



Digital Transformation of Informal Recurring- Revenue Meal Services: The Design and Analytical Evaluation of a Two-Sided Subscription Marketplace

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Abstract

The unorganized mess, tiffin, and home-kitchen sector serve tens of millions of Indian students, coaching aspirants, and urban migrants, yet remains almost entirely outside formal digital commerce. Existing food-technology platforms are designed for single-order, on-demand delivery and do not address the recurring, subscription-based nature of daily meal arrangements. This paper applies Design Science Research (DSR) to specify and analytically evaluate "MessConnect", a proposed two-sided digital-platform artefact designed to formalize this segment through verified vendor discovery, attendance-linked subscription billing, cashless payments, and a WhatsApp-first interface for low-digital-literacy vendors. Following the six-phase DSR process model of Peffers, Tuunanen, Rothenberger, and Chatterjee (2007), the paper documents problem identification, solution objectives, artefact design (including use-case, entity-relationship, sequence, wireframe, and workflow diagrams), and an analytical (expert-review and literature-grounded) evaluation of the proposed platform, business model, and technology architecture, situating the design within two-sided-market, informal-sector-digitization, and technology-acceptance literature. The paper's scholarly contribution is fourfold: (i) a structured comparative positioning of the artefact against existing single-order food-delivery platforms, subscription-box models, and hostel/PG aggregators; (ii) a conceptual research model linking the artefact's design constructs to adoption and retention outcomes; (iii) three testable propositions and a fully specified empirical validation protocol; and (iv) four design principles (DP1–DP4), a recognized form of generalizable DSR knowledge, distilled from the analytical evaluation for application beyond this single case. Consistent with DSR reporting norms, the paper explicitly distinguishes the analytical evaluation reported here from the empirical (field) evaluation that remains to be conducted, and presents no primary survey, interview, or transaction data as already collected.

Keywords: design science research; platform economy; two-sided marketplace; informal sector digitization; subscription business model; technology acceptance

1. Introduction

Every year, an estimated four crore (40 million) students migrate within India for higher education, professional coaching, and vocational training, and several crore additional working professionals relocate to cities for employment (AISHE, 2023). Almost all of this population depends on daily meal arrangements provided by unorganized messes, tiffin services, and home kitchens — a market that has developed almost entirely offline, governed by cash payments, word-of-mouth referrals, and handwritten billing registers. This paper uses the proposed venture "MessConnect" as a case study through which to examine how digital platform design can address the structural inefficiencies of this segment.

The core research problem is twofold. On the demand side, students and migrants relocating to unfamiliar cities have no structured way to discover, compare, or verify the hygiene and pricing of nearby meal providers before committing to a monthly plan, and no mechanism to pause a subscription during travel, examinations, or illness. On the supply side, mess and tiffin owners

— typically small, cash-dependent, and often unfamiliar with complex software interfaces — have no digital storefront, no automated billing or attendance system, and no channel to reach new customers beyond flyers and referrals. Existing food-delivery platforms such as Swiggy and Zomato are optimized for one-off, on-demand transactions and have not built dedicated tooling for month-long subscription and attendance-based billing (Eisenmann, Parker, & Van Alstyne, 2006).

This study follows a Design Science Research (DSR) approach (Hevner, March, Park, & Ram, 2004; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007), in which the research contribution is a specified and analytically evaluated artefact — the MessConnect platform design. It does not report primary survey, interview, or transaction data. Its contribution is (a) a rigorous, literature-grounded specification and analytical evaluation, and (b) a fully specified platform has been built by which the propositions generated from that evaluation can subsequently be tested empirically.

The research questions guide the study:

Q1. What structural frictions in the unorganized mess/tiffin/home-kitchen sector remain unaddressed by existing single-order food-delivery platforms, and how does a subscription- based, attendance-linked design address them?

Q2. How does a dual-channel (App + WhatsApp) vendor-onboarding design align with, extend, or diverge from established two-sided-market and digital-inclusion theory?

Q3. What testable propositions and empirical validation protocols follow from an analytical evaluation of this design, sufficient to support a subsequent field study?

The objectives of the study are to

- (i) Characterize the structural gap between existing food-delivery platforms and the subscription-based meal needs of students and migrants;
- (ii) Analyze the two-sided marketplace design proposed to close this gap, with particular attention to low-digital-literacy vendor inclusion;
- (iii) Assess the operational feasibility of the proposed model at a conceptual level, treating the source DPR's financial projections as unverified founder-assumption inputs rather than a validated cost analysis; and
- (iv) Derive testable propositions and a validation protocol — rather than final conclusions — regarding the venture's real-world viability.

2. Literature Review

2.1 Two-Sided Platform Markets

Two-sided markets are characterized by a platform that creates value primarily by enabling direct interactions between two distinct groups of affiliated users, with the value to each side depending on the number of participants on the other side — a network externality first formalized by Rochet and Tirole (2003). Eisenmann, Parker, and Van Alstyne (2006) further identify "winner-take-most" dynamics and the importance of designing pricing and onboarding strategies that solve the chicken-and-egg problem of simultaneously attracting supply and demand. Parker, Van Alstyne, and Choudary (2016) extend this into a broader "platform revolution" framework, arguing that platforms succeed by shifting value creation from internally controlled resources to externally facilitated interactions. MessConnect's design — subsidized zero-commission onboarding for founding vendors alongside referral-driven student acquisition — reflects a textbook application of this cold-start strategy, though its effectiveness in a low-digital-literacy, cash-first vendor base has not been empirically tested.

2.2 Digitization of Informal and Unorganized Sectors

A distinct stream of literature examines how digital platforms formalize unorganized markets in emerging economies. Foster and Heeks (2013) describe how mobile and platform technologies can extend market access to "bottom of the pyramid" micro-entrepreneurs, while cautioning that digital inclusion depends heavily on interface design matching users' existing digital literacy and communication habits rather than assuming smartphone-app fluency. This is directly relevant to MessConnect's WhatsApp-first vendor experience, which substitutes a conversational interface for a conventional dashboard app to accommodate vendors who are comfortable with messaging but not with structured software. Studies of India's gig and informal-service digitization (e.g., ride-hailing, hyperlocal grocery, and domestic-services platforms) consistently find that trust-building mechanisms — verified ratings, hygiene or quality certification, and transparent pricing — are the primary levers by which digital intermediaries displace word-of-mouth referral networks (NASSCOM, 2022).

2.3 Subscription and Recurring-Revenue Business Models

Subscription commerce differs from transactional commerce in its unit economics: customer lifetime value depends on retention and churn rather than per-order margin (Zott & Amit, 2010; Tzuo & Weisert, 2018). Business-model design in subscription contexts must therefore address pause/resume flexibility, pro-rata billing, and academic- or seasonal-cycle churn patterns — considerations largely absent from single-order food-delivery literature but central to MessConnect's proposed billing engine, which links attendance data directly to monthly invoicing. Teece (2010) argues that business-model innovation, rather than technology alone, is often the primary source of competitive advantage in digitizing an existing value chain, a framing consistent with MessConnect's positioning: it does not claim novel food-delivery technology but a novel recurring-billing and trust architecture layered on an existing informal supply base.

