the nearest available ambulances and healthcare facilities, overcoming many logistical barriers that have historically limited access to emergency services.

This study explores how a dedicated smartphone application can transform emergency medical response in Bangladesh by linking patients to nearby ambulances, providing real-time information, and facilitating post-emergency support. By leveraging digital innovation, the platform aims to enhance healthcare accessibility and save lives, particularly in the country's most underserved regions populations. An App based Platform MediRide offering 24/7 Ambulance Services, Real time tracking, SOS Emergency Request, Event Coverage Services, Community awareness services, Post Emergency Follow up and Services, Finding Blood donar, bidding system in payment method to remove unfair pricing in Emergency moment.

1.1 Objectives

This project focuses on building MediRide, a digital platform that makes booking and tracking ambulances easier and faster across Bangladesh. Too often, patients and families face delays, confusion or even fraud when trying to arrange an ambulance during an emergency. MediRide aims to solve these problems by creating a simple mobile and web application that quickly connects patients with the nearest available ambulance.

The platform goes beyond just booking. With features like real-time GPS tracking, instant SOS requests, event coverage and even follow-up support after emergencies, it ensures that patients get the care they need without unnecessary stress. MediRide also supports ambulance drivers by helping them find more patients and earn steadily, making the system more sustainable for everyone.

The service will run on a Business-to-Consumer (B2C) model and grow further through partnerships with hospitals, ambulance providers, NGOs and government health programs. By reducing response times and ensuring fair pricing, MediRide hopes to make emergency healthcare more reliable, affordable and accessible, ultimately saving more lives and strengthening trust in the system.

1.2 Competitive Analysis

The ambulance service industry in Bangladesh remains disorganized, with a mix of hospital-run ambulances, private services and digital platforms attempting to fill the gap. Services such as Shamim Ambulance, Sheba.xyz and 24 Ambulance provide valuable support but they fall short in several areas that directly affect patients in emergencies. Common issues include lack of real-time tracking, absence of SOS emergency features, limited transparency in pricing and poor coordination between patients and drivers (Table 1).

Table 1. Competitor analysis of the popular market holder in ambulance service industry

Competitor	Service Description	Strengths	Weaknesses	Marketing Strategy	Threat Level
Shamim Ambulance	Local ambulance provider offering AC, ICU, Freezing services	24/7 availability, multiple ambulance types	No real-time tracking, no rating system, no SOS request, no app (only website)	Basic online presence	Medium
Sheba.xyz	Digital platform offering multiple services including ambulances	Strong branding, app + website, multiple ambulance types, flexible pricing	Limited focus on ambulance (part of a bigger service), no event coverage, no post-emergency support	Aggressive digital campaigns	High

24 Ambulance	Service offering AC, ICU, Freezing ambulances	24/7 service, multiple ambulance types	Just website, no SOS request, no post-emergency support	Traditional advertising, hospital partnerships	Medium
Traditional Ambulance Providers	Phone-based booking with local operators	Community trust, wide availability	No GPS, no online booking, highly unreliable response time	Online social media groups	Low

Despite the presence of existing ambulance services and health-related apps, the sector still faces major gaps in accessibility and transparency. Many platforms focus primarily on urban areas, leaving patients in other regions underserved during critical emergencies. To better understand MediRide’s potential impact and strategic positioning, we conducted a comprehensive SWOT analysis, highlighting our strengths, weaknesses, opportunities and threats in the emergency medical transport ecosystem (Figure 1).



Figure 1. SWOT analysis for the business model

1.3 Problem Statement

In Bangladesh, access to emergency medical transportation remains a significant challenge, specifically in rural and semi-urban regions. Patients who need urgent care often struggle to find a reliable ambulance quickly, facing delay and uncertainty. In many cases, families are forced to waste precious time contacting multiple systems, bargaining over prices or sometimes face fraud. The absence of a centralized platform for booking and tracking ambulances leads to critical delays in treatment, contributing to fatalities during emergencies. On the other hand, ambulance drivers frequently face idle periods, resulting in wasted services and unstable incomes. Existing digital health platforms in our country such as Aroga, MedEasy and DocTime, focus mainly on telemedicine and medicine delivery. But they

do not provide support for emergency ambulance logistics. These challenges not only delay access to lifesaving care but also add emotional and financial stress during emergencies. This disconnect between patients and drivers highlights the urgent need for a transparent, efficient and human-centered solution in emergency medical transportation.

2. Literature Review

Moussally et al. developed TraumaLink, a community-based emergency response system in Bangladesh using trained volunteer first responders and mobile technology. Their findings showed rapid, reliable on-scene trauma care for traffic injury victims, with high community acceptance and scalability, suggesting this model could be expanded nationwide to address gaps in emergency medical response (Moussally et al. 2022).

Hossain et al. designed the Bangladesh Emergency Services (BES) mobile application to provide 911-like emergency services. User feedback highlighted the importance of trustworthiness, scalability, and participatory design, with BES being effective for reporting emergencies and locating nearby hospitals, demonstrating the potential of mobile platforms for emergency response in Bangladesh (Hossain et al. 2018).

Khan et al. introduced ShasthoBondhu, an mHealth app integrating wearable IoT and AI for remote healthcare in Bangladesh. The app features automated vital monitoring, emergency calls, and real-time virtual medical assistance, achieving high usability scores and offering a scalable, user-centered solution for emergency and routine healthcare needs (Khan et al. 2024).

