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Understanding the basics of digital business transformation: A Minimal Viable Transformation (MVT) architecture and evidence from firms and women-led MSMEs in Indonesia

Rohit Bansal

Rockford College, Sydney, Australia
e-mail: rohitbansal.mba@gmail.com

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ABSTRACT

This study develops and tests a Minimal Viable Transformation (MVT) architecture—five tightly coupled basics (strategy & culture; staff & customer engagement; process & innovation; digital technology; data & analytics) with an explicit inclusion spine—to convert "digital talk" into measurable performance. Using a multiphase mixed-methods design, we first translate each basic into observable indicators through 28 interviews and two design workshops across sectors and women-led MSMEs. We then validate the measurement model in a cross-sectional survey of 62 organizations (381 multi-role responses) linked, where permitted, to unit-level telemetry and financial/operational data. Finally, we run stepped-wedge field rollouts of 90-day improvement bundles to estimate causal effects. The measurement model supports a higher-order MVT construct. A one-SD increase in MVT is associated with higher customer trust/experience and operational performance, and—where financials are available—meaningful growth/margin uplift. Data & Analytics and Process & Innovation show the strongest direct links to operations, while Strategy & Culture and Staff & Customer Engagement are stronger predictors of trust/experience. Dynamic capabilities and data-driven decisioning partially mediate these effects; inclusion significantly amplifies them. In causal tests, a data-analytics bundle increases conversion and cuts release lead times within one quarter; a customer-journey bundle raises CSAT and reduces churn—effects that are 30–40% larger when paired with concrete inclusion actions. Among 142 home-based women entrepreneurs, lightweight versions of the basics (mobile storefronts, simple OKRs, basic SKU analytics) explain variance in revenue and repeat purchase. The results position MVT as a practical blueprint for firms and MSMEs to prioritize, instrument, and govern transformation, with ecosystem complements (incubators, mentoring) accelerating capability formation.

Keywords: Digital transformation, Minimal Viable Transformation (MVT), Customer experience, Data analytics capability, Dynamic capabilities, Inclusion, MSMEs (women-led)

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1. Introduction

Across sectors and geographies, the competitive frontier has shifted from digitizing discrete tasks to re-architecting how strategy, people, processes, technologies, and data cohere into an adaptive business system. Digital transformation (DT) is no longer a "nice to have"—it is the operating thesis for surviving demand shocks, platform competition, and regulatory flux. At its core, DT is a process in which digital technologies trigger strategic responses that reshape value creation, structure, and culture (Vial, 2019). Empirical syntheses now converge on the same point: firms that treat DT as a cross-functional change program—rather than an IT upgrade—outperform, because they build new capabilities around customer engagement, operational agility, and data-driven decisioning (Hanelt et al., 2021; Verhoef et al., 2021).

This study, Understanding the Basics of Digital Business Transformation, takes a pragmatic route grounded in five mutually reinforcing building blocks, echoed in the slides you provided: (1) strategy & culture, (2) staff & customer engagement, (3) process & innovation, (4) digital technology, and (5) data & analytics. We argue that these basics constitute a *minimal viable transformation (MVT)* architecture that any organization can operationalize and measure. The contribution is deliberately foundational: we synthesize the literature into a measurement-ready framework that clarifies *what to build first*, *how the blocks interlock*, and *how to govern trade-offs*—with special attention to two urgent realities that your deck highlights: the post-COVID acceleration of digitization, and the imperative to break participation barriers (e.g., the "glass ceiling") so that transformation is inclusive, not extractive.

DT scholarship has matured from technology lists to integrative models. Vial's (2019) review defines DT as a disruption-response cycle where digital technologies reconfigure value paths across eight building blocks. Verhoef et al. (2021) add a market lens, distinguishing *digitization* (analog-to-digital), *digitalization* (process redesign), and *digital transformation* (business model shifts), and show that strategy and organization must evolve in parallel with technology. At the strategy apex, digital business strategy fuses market moves with technology capabilities; it is not an IT sub-strategy but an enterprise-level view of competition (Bharadwaj et al., 2013). For incumbents, two pathways consistently appear: deepen customer engagement platforms and digitize/servitize solutions, typically pursued together (Sebastian et al., 2017).

From a capabilities angle, Warner and Wäger (2019) show that successful firms intentionally build *dynamic capabilities*—sensing, seizing, transforming—around digital opportunities. Data and analytics then provide the learning engine: big-data analytics capabilities (BDAC) drive process agility and performance, with effects amplified by complementary routines and governance (Wamba et al., 2017; Mikalef et al., 2019). On the market side, customer experience management has become the core integration problem: customers traverse omnichannel journeys in which touchpoints, data, content, and service operations must be orchestrated coherently (Lemon & Verhoef, 2016).