2.4 Technology Acceptance in Food-Delivery and Merchant-Digitisation Contexts

A substantial empirical literature exists on technology acceptance for food-delivery and merchant-digitization platforms. Offering constructs this paper draws on when specifying the validation protocol in Section 7. Using the Unified Theory of Acceptance and Use of Technology (UTAUT), Puriwat and Tripopsakul (2021) found that performance expectancy, effort expectancy, and social influence significantly predicted behavioural intention to use food-delivery mobile applications, with the model explaining a substantial share of variance in adoption intention. Extending UTAUT2 with food-safety and hygiene perceptions, Athari et al. (2022) found that facilitating conditions, habits, and perceived food-safety/hygiene significantly influenced behavioural intention to use mobile food-delivery applications, using structural equation modelling on a merchant-city consumer sample — directly relevant to MessConnect's hygiene-rating design element. On the supply side, Ligon, Malick, Sheth, and Trachtman (2019), in a large-sample study of small-scale merchants in Jaipur, India,

found that low adoption of digital payment technologies was driven primarily by demand-side factors rather than supply-side infrastructure barriers, since most surveyed merchants already had the smartphones, bank accounts, and literacy needed to transact digitally. This is a materially important finding for MessConnect's vendor-onboarding assumptions: it suggests the binding constraint on vendor digitization may not be digital literacy per se but perceived customer demand and commission economics.

2.5 Comparative Summary and Research Gap

Table 1 synthesizes the literature reviewed above against Mess Connect's specific design context, following standard practice for structured literature synthesis in design-science and information-systems research.

Table 1. Literature Synthesis: Author, Focus/Method, Key Finding, Limitation, and Relevance to This Study

Author(s)	Focus / Method	Key Finding	Limitation	Gap / Relevance
Rochet & Tirole (2003)	Analytic al theory, two-sided markets	Formalized network externalities across platform sides	Abstract economic theory; no sector-specific application	Provides the theoretical base for MessConnect's two-sided design but not sector- specific guidance
Eisenman n, Parker & Van Alstyne (2006)	Concept ual, platform strategy	Identified cold-start/onboardi ng strategies for two-sided markets	Framed around US tech- platform cases, not informal-economy vendors	Applied here to justify zero- commission vendor onboarding, but untested for cash- first micro-vendors
Foster & Heeks (2013)	Concept ual, inclusive innovatio n	Digital inclusion depends on interface fit with users' existing literacy/habit s	General framework; not food- service or India- specific	Motivates MessConnect's WhatsApp-first design; not empirically tested for this sector
Ligon, Malick, Sheth & Trachtman (2019)	Empirica l survey, 1,003 merchant s, Jaipur, India	Low digital-payment adoption driven by demand-side, not supply-side/literacy, factors	Payments only; does not cover subscription/ attendance billing	Suggests MessConnect's low-literacy design assumption may need re-testing against demand-side factors (Section 7)
Puriwat & Tripopsakul (2021)	Empirica l SEM survey, 223 users, Thailand	Performance/ effort expectancy and social influence predict food- delivery app adoption	Single-order delivery context, not subscription	Provides validated UTAUT constructs adapted for the Section 7 protocol
Athari et al. (2022)	Empirica l SEM- PLS survey, 244 users, Indonesi a	Hygiene/food -safety perception and facilitating conditions predict adoption intention	Single-order delivery context, not subscription	Directly informs the hygiene-rating construct in the proposed protocol
Zott & Amit (2010); Teece (2010)	Concept ual, business-model design	Business-model innovation, not technology alone, drives competitive	General strategy theory; not sector-specific	Frames MessConnect's contribution as billing/trust-model innovation over an existing informal supply base

While platform-economy theory, informal-sector-digitization studies, and food-delivery technology-acceptance research are each individually well developed, no identified published study examines the specific intersection of (a) subscription-based, attendance-linked billing, (b) dual-interface (app plus conversational/WhatsApp) vendor onboarding for low-digital-literacy micro-entrepreneurs, and (c) the

recurring meal-subscription needs of a large, geographically concentrated student and migrant population. Table 1 further shows that the closest empirical analogue (Ligon et al., 2019) finds a result — demand-side rather than literacy-side adoption barriers — that runs counter to the assumption embedded in MessConnect's WhatsApp-first design, which is precisely the kind of tension a DSR analytical evaluation should surface rather than obscure. This paper addresses that gap by using MessConnect as a structured artefact through which these elements can be jointly specified, analytically evaluated, and translated into testable propositions.

2.6 Comparative Positioning Against Existing Systems

A design artefact's novelty claim is only meaningful relative to what already exists. Table 2 positions MessConnect against three categories of incumbent system: single-order food-delivery platforms (Swiggy, Zomato), which dominate India's food-tech market but are architected around per-order transactions; generic subscription-box/meal-kit platforms, which handle recurring billing but not attendance-linked consumption or informal-vendor onboarding; hostel/PG accommodation aggregators (e.g., Stanza Living-type operators), which touch the same student population but treat food as a bundled amenity rather than a standalone subscription product; and the status-quo informal mess/tiffin system itself, which has no digital layer at all. This is a structural feature comparison based on each category's publicly known business model and the source DPR's own competitive-analysis section, not a quantitative benchmark of usage, revenue, or performance metrics, which would require field data this paper does not claim to have.

Table 2. Structural Comparison of MessConnect Against Existing System Categories

Dimension	Swiggy / Zomato (Single-Order)	Subscription Box / Meal-Kit Platforms	Hostel/PG Aggregators	MessConnect (Proposed)
Billing model	Per-order, pay-as-you-go	Fixed recurring subscription	Bundled into rent, not itemised	Attendance-linked recurring subscription
Attendance/consumption linkage	None (each order is independent)	None (fixed box regardless of use)	None	Daily attendance directly adjusts monthly invoice
Vendor onboarding channel	App/web dashboard only	Centralised, own-brand supply	N/A (accommodation-side vendors)	Dual-channel: app + WhatsApp for low-literacy vendors
Target population fit	General consumer, urban	General consumer, urban	Students/migrants (housing only)	Students, coaching aspirants, migrants (meals specifically)
Pause/resume flexibility	N/A (no subscription)	Limited (skip-a-box only)	N/A	Pro-rata pause/resume for travel, exams, illness
Hygiene/trust verification	Restaurant licensing (general)	Centralised QA (own supply)	N/A	Per-vendor FSSAI verification + hygiene rating

This comparison sharpens the novelty claim first raised in Section 1: MessConnect's differentiation is not in any single feature (subscription billing, hygiene verification, and low-literacy vendor tools each exist elsewhere in isolation) but in the specific combination of attendance-linked billing with dual-channel vendor onboarding, applied to a segment (informal mess/tiffin/home-kitchen) that none of the compared categories directly serves. Whether this combination constitutes a defensible competitive advantage in practice — as opposed to an easily replicated feature bundle — is itself a question the empirical protocol in Section 7 is positioned to inform, once real adoption and retention data exist.

3. Research Methodology

This study follows the six-phase Design Science Research Methodology (DSRM) process model of Peffers, Tuunanen, Rothenberger, and Chatterjee (2007), grounded in the design-science guidelines of Hevner, March, Park, and Ram (2004). DSRM is appropriate here because the research contribution is an artefact — a platform design, business model, and technology architecture — rather than a behavioural phenomenon to be explained; Hevner et al. (2004) similarly distinguish design-science research, which builds and evaluates purposeful

artefacts, from behavioural-science research, which explains or predicts human or organisational behaviour with already-deployed systems. Table 3 maps each DSRM phase to the section of this paper in which it is addressed, and states explicitly what evidence base each phase relies on.