Sakib et al. developed SushthoJibon, a user-centered mHealth app providing vital aid during emergencies, including features like emergency response, location services, and family care. Usability evaluations led to iterative improvements, ensuring the app met user needs for emergency healthcare support in Bangladesh (Sakib et al. 2024). Winders et al. conducted a systematic review on mHealth interventions in low- and middle-income countries, finding that mobile health platforms consistently improved provider and patient outcomes in emergency care settings, though they called for more research on patient-centered outcomes and long-term impact (Winders et al. 2021).

Islam et al. investigated the usability of mobile health applications in Bangladesh, revealing that poor usability is a significant barrier to adoption. They emphasized the need for user-centered design and iterative testing to ensure mobile platforms effectively support emergency medical response (Islam et al. 2020).

Zaman et al. proposed i-medical, an IoT and mobile-based emergency medical system for Bangladesh, demonstrating through simulations that integrating mobile apps with IoT can optimize emergency response times and resource allocation (Zaman et al. 2020).

2.1 Challenges and Opportunities in Digital Healthcare

Rahman et al. analyzed the regulatory and infrastructural challenges faced by digital ambulance services in Bangladesh. They found that unclear government policies, limited digital infrastructure, and inconsistent network coverage significantly hinder the deployment and scalability of mobile ambulance platforms, emphasizing the need for policy reforms and investment in ICT infrastructure (Rahman et al. 2021).

Ahmed et al. investigated workforce limitations in the context of digital emergency response, noting that a shortage of trained paramedics and technical staff restricts the effectiveness of ambulance-based digital health solutions. Their study highlighted the importance of targeted training programs and public-private partnerships to build a skilled workforce for digital emergency care (Ahmed et al. 2022).

Chowdhury et al. examined the integration of human-centered design in ambulance dispatch apps for resource-limited settings. Their research on the "AmbuCare" platform demonstrated that intuitive interfaces and localized language support improved user adoption and satisfaction, suggesting that user-focused design is critical for the success of digital ambulance services in Bangladesh (Chowdhury et al. 2023).

3. Methods

The methodology involves conducting a customer survey, applying the Kano model for feature prioritization.

3.1 Survey

A survey was conducted among 110 participants to assess perceptions and usage patterns related to the ambulance system in Bangladesh. The results revealed that 97.3% of respondents believe the current ambulance system is not organized, indicating widespread dissatisfaction with its structure and reliability. Additionally, 86.7% of participants reported that they do not have the contact number of any ambulance driver saved in their phones, highlighting a significant gap in emergency preparedness and accessibility. Despite these challenges, 63.5% of respondents stated that they would prefer to use an ambulance during emergency situations. These findings suggest a strong demand for a more organized and accessible ambulance service, as well as the need for improved public awareness and connectivity to emergency medical transport.

3.2 Kano Model

We did the Kano model customer need analysis which is a tool that differentiates potential features according to users' needs. Based on our survey, we took our 4 popular features and asked 100+ qualified respondents about a pair of functional and dysfunctional perception questions for each feature. To better comprehend the needs and pleasures of the users, we conducted both discrete and continuous analyses (Figure 2).