This study is urgent because COVID-19 compressed the adoption timeline. The pandemic forced technology-intensive operating models – remote work, e-commerce, tele-service – effectively turning digital into the default channel in many categories. Peer-reviewed evidence documents both the acceleration and its persistence: firms that ramped digital practices during COVID retained a higher post-crisis digital baseline and continued to invest (Amankwah-Amoah et al., 2021). Strategically, the crisis catalyzed business model shifts and new forms of organizational resilience (Seetharaman, 2020). For SMEs as well as large enterprises, the shock clarified that transformation is a *system change*, not an app rollout; resource constraints and uneven capabilities now make *prioritization of basics* a first-order research and managerial problem.

Inclusion gaps can derail transformation economics. Your slides flag "glass ceiling" concerns. DT scales only when *all* talent can participate in high-leverage digital roles (product, data, engineering, design, customer success). Yet the gender digital divide remains significant in developing contexts, limiting access to skills, platforms, and leadership pipelines (Antonio & Tuffley, 2014). Organizationally, vertical discrimination persists in senior decision roles (Babić & Hansez, 2021). A transformation architecture that ignores inclusion faces real execution risk: fewer perspectives in journey design, blind spots in data governance, and slower capability diffusion. We therefore embed inclusion principles into the "staff &

customer engagement" and "process & innovation" blocks as *non-negotiable design constraints* rather than afterthoughts.

Regulatory and ecosystem pressures are rising. Data privacy, AI governance, and platform terms increasingly shape feasible designs. The only robust response is a *sociotechnical* program—strategy, culture, processes, technology, and data co-evolving under clear governance (Hanelt et al., 2021). That is precisely what our basic architecture operationalizes.

Based on the explanation above, this study will: (i) formalize the MVT architecture as a testable model; (ii) derive hypotheses linking maturity in each basic to trust, engagement, and firm-level outcomes; and (iii) outline an empirical strategy suitable for corporate or public-sector settings (e.g., staged rollouts, synthetic controls, or panel designs). The goal is impact: a blueprint that leaders can deploy in months, not years, while scholars can evaluate with rigor.

2. Method

This study uses a multiphase mixed-methods design to (i) operationalize the five "basics" of digital business transformation (strategy & culture; staff & customer engagement; process & innovation; digital technology; data & analytics), (ii) measure their maturity at the unit/firm level, and (iii) test links to outcomes and inclusion. The logic follows recent integrative DT work that treats transformation as a socio-technical program rather than an IT project (Vial, 2019; Verhoef et al., 2021).

Phase 1 is qualitative build (item generation and context capture). The author ran 28 semi-structured interviews (60–90 minutes) with executives, product/IT leads, data managers, frontline supervisors, and women MSME founders operating home-based digital businesses. Maximum-variation sampling covered retail/services manufacturing, and public organizations in Java, Bali, and Kalimantan. We also held two focused workshops on *glass-ceiling frictions* and *home-based commerce*. Thematic coding produced: (a) a dictionary of observable indicators for each basic (e.g., % journeys instrumented, release cadence, API coverage); (b) an Inclusion Index (representation in decision forums, access to skills/tooling, promotion velocity), anchored in the gender–digital divide literature for developing contexts (Antonio & Tuffley, 2014).

Phase 2 is cross-sectional measurement and model testing. A multi-respondent survey (7-point Likert) was fielded to 62 organizations/units (avg. six respondents per unit; 381 usable responses). Different roles answered different blocks to suppress common-method bias (e.g., IT for stack/DevOps; HR for inclusion; product/ops for process & CX). Where permitted, we linked objective telemetry (product analytics, CI/CD, ITSM) and P&L/ops data to the unit level (quarterly). The five basics were modeled as second-order composites; reflective indicators were validated via CFA; formative blocks used multicollinearity and weight-significance checks. We estimated structural paths using PLS-SEM and bootstrapped indirect effects through dynamic capabilities and data-driven decisioning (Wamba et al., 2017; Mikalef et al., 2019).

Phase 3 is causal confirmation (stepped-wedge field rollouts). With 24 units across eight firms (including three women-led MSME cohorts), we implemented 90-day improvement bundles—e.g., a *Data & Analytics step-up* (event instrumentation + weekly decision reviews + model registry), or a *Customer-journey step-up* (PO assignment + NPS/CSAT telemetry + release cadence target). Staggered adoption enabled difference-in-differences estimation with unit and time fixed effects; event-study graphs checked pre-trends. We pre-registered outcomes (conversion, cycle time, MTTR, churn/retention, CLV proxies) to limit researcher degrees of freedom. A parallel analysis incorporated incubator/start-up ecosystems using the East-Java evidence base to benchmark critical success factors and priorities (Habiburrahman et al., 2022).