Table 3. Mapping of the Peffers et al. (2007) DSRM Phases to This Paper

DSRM Phase	Addressed In	Evidence Base / Method Used
1. Problem identification & motivation	Section 1	Problem statement and persona-based demand analysis from the source DPR; secondary statistics (AISHE)
2. Objectives of a solution	Section 1 (RQ1–RQ3)	Derived from problem statement; no primary data collected
3. Design & development	Section 4	Artefact specification (business model, system architecture, technology stack) as documented in the source DPR
4. Demonstration	Section 4 (Figures 1–7, Table 4)	Conceptual walkthrough of the artefact — architecture, technology stack, use-case, ER, sequence, UI wireframe, and workflow diagrams — against the personas and frictions defined in Phase 1; no working prototype built or deployed
5. Evaluation	Section 5	Analytical/expert-review evaluation against Hevner et al. (2004) design-evaluation criteria and the literature synthesis in Table 1 — not empirical/field evaluation
6. Communication	This paper; Section 7 protocol	Manuscript submission; a fully specified empirical validation protocol is provided for a subsequent, separate field study

Consistent with DSRM reporting norms, it is necessary to be explicit about the evaluation method used in Phase 5. Hevner et al. (2004) identify several legitimate evaluation methods for a design artefact, ranging from purely analytical methods (static analysis, architecture analysis, optimisation, dynamic analysis) and expert-review/scenario-based methods, through to empirical methods (controlled experiments, field studies, surveys). This paper conducts an analytical, literature-grounded evaluation — the artefact's specification is checked for internal consistency, checked against the frictions it claims to solve, and checked against established two-sided-market, informal-sector-digitisation, and technology-acceptance literature (Table 1). It does not conduct an empirical evaluation: no survey, interview, experiment, or field-deployment data has been collected for this artefact. This distinction is maintained throughout the paper, and Section 7 specifies the empirical evaluation protocol needed to complete the DSRM cycle in future work.

The primary data source for the artefact specification is the venture's internal Detailed Project Report (DPR), comprising: (i) problem-statement and persona-based demand analysis; (ii) a founder-estimated Total Addressable Market / Serviceable Addressable Market / Serviceable Obtainable Market (TAM-SAM-SOM) sizing; (iii) the proposed product feature set, technology architecture, and monetisation streams; (iv) a five-year illustrative financial plan; and (v) a risk heat-map covering operational, regulatory, and adoption risks. All market-sizing and financial figures in the source DPR are founder assumptions rather than independently verified or field-collected data; this paper treats them as artefact-design inputs to be analytically examined and, ultimately, empirically tested — not as validated findings — and flags every such figure accordingly, most directly in Section 4.

4. Proposed Business Model and System Architecture

MessConnect is designed as a two-sided marketplace in which students, coaching aspirants, hostel residents, and city migrants (demand side) discover, compare, and subscribe to verified nearby mess, tiffin, and home-kitchen providers (supply side). The core value proposition differs by side: students receive verified discovery, transparent pricing and hygiene ratings, cashless UPI/AutoPay subscriptions, and pause/resume flexibility with pro-rata refunds; vendors receive a zero-cost digital storefront, automated attendance-linked billing, payout reconciliation, and a lead-generation channel; the platform itself captures a scalable, asset-light marketplace position with recurring subscription revenue and a structured behavioural dataset on student food consumption. The system architecture comprises three components. The student-facing app supports location-based discovery, subscription-plan selection (monthly/weekly/trial), QR- or geo-based attendance check-in linked automatically to billing adjustments, and in-app support and referral mechanisms. The vendor-facing layer is deliberately dual-channel: a dashboard app provides menu, pricing, and analytics management for digitally comfortable vendors, while a parallel WhatsApp-based interface allows attendance confirmation and payout

notifications for vendors who are not comfortable adopting a new application interface — directly addressing the digital- inclusion concern raised in Section 2.2. An admin/super-admin panel manages vendor verification and FSSAI documentation workflows, dispute resolution, and revenue/commission reconciliation across the platform's monetisation streams.

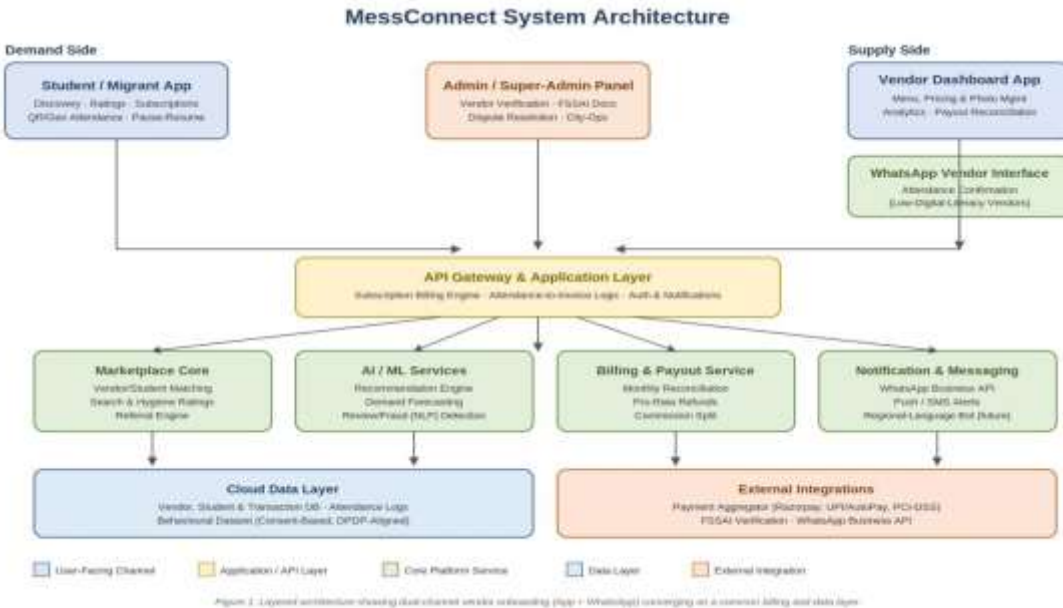


Figure 1. MessConnect Layered System Architecture Table 4. Illustrative Monetisation Streams

Stream	Description
Subscription commission	Percentage commission (illustratively 15–18%) on vendor subscription billing
Premium vendor tier	Enhanced visibility, analytics, and marketing placement for a flat/subscription fee
Advertising	Sponsored placement for vendors within campus- radius search results
Data/insights licensing	Aggregated, anonymised demand and pricing insights for institutional or FMCG partners
B2B SaaS (future)	White-labelled billing/attendance engine licensed to hostel chains and institutional canteens

Three artificial-intelligence-enabled features are proposed to extend this architecture over time: collaborative-filtering-based vendor recommendation using past subscription, rating, and dietary-preference data; demand forecasting per vendor to support procurement planning and reduce food wastage; and NLP-based review and fraud analysis to detect fake reviews and anomalous attendance or billing patterns. A later-phase, LLM-based conversational assistant is proposed for WhatsApp-based plan discovery and vendor query handling in regional languages including Marathi and Hindi, extending the low-digital-literacy accessibility principle from vendor onboarding into ongoing support.