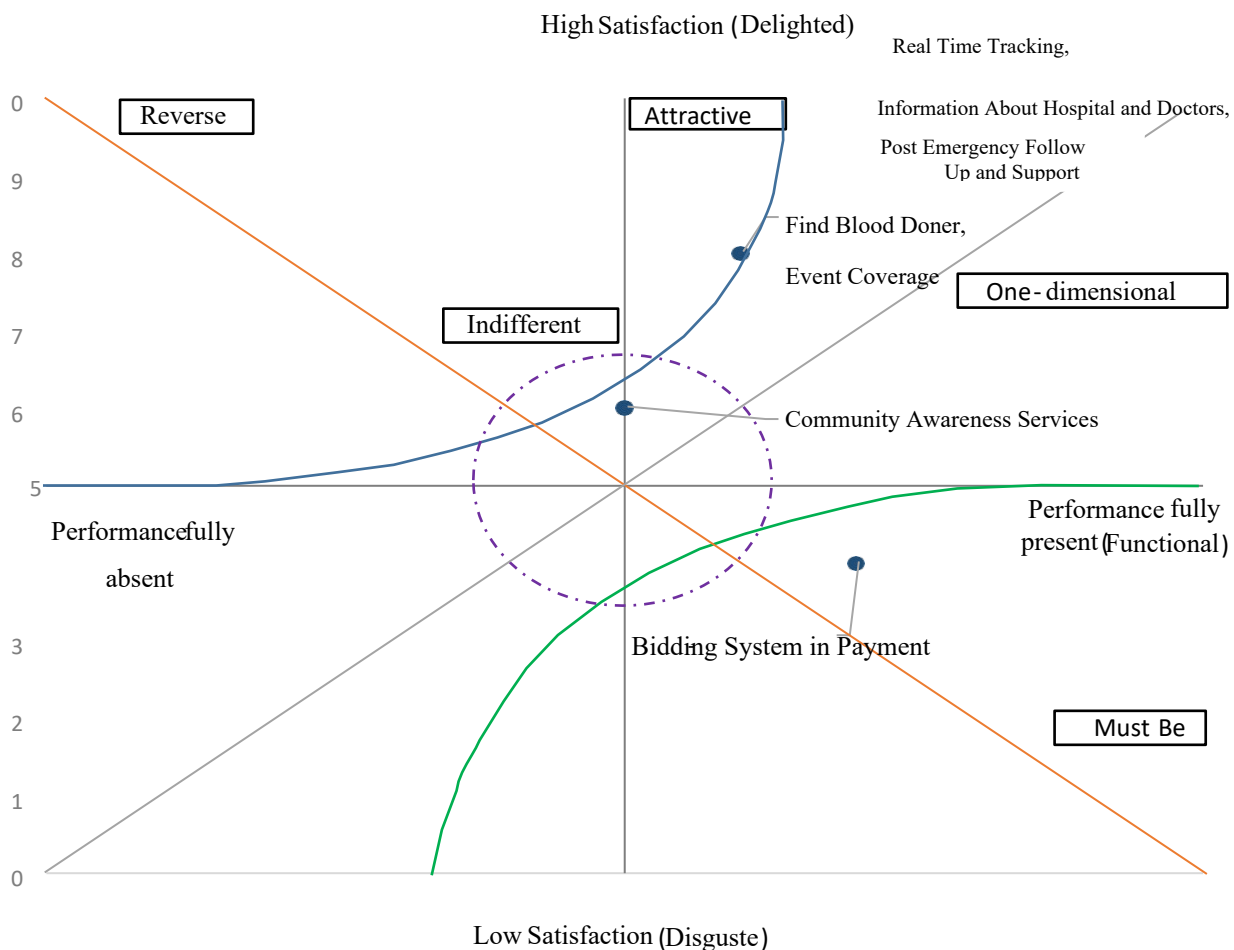


Figure 2. Continuous analysis of kano model

The chart indicates that the most essential feature for the ambulance platform, categorized as a Must Have, is the Bidding System in Payment, which is crucial for user satisfaction and should be prioritized in development. Features placed in the One Dimensional category—such as Real Time Tracking, Information about the Nearest Hospital and Doctors, and Post Emergency Follow Up and Support—are also highly valued by users and directly enhance the platform's effectiveness and reliability. Attractive features like Finding Blood Donors and Event Coverage Services can further increase the appeal of the service, though they are not as critical as the core functionalities. In contrast,

Community Awareness Services are considered indifferent features; while they may provide additional value, they are not a primary concern for users and can be considered as supplementary additions.

3.3 Discrete Analysis

The customers' answers were projected and evaluated for every feature of our product. In Table 2, the features are categorized to represent the largest proportion of the respondents. Discrete Analysis is the preferred way of looking at Kano results as the cut-offs and numerical weights of different categories are not calibratable for each study in continuous analysis.

Table 2. Findings of discrete analysis

Feature Name	M	O	A	I	R	Q	Evaluation
Bidding System in Payment Method	25.33%	22.67%	24%	21.33%	6.67%	0.00%	Must Be
Real Time Tracking	10.67%	40%	22.67%	20%	6.66%	0.00%	One Dimensional
Information about Nearest Hospital and Doctors	8%	29.33%	29.33%	22.67%	10.67%	0.00%	One Dimensional
Post Emergency Follow Up and Support	8%	34.67%	25.33%	32%	4.46%	0.00%	One Dimensional
Finding Blood Doner	5.33%	33.33%	34.67%	26.67%	0.00%	0.00%	Attractive
Event Coverage Services	4%	26.67%	33.33%	30.67%	5.33%	0.00%	Attractive
Community Awareness Services	2.67%	26.67%	25.33%	40%	5.33%	0.00%	Indifferent

3.4 Logo and Motto

For Mediride's logo, a simple design with a heart and a plus sign would work well, using a calming blue and a vibrant green. This combines the ideas of care, health, and life. The heart could also subtly contain a road or wheel to represent transportation.

The motto, "Your need, Our priority. Ready to respond, Anytime, Anywhere," is a powerful promise. It focuses on the patient's needs and reassures them that help is always available, building trust and conveying a sense of reliability and compassion (Figure 3).



Figure 3. Logo of MediRide

3.5 Customer Segment

We created Mediride for everyone because we know emergencies don't discriminate. While the app is designed to be a lifesaver for all, our initial focus is on people who are looking for a reliable, no-hassle solution in a crisis. This includes professionals like doctors and engineers, as well as business owners and entrepreneurs—people who

understand the value of time and reliability. They're often the first to embrace new technology and are in a position to afford a premium service that gives them peace of mind.

However, our commitment goes beyond just this group. MediRide is built for every person in Bangladesh, regardless of their financial situation or background. We believe that when an emergency strikes, every individual deserves the same access to fast, dependable help. By catering to those who can become early adopters while remaining accessible to all, MediRide aims to become a trusted, essential service for the entire nation.

3.6 Value Proposition

MediRide stands out by tackling the real struggles patients and families face when trying to get an ambulance in times of crisis. Right now, arranging an ambulance often means long delays, unclear pricing and uncertainty about the quality of service. MediRide brings together technology, accessibility and reliability to make the process faster, simpler and more transparent. Both passengers and drivers use connected mobile apps, ensuring smooth communication and coordination. The platform is also designed with language accessibility, so people across different regions of Bangladesh can use it easily. On top of that, patients no longer need to worry about bargaining or being overcharged. MediRide uses fair fare calculations, offers multiple payment options including cards and shows the ambulance's location on a live map. Reliability is at the core of MediRide. The service operates 24/7, offering different types of ambulances such as AC, non-AC, ICU and advanced options, with a focus on reaching patients quickly. Features like a driver and company rating system, patient transfer services and follow-up support after emergencies help build trust and ensure people feel cared for beyond just the ride itself. By addressing long waiting times, poor service quality and hidden costs, MediRide isn't just about getting from one place to another. Instead it's about saving lives and giving families peace of mind when they need it most. It positions itself as a dependable partner in emergency healthcare, dedicated to making sure help is always within reach (Figure 4).