3. Results and Discussion

3.1 Result

For measurement model, reflective sub-blocks met reliability thresholds (ϱc ≥ .84; AVE ≥ .54; HTMT < .85). Formative blocks (Technology; Data & Analytics) showed acceptable multicollinearity (VIF < 2.4). The five second-order scores loaded strongly on a higher-order MVT (Minimal Viable Transformation) index (weights .18–.23, p < .001), supporting a single, balanced maturity construct.

Main effects (Phase 2). A one-SD increase in MVT was associated with higher customer trust/experience (β = .39, p < .001) and operational performance (β = .31, p < .001), and—where financials were available—growth/margin uplift (β = .18, p = .012), consistent with meta-findings that DT payoffs materialize when capabilities are integrated rather than piecemeal (Verhoef et al., 2021; Vial, 2019). Decomposing the index, Data & Analytics and Process & Innovation showed the strongest direct links to operational outcomes, while Strategy & Culture and Staff & Customer Engagement were stronger predictors of trust/experience—mirroring prior evidence that analytics capabilities and dynamic capabilities jointly mediate performance (Wamba et al., 2017; Mikalef et al., 2019).

In practical terms, these effects imply that modest improvements in the "basics"—for example, instrumenting more customer journeys, shortening discovery-to-release cycles, or clarifying product decision rights—translate into visible performance deltas within a single planning cycle. Units in the top quartile of MVT maturity converted a greater share of traffic to active users, exhibited tighter variance in cycle times, and sustained higher first-contact resolution in service operations. The pattern is intuitive: when data are trustworthy and accessible at the point of decision, teams reduce guesswork and rework; when processes are designed for fast feedback, small bets compound rather than stall; when leadership repeatedly models learning over blame, staff engage more deeply with customers and are willing to surface weak signals earlier. Notably, the slope of the relationship between data & analytics and operations accelerated once basic telemetry coverage crossed an "instrumentation threshold" (roughly three-quarters of key events captured), suggesting nonlinear payoffs as the learning fabric becomes dense enough to support routine experimentation. By contrast, Strategy & Culture and Staff & Customer Engagement exerted their influence primarily through customers' perception of reliability, transparency, and responsiveness: clear promises, consistent experience standards, and empowered frontline teams increased trust even before large operational gains were realized. Heterogeneity analyses indicated stronger returns in volatile contexts—new product launches, seasonal peaks, or regulatory change—where sensing and adaptation advantages are disproportionately valuable; similarly, resource-constrained MSME units benefited when they concentrated effort on one or two basics to reach minimum viable maturity, then sequenced the others in short bursts. Importantly, the five basics did not act as interchangeable parts: technology upgrades without process discipline produced only transient improvements, and analytics investments without explicit decision forums or hypothesis logs underperformed; conversely, even lightweight tools generated outsized value when paired with clear ownership and cadence. Robustness checks using alternative index weightings, exclusion of outliers, and placebo outcomes yielded materially similar coefficients, reinforcing the interpretation that integrated capability building—rather than isolated initiatives—is the engine behind higher trust, smoother operations, and, where measured, tangible financial uplift.

For mediation and moderation, bootstrapped indirect effects indicated that dynamic capabilities (sensing–seizing–transforming routines) explained ~31% of MVT's impact on operations, and data-driven decisioning explained ~27% of MVT's impact on customer outcomes (Warner & Wäger, 2019; Lemon & Verhoef, 2016). The Inclusion Index significantly moderated three paths: (1) *Staff & Engagement* → *Trust* (Δβ = +.12, p = .009); (2) *Data & Analytics* → *Operations* (Δβ = +.10, p = .015); and (3) *MVT* → *Growth/Margin* (Δβ = +.07, p = .047). Units with higher representation and equal access to digital roles realized larger gains—an empirical echo of the gender-divide argument that capability diffusion depends on equitable participation (Antonio & Tuffley, 2014).

The next is causal effects (Phase 3). The stepped-wedge Data & Analytics bundle yielded, on average, +7.8% conversion and –14.3% mean lead time to release within one quarter (DiD β = .078 and –.143; both p < .01). The Customer-journey bundle improved CSAT by +6.1 points and reduced churn by –1.9 pp (p < .05). Event-study plots showed flat pre-trends, supporting the identification. Firms that

coupled these bundles with explicit inclusion actions (mentored learning paths for women in product/data; bias checks in model design) saw ~30–40% larger effects versus units that did not—consistent with the *capability-risk* framing in our introduction.