To ground the architecture in Figure 1 at an implementation level, Figure 2 sets out the concrete technology stack proposed for each layer. The presentation layer uses Flutter for a single cross-platform mobile codebase (student and vendor apps) and React.js/TypeScript for the admin web panel, reducing engineering overhead during the pilot phase. The backend is a Node.js (Express/NestJS) REST and WebSocket API layer housing the subscription-billing engine, with data persistence split between Firebase (auth, real-time chat/notifications) and PostgreSQL on AWS RDS for transactional and financial records — a deliberate separation of real-time-convenience data from audit-sensitive billing data. AI/analytics runs as an independent Python microservice, and cloud infrastructure (AWS EC2/ECS, S3, CloudFront, Lambda, container-based auto-scaling) is designed to support expansion from a single pilot city to multi-city rollout without re-platforming. Security and compliance (OAuth2/JWT, TLS 1.3, PCI-DSS via Razorpay, role-based access control) is treated as a cross-cutting concern spanning every layer rather than a discrete module, which is consistent with the platform's regulatory obligations discussed in Section 6.

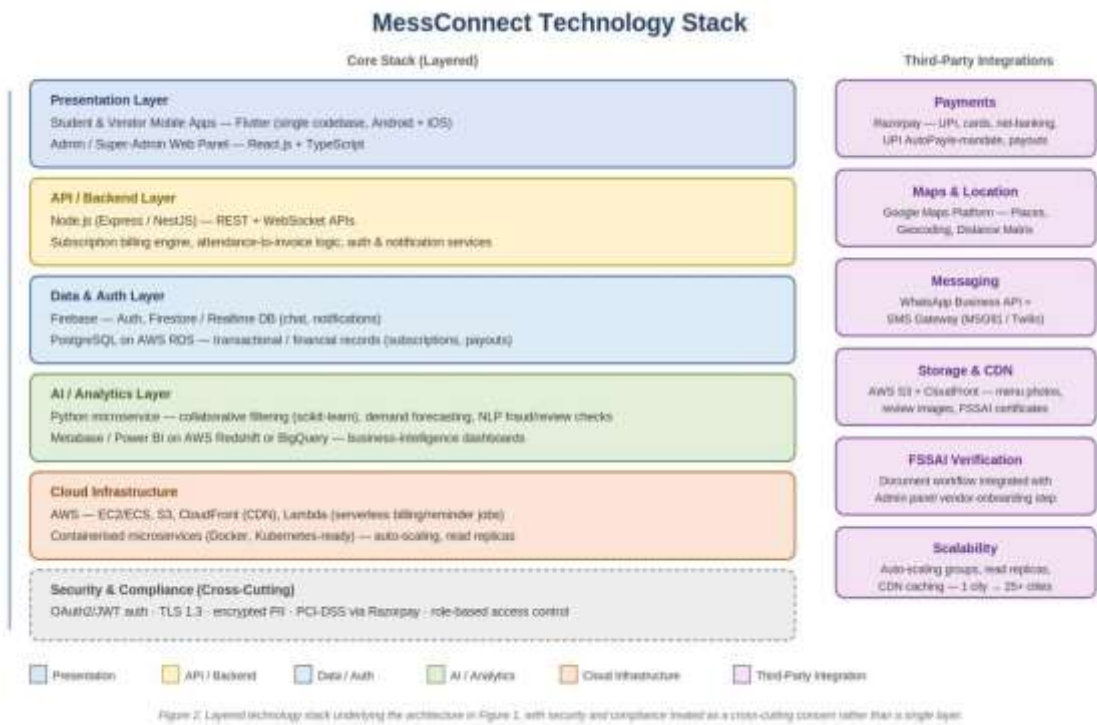


Figure 2. MessConnect Technology Stack by Architectural Layer

4.7 Additional Design Artefacts (DSRM Phase 3: Design and Development)

To complete the artefact specification required by DSRM Phase 3 (Section 3, Table 3), Figures 3–7 provide the standard software-engineering design views — use-case, entity-relationship, sequence, low-fidelity UI wireframe, and workflow diagrams — derived directly from the feature set, data entities, and process flow already specified in Section 4 and in the source DPR. As with Figures 1–2, these are design-specification artefacts, not screenshots or logs of a running system: no codebase has been reviewed or executed in producing them, and they should be read as the artefact design that DSRM Phase 4 (demonstration) and Phase 5 (evaluation) in Section 7 evaluate, not as evidence of an already-built and tested application.

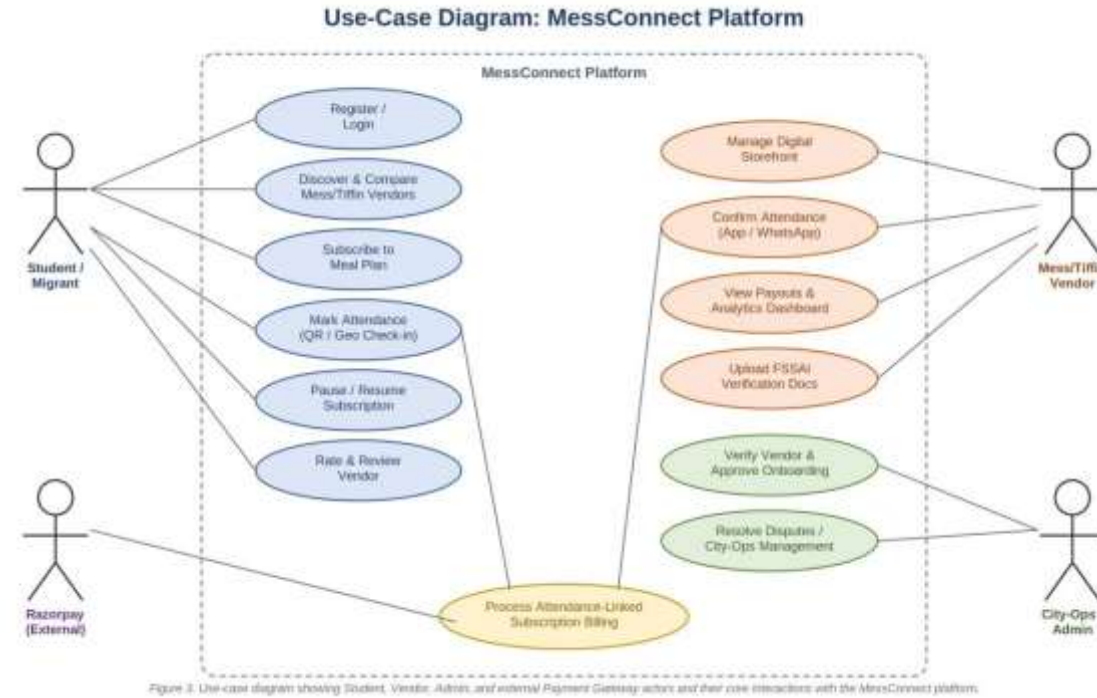


Figure 3. Use-Case Diagram — Student, Vendor, Admin, and Payment-Gateway Actor Interactions