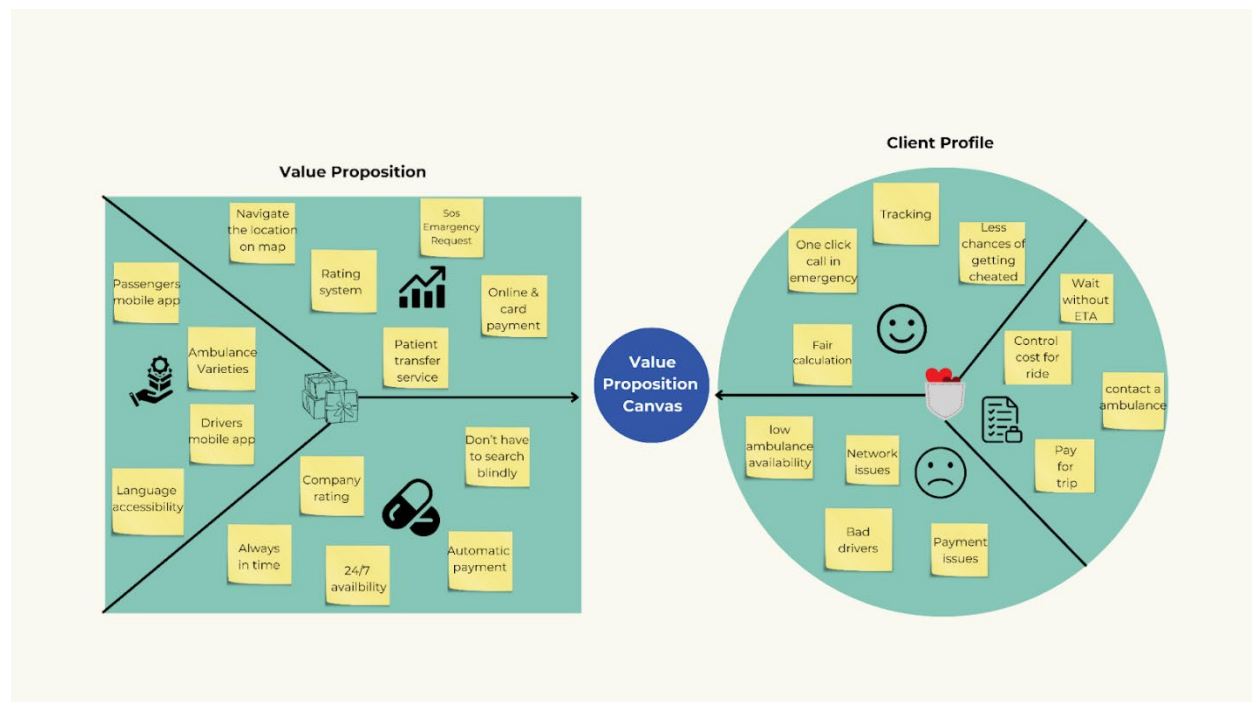


Figure 4. Value Proposition Model of MediRide

3.7 Business Model Canvas

- Customer: Who are they?
- Values: Customers receive what value from the business?
- Operation: What are the business's operations?
- Revenue: How does the business make money?

3.7.1. Customer: Who are they?

MediRide primarily serves individuals in Bangladesh who require timely access to ambulances during medical emergencies. The customer segment includes professionals such as doctors, engineers, bankers, government employees and first-class officers, as well as people leading a high-class lifestyle. The early adopters are expected to be technology-adapted individuals, particularly within the 20–35 age group, who are more inclined to embrace digital solutions for urgent healthcare needs.

3.7.2. What value do customers receive from the business?

In critical situations, patients and their families often face delays, confusion and negotiation challenges in securing an ambulance. These delays may lead to worsening health outcomes or even fatalities. MediRide addresses this problem by offering a simple, reliable and transparent ambulance booking process. Through features such as real-time GPS tracking, SOS emergency request, post-emergency follow-up and event coverage service. MediRide ensures that patients receive timely medical transport and continued care after emergencies. This service not only saves time and reduces uncertainty but also enhances trust in emergency medical response systems, contributing to improved healthcare outcomes.

3.7.3. What are the business's operations?

The key operations of MediRide are outlined below:

- a) Platform Development:** Designing and maintaining an intuitive, secure and scalable mobile and webApp platform for real-time ambulance booking and tracking.
- b) Emergency Dispatch & Scheduling:** Coordinating ambulance drivers' schedules and ensuring 24/7 availability through partnerships with local and national providers.
- c) Technology Integration:** Enabling GPS-based live tracking and SOS emergency request systems for instant responses.
- d) Community Engagement:** Conducting awareness campaigns and event coverage services to promote public understanding of emergency healthcare.
- e) Post-Emergency Support:** Following up with patients and families after service to ensure continuity of care and customer satisfaction.
- f) Marketing & Branding:** Running digital marketing, influencer campaigns and billboard advertising to increase visibility and adoption.

3.7.4 Key Metrics

- a) Achieving **215 rides in the first year**.
- b) Connecting with **30 ambulance drivers** in the initial rollout phase.
- c) Reaching a customer base of **100,000 people**.