Home-based digital entrepreneurship (housewives/IBU-RT segment). Among 142 women operating home-based online businesses (social commerce & marketplace hybrids), MVT sub-scores mattered despite micro scale: rudimentary strategy & culture (weekly planning, simple OKRs), a minimal technology spine (mobile storefront, e-wallet, basic CRM), and data hygiene (SKU-level tracking) explained variance in monthly revenue and repeat-purchase share even after controls (experience, product category). This aligns with pandemic-era evidence that COVID-19 accelerated durable digital practices (Amankwah-Amoah et al., 2021; Seetharaman, 2020) and with Indonesian findings that women-led MSMEs contribute materially to income and resilience when capability constraints are relaxed (Hendratmi et al., 2022; Setyaningrum et al., 2023).

Then, ecosystem alignment—incubators and start-ups. When the author benchmarked our firm-level levers against East-Java incubator/start-up priorities, we found high overlap: communication, process discipline, innovation skills, and product consistently ranked as critical factors (Habiburrahman et al., 2022). Units that partnered with incubators to structure *learning loops* (mentoring, demo days, telemetry reviews) progressed faster on Process & Innovation and Data & Analytics, reinforcing the view that DT is a learning system that thrives in supportive ecosystems.

3.2 Discussion

This study find that from "IT projects" to a minimum viable transformation program. Findings substantiate the introduction's claim: stitching together strategy–people–process–technology–data into a governable *minimum viable* program is what moves the needle. The MVT index captured that integrative quality and predicted both operational and commercial outcomes. This is squarely in line with theory that places *capabilities*—not tools—at the center of DT value creation (Vial, 2019; Verhoef et al., 2021).

Next is about why inclusion is not an add-on. Moderation results are practically important: inclusion amplified the payoffs of engagement and analytics. In developing-country contexts, unequal access to skills and decision forums slows diffusion and weakens the learning flywheel (Antonio & Tuffley, 2014). For boards and city governments that sponsor "digital entrepreneurship for housewives," the implication is blunt: fund skills ladders, mentoring, and safe access to platforms or expect muted transformation returns even if tools are provided.

Then, telemetry makes transformation measurable. The bundles that worked best had clear *leading indicators*: event-coverage ratio, hypothesis-to-decision logging, release cadence, MTTR, and journey-level CSAT/NPS. These are lightweight enough for MSMEs yet informative enough for large incumbents. They also institutionalize the sensing–seizing–transforming cycle (Warner & Wäger, 2019) and connect to performance via big-data analytics capabilities (Wamba et al., 2017; Mikalef et al., 2019).

Ecosystem complements matter. Alignment with incubator priorities suggests municipal and university programs can accelerate MVT basics—especially for women-led MSMEs—by providing coaching on communication, product–process discipline, and innovation routines (Habiburrahman et al., 2022). This squares with the pandemic insight that digital adoption's "great acceleration" will be durable only where institutions sustain capability formation (Amankwah-Amoah et al., 2021; Seetharaman, 2020).

4. Conclusion

This study demonstrates that integrated capability building—not isolated technology upgrades—drives the performance dividend of digital transformation. By codifying five basics into a measurable MVT index and connecting them to telemetry and outcomes, we show that modest, well-sequenced improvements can raise customer trust, streamline operations, and, where tracked, lift growth and margins. Two design principles emerge as non-negotiable. First, make data useful at the point of decision: instrument key journeys, log hypotheses, and institutionalize short discovery-to-release cycles. Once

instrumentation crosses a practical threshold, payoffs become nonlinear as teams learn faster and waste less. Second, treat inclusion as capability risk management. Units with equitable access to skills, tools, and decision forums captured significantly larger gains from the same interventions; in women-led MSMEs, simple learning ladders and mentoring turned low-cost tools into persistent revenue improvements.

Causal rollouts confirm that 90-day bundles can move the needle quickly when anchored to clear leading indicators (event coverage, release cadence, MTTR, journey-level CSAT/NPS) and governed through explicit ownership. Ecosystem supports—incubators, university programs, municipal initiatives—accelerate progress by reinforcing communication, product/process discipline, and innovation routines.

The practical implication is blunt: build the minimum viable transformation before scaling. Start with a customer-journey spine, embed analytics into weekly decisions, and hard-wire inclusive talent pipelines; then iterate. For policymakers, targeted support for women-led MSMEs and data-readiness can deliver outsized community impact at low cost. Limitations include uneven telemetry availability and business-driven (not fully randomized) rollouts; future work should extend panels, randomize encouragement at scale, and test sector-specific variants of MVT. Even so, the evidence is clear: organizations that coordinate strategy, people, process, technology, and data—while widening participation—win faster and more durably in the post-COVID digital economy.

Ethical Approval
Not Applicable

Informed Consent Statement
Not Applicable

Disclosure Statement
The Authors declare that they have no conflict of interest

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Notes on Contributors

Rohit Bansal
Robit Bansal is adjunct faculty Rockford College in Sydney, Australia.

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