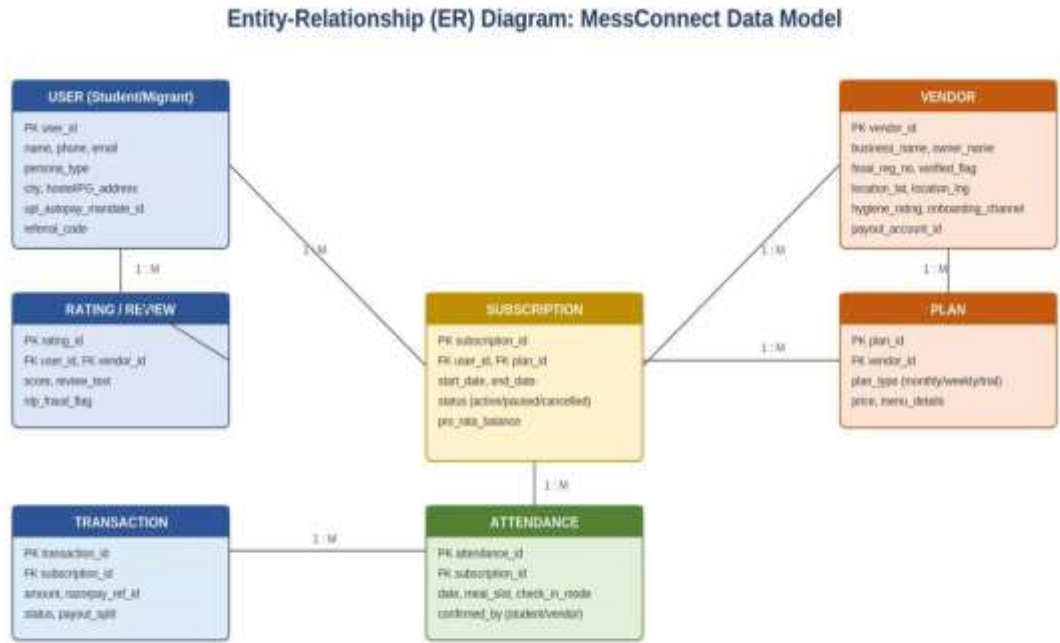


Figure 4. Entity-relationship diagram: USER and VENDOR are linked through PLAN, SUBSCRIPTION, ATTENDANCE, TRANSACTION, and RATING entities that together implement attendance-linked billing

Figure 4. Entity-Relationship Diagram — Core Data Model

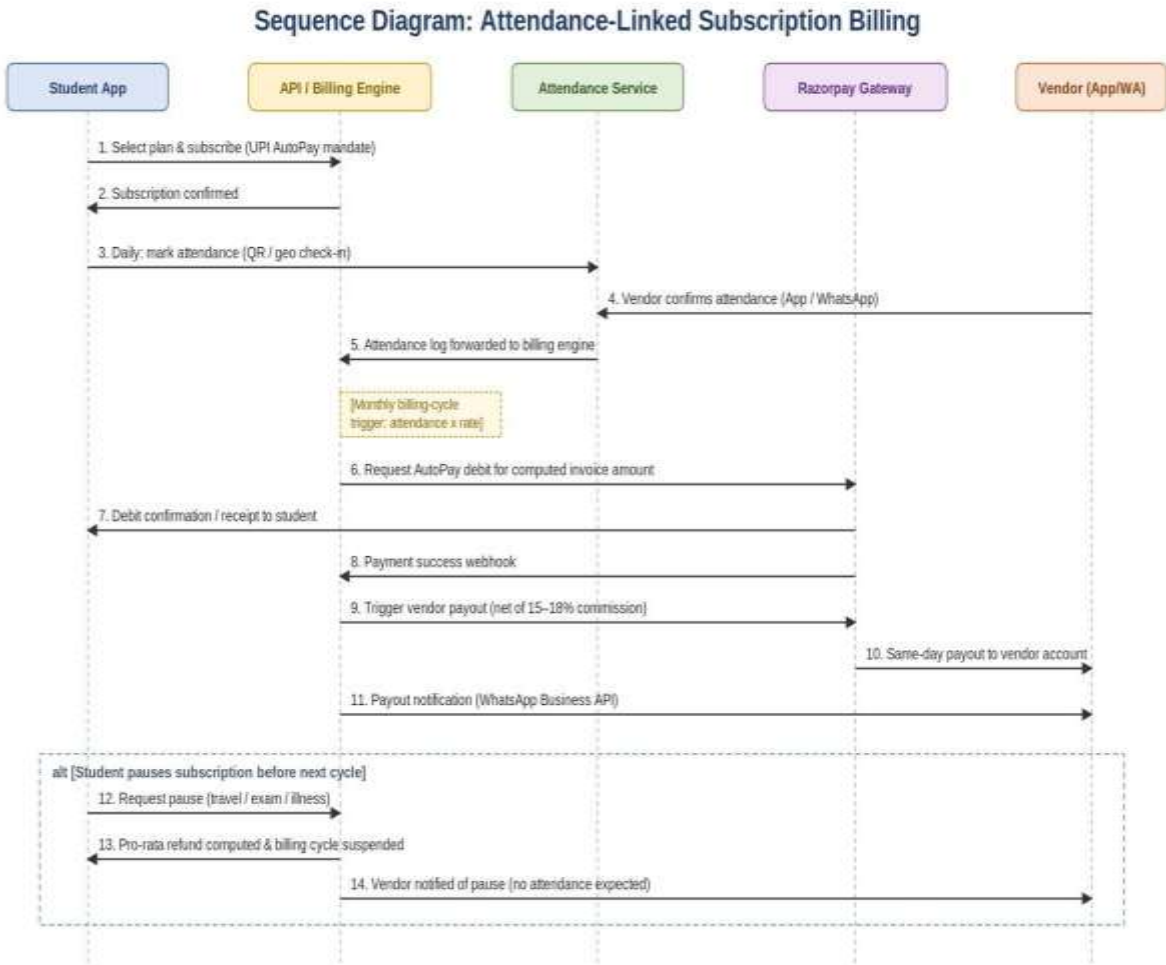


Figure 5. Sequence diagram for the attendance-to-invoice billing cycle, including the pause/resume alternate flow

Figure 5. Sequence Diagram — Attendance-Linked Subscription Billing Cycle



Figure 6. Low-fidelity wireframes: Student discovery, subscription/plan selection, and attendance screens; Vendor dashboard with WhatsApp-party quick actions.