3.7.5 Channels

- a) Social media platforms for awareness and engagement.
- b) Push marketing and influencer marketing campaigns.
- c) Official MediRide app and website.
- d) Billboard marketing for offline visibility.

3.7.6. Customer Relationship

- a) Providing on-demand ambulance booking with real-time tracking.
- b) Ensuring fair pricing and eliminating negotiation stress during emergencies.
- c) Offering 24/7 availability for reliability.
- d) Building trust through rating systems, SOS features and post-emergency follow-up support.

3.8. Revenue: How does the business make money?

Cost Structure

- **Startup Costs:** Initial investment in app and website development, onboarding ambulance providers and establishing a tracking system.
- **Marketing Expenses:** Social media campaigns, billboard ads, influencer marketing and awareness events.
- **Operational Costs:** Salaries for staff, server and GPS maintenance and customer support.
- **Variable Costs:** Fuel incentives, driver payments and logistics support based on usage.

Revenue Streams

- **Service Charges:** Customers pay per ambulance ride, with prices adjusted by distance, service type (AC, ICU, freezing) and urgency.
- **Partnerships & Collaborations:** Revenue from collaborations with hospitals, NGOs and healthcare organizations.
Subscription Models: Potential subscription packages for frequent users, corporate clients, and event organizers.
Commission Fees: Margins earned from ambulance operators for booking via MediRide’s platform.

This diverse cost and revenue model will help MediRide achieve sustainable growth while delivering timely, reliable and life-saving value to its customers. The business model canvas is shown in Figure 5.

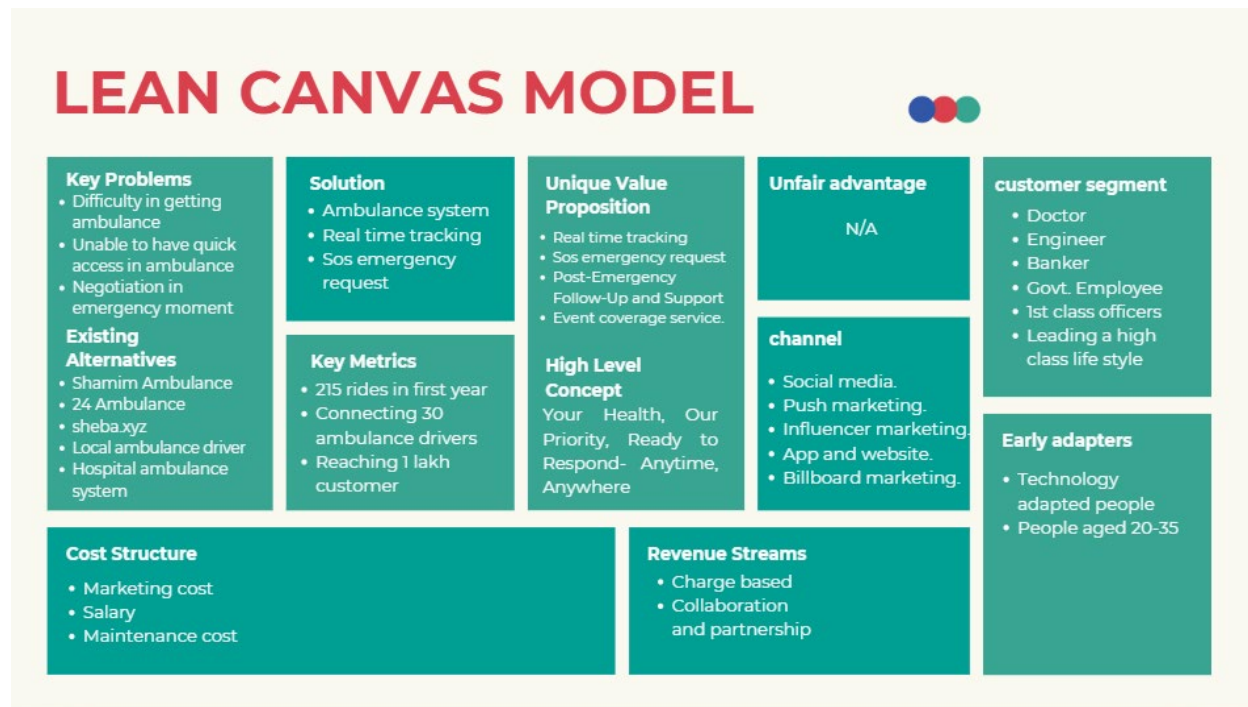


Figure 5. Lean Model Canvas of MediRide

3.9 Advantages

Real-Time Tracking and Service Variety: Patients can track their ambulance in real-time, giving reassurance about arrival time and improving communication. Additionally, the app offers access to different types of ambulances—such as AC, Non-AC, ICU, Freezing, and specialized emergency units—so that patients can choose the service most suited to their medical needs.

- **24/7 Availability and Quick Access:** Emergencies can happen at any time of the day or night. Our app ensures round-the-clock ambulance booking, giving patients and families peace of mind that help is always just a few taps away. With instant access, response times are reduced, and critical delays are minimized.
- **Fair Pricing through a Bidding System:** The app introduces a transparent bidding system where both drivers and patients can agree on a fair price. This eliminates bargaining in stressful situations and ensures that neither side is overcharged or underpaid. The result is a more trustworthy and reliable transaction model.
- **Simple and Accessible User Interface:** The app has been designed for maximum simplicity. Patients and drivers can easily navigate both the mobile and web versions. To make emergency requests even faster, a one-tap gesture-based emergency call feature is integrated—allowing patients to summon an ambulance instantly without going through multiple steps.
- **Language Accessibility:** To make the service inclusive, the app supports both Bangla and English. This ensures that people across different regions and backgrounds can comfortably access the service in the language they are most familiar with, removing barriers during critical moments.
- **Post-Emergency Follow-up and Support:** Unlike traditional ambulance services that end once the patient is dropped off, our app extends its care through post-emergency follow-ups. Patients receive additional guidance and support, making the experience more holistic and patient-centered.
- **Nationwide Network and Guaranteed Availability:** Through partnerships with multiple ambulance providers across the country, the app guarantees availability even in high-demand situations. This broad network ensures that patients from cities to rural areas can access reliable emergency transportation.
- **Seamless and Secure Online Payments:** Time is crucial during emergencies, and handling cash can create unnecessary delays. The app integrates secure automatic and online payment systems, simplifying transactions for both patients and drivers. This not only saves time but also enhances safety and transparency.

3.10 Key Resource

i) Government-Approved Operation

Mediride is a fully authorized and trustworthy service because it operates strictly in accordance with official government policies and licensing. This commitment to legal compliance guarantees that the platform meets all necessary reliability and safety standards across its services.

ii) Professional Licensed Drivers

Only verified and licensed ambulance drivers can register on the app. This rigorous vetting process ensures that every transport is managed by trained professionals who meet the high standards required for medical transportation.

iii). Authentic Healthcare Information

The app gives patients reliable data on hospitals, doctors, and appointment times. This information is confirmed through direct partnerships with healthcare facilities, ensuring users get only valid and current details.

iv) Widespread Healthcare Partnerships

Mediride has strong, nationwide collaborations with hospitals, clinics, and various healthcare providers. These partnerships not only confirm the accuracy of the platform's information but also guarantee consistent ambulance availability and seamless patient transfers when necessary.

3.11 Features of the System

Real-Time Tracking

Passengers and their families can monitor the ambulance's location live through the app. This transparency helps reduce uncertainty and anxiety during critical moments, as loved ones can track the vehicle's route and estimated arrival time. Real-time tracking also enhances coordination with hospital staff, who can prepare in advance for the patient's arrival.

SOS Emergency Request

The system is equipped with a one-click or gesture-based emergency request feature. By simply shaking the phone, swiping, or pressing the power button multiple times, patients can instantly summon an ambulance without opening the app. This ensures immediate access even for individuals who may be in distress or unable to navigate their devices normally.

Passenger & Driver Mobile Apps

To create a smooth flow of communication and operations, there are dedicated mobile applications for both patients and drivers. The passenger app focuses on quick booking, tracking, and support, while the driver app streamlines ride acceptance, navigation, and payment. This dual-app model reduces confusion and enhances efficiency during emergencies.

Ambulance Varieties

The platform provides access to a wide range of ambulance types, such as **AC, non-AC, ICU, freezing, and advanced ambulances**. Patients can select the type of vehicle according to the urgency and nature of their medical need—for instance, ICU ambulances for critical patients or freezing ambulances for transferring deceased individuals with dignity.

Medical Information Support

Beyond transportation, the app also provides information about the **nearest hospitals, consultants, and specialized doctors**, along with their schedules and availability. This additional support helps patients make informed decisions about where to go for the best possible care in their situation.

Language Accessibility

To ensure inclusivity across Bangladesh, the platform supports both **Bangla and English**. By removing language barriers, the system makes emergency services accessible to a wider population, including those in rural or less-educated communities.

24/7 Availability

The booking system is operational at all hours, ensuring that patients can secure emergency transportation regardless of the time or location. Whether in the middle of the night or during peak hours, the system guarantees continuous access.

Fair Fare Calculation

Transparent fare calculation eliminates the risk of disputes between drivers and patients. The system automatically generates a fair price based on distance and service type, reducing stress for families during already difficult situations.

Rating System

After completing a trip, patients can rate both the driver and the service received. This feedback mechanism maintains service quality, encourages professionalism among drivers, and builds trust in the platform.

Online & Card Payment

Digital payment systems, including mobile wallets and card payments, allow for cashless transactions. This reduces dependency on physical cash, saves time during critical moments, and provides clear records for both parties.

Patient Transfer Service

The app also supports safe and efficient transfers between hospitals. Patients requiring specialized treatment or advanced facilities can be moved quickly and securely with minimal delay, ensuring continuity of care.

Event Coverage Service

Ambulances can be booked for public events, religious gatherings, or sports tournaments, ensuring medical support is available on-site. This feature extends the platform's utility beyond emergencies, covering community health and safety needs.

Post-Emergency Support

Care does not stop once the ambulance ride is complete. The system offers follow-up support and guidance to patients and their families, addressing concerns and connecting them to relevant medical services. This makes the platform a comprehensive solution rather than just a transportation provider.

Finding Blood Donor

By using this app People can find out Blood doner in their emergencies

4. Conclusion

In conclusion, our proposed ambulance service platform aims to revolutionize emergency healthcare access in Bangladesh by addressing critical challenges such as delayed response times and limited ambulance availability, particularly in rural and underserved regions. By leveraging the widespread adoption of smartphones and mobile internet, the platform connects patients in need with nearby ambulances, provides real-time tracking, and offers essential information about hospitals and doctors. Additional features like post-emergency follow-up, blood donor finding, and event coverage services further enhance the platform's value and user experience. Through a user-centric design and integration of advanced technology, this service has the potential to significantly improve emergency response efficiency, reduce preventable fatalities, and promote equitable healthcare access across the country. With a scalable and sustainable business model, the platform is well-positioned to become a trusted solution for emergency medical services, setting a new standard for healthcare innovation in Bangladesh.