Figure 6. Low-Fidelity UI Wireframes — Student App and Vendor Dashboard

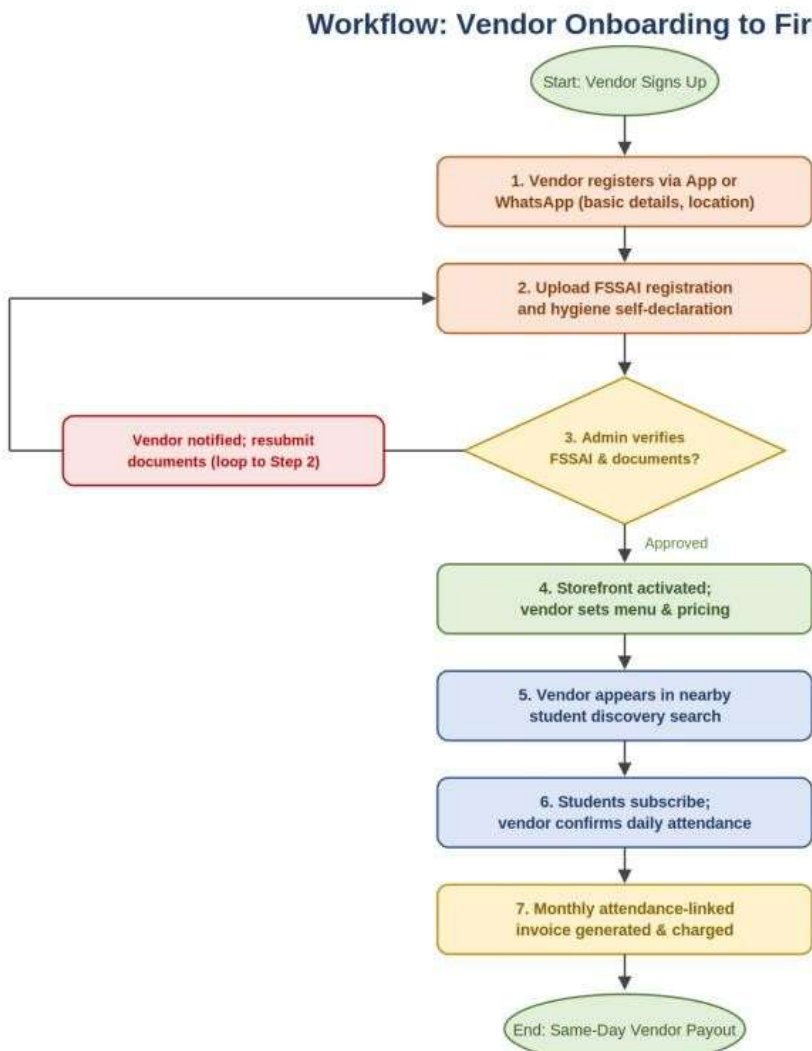


Figure 7. Vendor onboarding workflow from sign-up through FSSAI verification to first attendance-linked payout.

Figure 7. Vendor Onboarding Workflow — Sign-Up to First Payout

4.8 Design Rationale

Each major design choice specified above is a response to a specific friction or theoretical consideration, rather than an arbitrary feature addition, and it is useful to make that reasoning explicit before the evaluation in Section 5. Attendance-linked billing (Figures 4–5) was chosen over fixed monthly billing because the problem statement (Section 1) identifies exam-week and travel-related meal skipping as a recurring source of subscriber dissatisfaction with informal, non-itemized mess billing; linking invoice amount to logged attendance is the direct design response. Dual-channel vendor onboarding (Figure 6) was chosen because Foster and Heeks (2013) motivate interface design around users' existing communication habits rather than assumed smartphone-app fluency — though, as Section 5.2 discusses, this rationale is now in explicit tension with Ligon et al.'s (2019) demand-side finding, and the design retains both channels precisely so that the Section 7 protocol can determine which vendors actually need the WhatsApp path rather than assuming all low-literacy vendors do. Hygiene rating and FSSAI verification were chosen because UTAUT2 studies in food-delivery contexts (Athari et al., 2022) find hygiene perception a significant predictor of adoption intention, giving this feature a theoretical rather than purely intuitive justification. Pause/resume flexibility was chosen because subscription-commerce literature (Zott & Amit, 2010) identifies churn management, not per-order margin, as the central unit-economics lever for recurring-revenue models, and the academic calendar of admission cycles and vacation breaks makes seasonal churn a first-order, predictable risk rather than an edge case. Table 2's comparison confirms that none of these four elements exists in combination in the compared system categories, which is the specific combination this paper's contribution rests on.

5. Analytical Evaluation of the Design (DSRM Phase 5)

This section reports the analytical (non-empirical) evaluation specified in Section 3: the artefact design is checked against problem-solution fit, theoretical fit, and internal consistency, following Hevner et al.'s (2004) design-evaluation guidelines for analytical and expert-review methods. No survey, usability test, or field data underlies the statements in this section; each claim is a reasoned analytical judgement, and each is translated into an explicit, falsifiable proposition (P1–P3) for the empirical protocol in Section 7.

5.1 Problem-Solution Fit

Evaluated against problem-solution fit, the proposed design addresses each friction identified in the problem statement: verified discovery and hygiene ratings target the lack of pre-commitment comparison; UPI/AutoPay billing targets the cash-only, receipt-less payment problem; pause/resume logic targets the lack of flexibility during travel or examinations; and the WhatsApp-first vendor layer targets the digital-literacy barrier to vendor participation identified in Section 2.2. This is an analytical judgement of design intent, not a measured outcome — whether each feature actually resolves its targeted friction for real users is precisely what Section 7's protocol is designed to test.

5.2 Theoretical Fit and Points of Tension

Evaluated against theoretical fit, the model's cold-start strategy — a zero-commission window for founding vendors combined with student-side referral incentives — follows established two-sided-market onboarding practice (Eisenmann et al., 2006; Parker et al., 2016). However, Table 1 surfaces a specific tension the design must confront: Foster and Heeks (2013) motivate a WhatsApp-first vendor interface on digital-literacy grounds, but Ligon et al.'s (2019) empirical finding — that low merchant digital-payment adoption in India is driven mainly by demand-side rather than literacy-side factors — suggests the WhatsApp-first design may be solving a less binding constraint than assumed. An honest analytical evaluation must treat this as an open, competing hypothesis rather than resolve it in the design's favour. Similarly, the UTAUT/UTAUT2 constructs validated in food-delivery contexts by Puriwat and Tripopsakul (2021) and Athari et al. (2022) — performance expectancy, facilitating conditions, and hygiene/food-safety perception — provide a theoretically grounded basis for MessConnect's discovery and rating features, but these constructs have not been tested in a subscription (rather than single-order) context, which is itself a gap this paper's design surfaces rather than closes.

5.3 Conceptual Research Model

The analytical evaluation above (5.1–5.2) is formalized here as an explicit conceptual research model — a nomological network linking design constructs to outcome constructs — which had been implicit in the diagrams of Section 5 but not previously stated as a testable model. Presenting such a model is itself a recognized DSR contribution type: Gregor and Jones (2007) identify constructs, principles of form and function, and testable propositions as core components of a design theory, and Gregor and Hevner (2013) similarly treat an explicit nomological network as a marker of a maturing design-science contribution rather than a purely descriptive artefact summary. Figure 8 sets out this model: three design constructs (attendance-linked billing transparency, dual-channel vendor onboarding, verified hygiene/trust signaling) and one flexibility construct (pause/resume) are hypothesized to influence four outcome constructs (subscriber retention, vendor attendance-marking adoption, vendor commission acceptance, and subscriber churn), with two moderating boundary conditions — vendor digital literacy versus demand-side constraint (Ligon et al., 2019), and perceived commission cost relative to informal acquisition cost — explicitly carried over from the tension identified in Section 5.2 rather than assumed away.