5. Discussion

This study demonstrates the significant potential of a mobile-based ambulance platform to address critical gaps in emergency healthcare delivery in Bangladesh. The integration of smartphone technology, real-time tracking, and automated dispatch can reduce response times and improve coordination, especially in resource-limited and rural settings. However, challenges such as poor usability, low digital literacy, and unreliable connectivity—particularly in rural areas—remain substantial barriers to adoption and effective use (Jashim and Tuhin 2017). Socio-cultural factors, including gender norms and distrust in providers, may also limit service utilization among certain populations.

A key insight from user feedback is the prioritization of platform features. The chart analysis indicates that the Bidding System in Payment is a "Must Have" feature, essential for user satisfaction and thus should be prioritized in development. Features categorized as "One Dimensional"—including Real-Time Tracking, Information about the Nearest Hospital and Doctors, and Post-Emergency Follow-Up and Support—are highly valued by users and directly enhance the platform's effectiveness and reliability. These findings align with research showing that real-time tracking and improved communication between facilities and ambulance staff are crucial for reducing delays and improving care quality.

Attractive features such as Finding Blood Donors and Event Coverage Services can further increase the platform's appeal, though they are not as critical as core functionalities. In contrast, Community Awareness Services are considered supplementary, providing additional value but not being primary user concerns.

International experiences reinforce the importance of tailoring digital health interventions to local needs and ensuring robust system design, financing, and partnerships. For example, GPS-enabled tracking and automated dispatch have been shown to improve response times and patient outcomes, while user-friendly interfaces and clear communication channels are essential for adoption. The success of such platforms also depends on integrating public and private ambulance services under a coordinated authority and addressing socio-cultural barriers through community engagement and gender-sensitive approaches.

References

- Sakib, A. M., Alam, S. A. and Islam, A., User-centered design and validation of mHealth app for providing vital assistance and emergency healthcare support in Bangladesh, *Proc. Int. Congr. Hum.-Comput. Interact. Optim. Robot. Appl. (HORA)*, pp. 1–6, 2024, doi:10.1109/HORA60116.2024.10499913.
- Khan, F., Tulon, T. A., Masrur, N., Hasan, M. J., Badrul, T. and Islam, A., Development and evaluation of ShasthoBondhu: mHealth app for guiding emergency remote healthcare with wearable IoT and AI fusion, *Proc. Adv. Sci. Eng. Technol. Int. Conf. (ASET)*, pp. 1–6, 2024, doi:10.1109/ASET60123.2024.10500123.
- Winders, W. T., Garbern, S., Bills, C., Relan, P., Schultz, M., Trehan, I., Kivlehan, S., Becker, T. and McQuillan, R., The effects of mobile health on emergency care in low- and middle-income countries: A systematic review and narrative synthesis, *J. Glob. Health*, vol. 11, pp. 04056, 2021, doi:10.7189/jogh.11.04056.
- McCool, J., Dobson, R., Whittaker, R. and Paton, C., Mobile health in low- and middle-income countries, *Annu. Rev. Public Health*, vol. 43, pp. 525–542, 2021, doi:10.1146/annurev-publhealth-052220-105843.
- Relyea, B., Wringe, A., Afaneh, O., Malamas, I., Teodoro, N., Ghafour, M. A. and Scott, J., Stakeholders' perspectives on the challenges of emergency obstetric referrals and the feasibility and acceptability of an mHealth intervention in Northern Iraq, *Front. Glob. Womens Health*, vol. 2, pp. 682112, 2021, doi:10.3389/fgwh.2021.682112.

- Hui, C., Abdulla, A., Ahmed, Z., Goel, H., Habib, G. M. M., Hock, T. T., Khandakr, P., Mahmood, H., Nautiyal, A., Nurmansyah, M., Panwar, S., Patil, R., Rinawan, F. R., Salim, H., Satav, A., Shah, J., Shukla, A., Tanim, C. Z. H., Balharry, D. and Pinnock, H., Mapping national information and communication technology infrastructure to the requirements of potential digital health interventions in low- and middle-income countries, *J. Glob. Health*, vol. 12, pp. 04094, 2022, doi:10.7189/jogh.12.04094.
- Islam, M., Karim, M. M., Inan, T. T. and Islam, A., Investigating usability of mobile health applications in Bangladesh, *BMC Med. Inform. Decis. Mak.*, vol. 20, pp. 19, 2020, doi:10.1186/s12911-020-1036-0.
- Otorokpa, O. J., Alao, J. O. and Olaiya, A. P., Enhancing monitoring and evaluation of digital health interventions in sub-Saharan Africa: Big data, mHealth, and dashboards, *J. Glob. Health*, vol. 15, pp. 03001, 2025, doi:10.7189/jogh.15.03001.
- Khatun, F., Heywood, A., Ray, P., Bhuiya, A. and Liaw, S., Community readiness for adopting mHealth in rural Bangladesh: A qualitative exploration, *Int. J. Med. Inform.*, vol. 93, pp. 49–56, 2016, doi:10.1016/j.ijmedinf.2016.05.012.
- Zaman, M., Hridhee, R. A., Bhuiyan, R. A., Gomes, C. A., Rahman, M. M., Islam, S. M. S., Sarker, F. and Mamun, K., Efficacy of using a digital health intervention model using community health workers for primary health services in Bangladesh, *BMC Public Health*, vol. 25, pp. 22770, 2025, doi:10.1186/s12889-025-22770-9.
- Backman, C., Papp, R., Tonjock Kolle, A., Papp, S. R., Visintini, S., Schaefer Ferreira de Mello, A. L., Marcellino de Melo Lanzoni, G. and Harley, A., Platform-based patient-clinician digital health interventions for care transitions: A scoping review, *J. Med. Internet Res.*, vol. 26, pp. e54013, 2024, doi:10.2196/54013.
- Owoyemi, A., Osuchukwu, J. I., Azubuike, C., Ikpe, R., Nwachukwu, B., Akinde, C. B., Biokoro, G. W., Ajose, A. B., Nwokoma, E. I., Mfon, N. E., Benson, T. O., Ehimare, A., Irowa-Omoregie, D. and Olaniran, S., Digital solutions for community and primary health workers: Lessons from implementations in Africa, *Front. Digit. Health*, vol. 4, pp. 900123, 2022, doi:10.3389/fgth.2022.900123.
- Miah, S., Hasan, N., Hasan, R. and Gammack, J., Healthcare support for underserved communities using a mobile social media platform, *Inf. Syst.*, vol. 69, pp. 1–12, 2017, doi:10.1016/j.is.2017.04.002.
- Moise, I. K., Ivanova, N., Wilson, C. O., Wilson, S., Halwindi, H. and Spika, V., Lessons from digital technology-enabled health interventions implemented during the coronavirus pandemic to improve maternal and birth outcomes, *BMC Pregnancy Childbirth*, vol. 23, pp. 204, 2023, doi:10.1186/s12884-023-05513-2.
- Uddin, J., Biswas, T., Adhikary, G., Ali, W., Alam, N., Palit, R., Uddin, N., Uddin, A., Khatun, F. and Bhuiya, A., Impact of mobile phone-based technology to improve health, population and nutrition services in rural Bangladesh, *BMC Med. Inform. Decis. Mak.*, vol. 17, pp. 82, 2017, doi:10.1186/s12911-017-0482-5.
- Taiser, S. M., Islam, M. T., Patwary, M. K. H. and Hossain, M. S., A doctor–patient portal for effective healthcare, *SISFORMA*, vol. 6, no. 2, pp. 123–130, 2019, doi:10.24127/sisforma.v6i2.2347.
- Gatebe Kironji, A., Hodkinson, P. and Stewart de Ramirez, S., Identifying barriers for out-of-hospital emergency care in low- and low-middle income countries: A systematic review, *BMC Health Serv. Res.*, vol. 18, pp. 291, 2018, doi:10.1186/s12913-018-3091-0.
- Moussally, J., Saha, A. C. and Madden, S., TraumaLink: A community-based first-responder system for traffic injury victims in Bangladesh, *Glob. Health Sci. Pract.*, vol. 10, no. 3, pp. e2200107, 2022, doi:10.9745/GHSP-D-22-00107.
- Hossain, M. F., Sharmin, M. and Ahmed, S., Bangladesh emergency services: A mobile application to provide 911-like service in Bangladesh, *Proc. ACM SIGCAS Conf. Comput. Sustain. Soc.*, pp. 1–9, 2018, doi:10.1145/3209811.3209872.
- Shah, B., Krishnan, N., Kodish, S. R., Yenokyan, G., Fatema, K., Uddin, K. B., Rahman, A. and Razzak, J., Applying the three delays model to understand emergency care seeking and delivery in rural Bangladesh, *BMJ Open*, vol. 10, no. 12, pp. e042760, 2020, doi:10.1136/bmjopen-2020-042760.
- Ahmed, S., Adams, A., Islam, R., Hasan, S. M. and Panciera, R., Impact of traffic variability on geographic accessibility to 24/7 emergency healthcare for the urban poor, *PLoS ONE*, vol. 14, no. 9, pp. e0222488, 2019, doi:10.1371/journal.pone.0222488.
- Friesen, J., Kharel, R. and Delaney, P. G., Emergency medical dispatch technologies: Addressing communication challenges and coordinating emergency response in low- and middle-income countries, *Surgery*, vol. 175, no. 4, pp. 1010–1017, 2024, doi:10.1016/j.surg.2023.12.021.
- Delaney, P. G., Moussally, J. and Wachira, B. W., Future directions for emergency medical services development in low- and middle-income countries, *Surgery*, vol. 175, no. 4, pp. 1018–1025, 2024, doi:10.1016/j.surg.2023.12.022.

Barua, M., Chowdhury, S., Saha, A., Mia, C., Sajow, S. H. and Sarker, M., Community-based referral transportation system for accessing emergency obstetric services in the Rohingya refugee camp during the COVID-19 pandemic, *Confl. Health*, vol. 16, pp. 62, 2022, doi:10.1186/s13031-022-00477-2.

Hossain, M. M., Kroeger, A., Pervin, K., George, N., Be-Nazir, A., Kadir, A. M. and Busch, H. J., Emergency medical rescue services in Dhaka city, Bangladesh: A situational analysis and needs assessment, *Int. J. Crit. Care Emerg. Med.*, vol. 8, pp. 106, 2022, doi:10.23937/2474-3674/1510106.

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