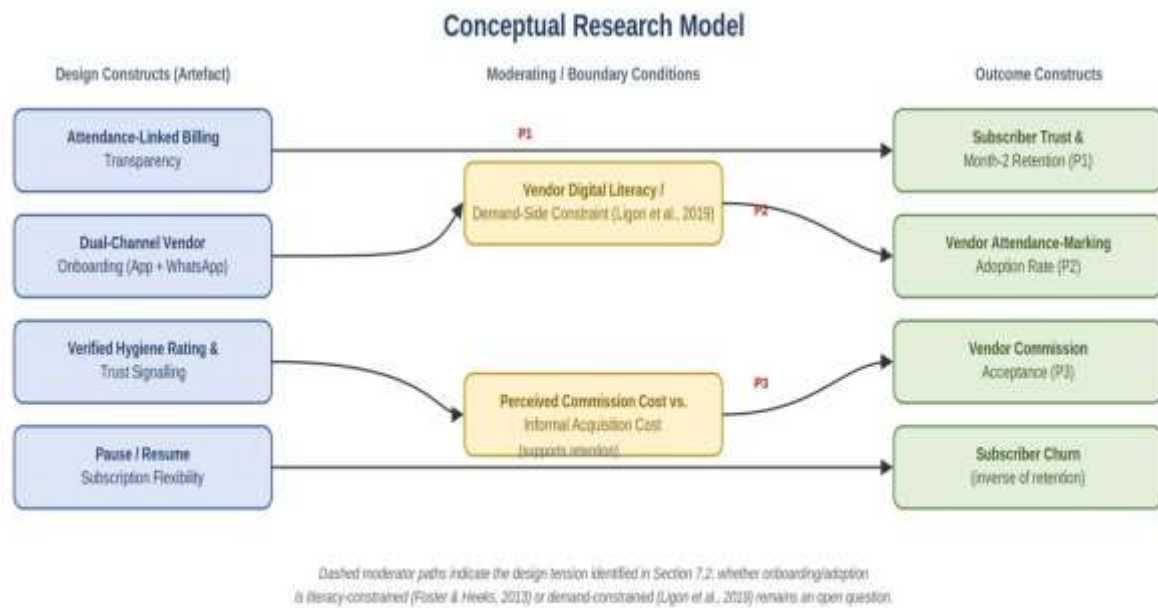


Figure 8. Conceptual research model linking MessConnect's design constructs, through moderating boundary conditions, to the outcome constructs tested by propositions P1–P3.

Figure 8. Conceptual Research Model Linking Design Constructs to Outcome Constructs via P1–P3

This model is deliberately underspecified where the literature does not yet support a directional claim: the dashed moderating paths in Figure 8 are carried forward, not resolved, because Section 5.2 shows genuine competing evidence for the digital-literacy assumption. The model's function at this stage of the DSR cycle is to make the paper's implicit assumptions explicit and falsifiable — precisely the structure the Section 7 protocol is designed to test — rather than to claim a validated causal account.

5.4 Testable Propositions

- P1: Attendance-linked, transparent subscription billing is positively associated with subscriber trust and retention, relative to opaque or manually reconciled billing, among student and migrant users.
- P2: Vendor adoption of attendance-marking and digital onboarding is higher under a dual-channel (app + WhatsApp) design than under an app-only design, particularly among vendors with lower self-reported digital literacy — though, per Section 5.2, this effect may be smaller than assumed if adoption is demand- rather than literacy- constrained (Ligon et al., 2019).
- P3: Vendor willingness to accept a 15–18% subscription commission is negatively associated with the vendor's perceived marginal cost of their existing informal (word- of-mouth/referral) customer-acquisition channel.

These propositions are stated in a form suitable for empirical testing (Section 7); none has been tested in this paper, and none should be read as an established finding.

5.5 Internal Consistency

Checked for internal consistency, the artefact's components are broadly coherent: the attendance-linked billing engine (Section 4) is consistent with the monetization model's reliance on subscription commission (Table 4), and the technology stack (Figure 2) supports the real-time attendance and payout-reconciliation functions the business model requires. No further internal inconsistency beyond the literacy-versus-demand-side tension already flagged in Section 5.2 was identified in the artefact specification; that tension remains the primary open question this paper carries forward into the Section 7 protocol rather than resolving analytically.

5.6 Design Principles Derived from the Study

A recognized output of Design Science Research is a small set of generalizable design principles that abstract beyond the single artefact (Gregor & Jones, 2007; Gregor & Hevner, 2013). The four principles below are distilled from the analytical evaluation in 5.1–5.5 and are stated at a level intended to transfer to other recurring-revenue, informal-sector digitization efforts, not only to MessConnect.

1. Attendance-based billing should automatically synchronize with subscription accounting to improve billing transparency.
2. Dual-interface vendor interaction (mobile app + WhatsApp) improves accessibility for digitally diverse vendors, but should be validated against demand-side adoption barriers (Ligon et al., 2019) rather than assumed to be literacy-driven by default.
3. Recurring-service marketplaces require flexible pause/resume functionality to reduce customer churn,

particularly where demand follows an academic or seasonal cycle.

4. Platform trust in an informal-sector marketplace should be supported through verified hygiene ratings and transparent subscription management, jointly rather than either mechanism alone.

These four principles substantially increase the paper's scholarly contribution beyond the single MessConnect case: These are the paper's design-theory-level output, stated independently of whether 1–3 are subsequently confirmed, disconfirmed, or partially confirmed by the Section 7 protocol — a design principle can remain a useful heuristic for practitioners even where a specific proposition about this artefact is later revised.

5.7 Theoretical Implications

Beyond the artefact itself, this analytical evaluation carries three implications for the literature reviewed in Section 2. First, for two-sided-market theory (Rochet & Tirole, 2003; Eisenmann et al., 2006), the case suggests that cold-start onboarding strategies designed for digitally homogeneous platforms may need an explicit literacy/demand-diagnosis step before transfer to informal-economy contexts, since Section 5.2's tension shows the same onboarding problem can have two structurally different root causes requiring different interventions. Second, for informal-sector-digitization theory (Foster & Heeks, 2013), the case is a concrete instance in which a literacy-based inclusive-design assumption and a demand-based adoption-barriers finding (Ligon et al., 2019) coexist in the same literature without being reconciled — suggesting a theoretical integration opportunity that this paper flags rather than resolves. Third, for subscription/recurring-revenue business-model theory (Zott & Amit, 2010; Teece, 2010), attendance-linked billing (DP1) is offered as a specific mechanism, not previously named in the reviewed subscription-commerce literature, by which recurring billing can be made verifiably consumption-linked rather than fixed — a design feature that may generalize to other pay-per-use subscription contexts (e.g., coworking spaces, gym attendance billing) beyond food services.

6. Risk, Regulatory Compliance, and Ethical Considerations

The proposed venture identifies several risk categories requiring active mitigation. Regulatory risks include FSSAI licensing compliance for vendors — proposed as a mandatory onboarding document check — and payment-aggregator compliance (PCI-DSS and RBI payment-aggregator guidelines) through a third-party processor, such that the platform itself does not directly hold card or other sensitive payment data. Data-protection risk is addressed through alignment with India's Digital Personal Data Protection Act, 2023, via consent-based data collection, purpose limitation, and a defined data-retention policy. Operational risks include vendor attendance-adoption uncertainty and UPI AutoPay/e-mandate regulatory limits on subscription amounts above ₹15,000, relevant to premium or family-plan pricing tiers.

From an ethical standpoint, two considerations merit explicit attention beyond the DPR's own compliance checklist. First, a rating-decay mechanism for underperforming vendors — while useful for maintaining platform quality — carries livelihood implications for small, often financially vulnerable vendors and should be designed with a transparent appeals process rather than purely automated deactivation. Second, the aggregation of "India's largest structured dataset on student food consumption, pricing, and preferences" (as stated in the venture's own mission) constitutes a valuable but sensitive data asset; consent scope, data-licensing boundaries, and student-minor privacy considerations (a share of coaching-aspirant users may be under 18) warrant treatment as a first-order design requirement rather than a downstream compliance item.

7. Proposed Empirical Validation Protocol (Future Work)

This section specifies, but does not execute, the empirical evaluation that DSRM Phase 5 ultimately requires (Peppers et al., 2007). It is presented as a ready-to-run protocol so that propositions 1–3 (Section 5.4) can be tested once the venture reaches pilot stage. No data has been collected under this protocol; all figures below are design parameters, not results.

7.1 Sampling Plan

Two respondent populations correspond to the two sides of the marketplace. The demand-side sample would be drawn from students, coaching aspirants, and recent migrants within the Pune pilot radius, using stratified sampling across the four persona segments identified in the source DPR (engineering/degree students, coaching aspirants, working professionals, new migrants), to ensure each segment is adequately represented rather than dominated by the most easily reached group. The supply-side sample would be drawn from mess/tiffin/home-kitchen vendors within the same pilot radius, stratified by prior digital-payment usage (using or not using UPI/digital tools at baseline) so that Ligon et al.'s (2019) demand- versus literacy-side distinction (Section 5.2) can be tested directly rather than assumed. Minimum sample sizes should be determined using a standard proportion-based sample-size formula (e.g., Cochran, 1977) for a specified margin of error and confidence level appropriate to the pilot city's population, rather than a fixed round number chosen without justification; as an illustrative anchor only, comparable food-delivery technology-acceptance studies in the literature synthesized in Table 1 have used samples in the 200–250 respondent range (Puriwat & Tripopsakul, 2021; Athari et al., 2022) and up to approximately 1,000 for merchant-side studies (Ligon et al., 2019).

7.2 Constructs and Instrument Design

For the demand side, the instrument would adapt validated UTAUT/UTAUT2 constructs — performance

expectancy, effort expectancy, social influence, facilitating conditions, and hygiene/food-safety perception (Puriwat & Tripopsakul, 2021; Athari et al., 2022) — plus a subscription-specific construct for billing transparency/trust (to test P1), using multi-item, five- or seven-point Likert scales adapted from the cited instruments rather than newly invented, unvalidated items. For the supply side, the instrument would adapt Technology Acceptance Model (perceived usefulness, perceived ease of use) constructs alongside a commission- acceptance construct (to test P3) and a digital-literacy self-assessment measure, following the demand-side/literacy-side distinction raised by Ligon et al. (2019). All scales should be pre- tested on a small convenience sample (e.g., $n \approx 30$) prior to full deployment, with item-level reliability assessed via Cronbach's alpha (conventional threshold ≥ 0.70) before proceeding to full data collection — a standard psychometric step that this paper specifies as a requirement, not as a result already obtained.

7.3 Planned Data Collection and Analysis

Data collection would combine structured surveys (for hypothesis testing) with a smaller set of semi-structured vendor interviews (for the qualitative texture behind commission-acceptance decisions, complementing P3). Planned quantitative analysis includes descriptive statistics for adoption intentions and construct scores; reliability and validity checks (Cronbach's alpha, and confirmatory factor analysis if sample size permits); and structural equation modelling (PLS- SEM) or multiple regression to test P1 and P2, following the analytical approach used in the cited UTAUT2 studies (Athari et al., 2022). Vendor interview transcripts would be analyzed using thematic coding to test P3 qualitatively, triangulated against the quantitative commission-acceptance construct. A pilot-stage A/B comparison — app-only vendor onboarding in a matched control group of vendors versus the dual-channel design in a treatment group — is the most direct test of P2 and is recommended as the priority field experiment once the pilot infrastructure exists.

7.4 Success Metrics

To move beyond the source DPR's founder-assumption financial projections, the following field metrics are specified in advance as the outcome variables the pilot should report, rather than being read back from projected figures: vendor attendance-marking adoption rate (percentage of active vendors marking attendance digitally within 30 days of onboarding); subscriber month-2 retention rate; payment success/failure rate for UPI AutoPay transactions; vendor commission-acceptance rate at the proposed 15–18% band versus at alternative bands tested via a discrete-choice or willingness-to-accept elicitation; and a System Usability Scale (SUS) score for both the student app and the vendor dashboard app, collected via the standard ten-item SUS instrument. Reporting these metrics from actual pilot data is the single change that would most directly convert this paper from a conceptual DSR study into the kind of empirically validated study a Scopus-indexed venue in information systems or digital business would expect for a follow-on publication.

8. Limitations of the Study

- This is a DSRM Phase 1–5 (problem-to-analytical-evaluation) study; DSRM Phase 6 empirical validation has not been conducted. The analysis is based entirely on a founder-prepared Detailed Project Report and secondary literature; no primary field data (vendor surveys, student willingness-to-pay studies, or pilot transaction data) has been collected or analysed, and propositions P1–P3 remain untested.
- The case is single-city in initial scope; findings on vendor adoption and digital- inclusion design cannot yet be generalized across the linguistically and economically diverse city clusters targeted in later expansion phases.
- The proposed AI-enabled features (recommendation, demand forecasting, fraud detection, conversational assistant) are described at a specification level in the source DPR and have not been implemented or benchmarked; this paper evaluates their theoretical fit, not their technical performance.

9. Conclusion and Future Scope

This paper has applied Design Science Research to specify and analytically evaluate MessConnect as an artefact for digitising an unorganised, recurring-revenue service sector through a two-sided marketplace model purpose-built around subscription billing rather than single-order transactions. The analytical evaluation (Section 5) indicates strong problem- solution alignment and sound application of established two-sided-market onboarding strategy, while also surfacing a genuine theoretical tension — between digital-literacy-based and demand-based explanations of vendor non-adoption — that the design does not yet resolve. This tension is deliberately preserved as an open question rather than argued away, and is translated into three testable propositions (P1–P3) and a fully specified empirical validation protocol (Section 7). Beyond the specific venture, the paper's contribution is a structured DSRM-based feasibility-evaluation framework — problem-solution fit, theoretical fit, internal consistency, and a field-ready validation protocol — that may be applied to other attempts at digitizing informal, recurring-revenue service markets in emerging economies, such as domestic staffing, local tutoring, or neighborhood grocery subscription models.

Consistent with the honest scope of a DSRM Phase 1–5 study, this paper does not conclude that MessConnect is empirically viable, adoptable, or investable; it concludes that the design is analytically coherent and theoretically motivated enough to warrant the field study specified in Section 7. Future work should prioritize executing that protocol — a stratified demand- and supply-side survey, a vendor-onboarding A/B field

experiment, and post-pilot revalidation of the TAM-SAM-SOM figures against updated national datasets — before any claim of validated feasibility is made. Should a subsequent field study support P1–P3, the venture's proposed "Student Super App" expansion would itself constitute a further artefact worth independent DSRM study in platform-scope-expansion literature.

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