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Original Research Article

National Broadband KPIs: Measuring FTTH Impact on Vision 2030 Digital Goals

Malik Faisal Ahmed[1*]
[1]Cost Optimization Strategies for Large-Scale FTTH Deployment in KSA

***Corresponding Author**
Malik Faisal Ahmed
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Abstract: This review examines how a national broadband key performance indicator framework can measure the contribution of fibre to the home to Saudi Arabia's Vision 2030 digital goals. The paper argues that broadband assessment in the Kingdom should move beyond rollout counts and headline speeds toward a layered dashboard linking FTTH to adoption, affordability, quality, inclusion, and public value. Using a structured review of peer reviewed studies and policy reports published between 2020 and 2025, the study synthesizes Saudi official sources, international benchmarking systems, and the empirical literature on high speed broadband effects. The review asks which indicators best capture FTTH progress, how those indicators should be grouped, what kinds of impacts can reasonably be associated with FTTH, and how Saudi institutions should govern a national dashboard. The findings show that a credible framework must combine leading indicators such as homes passed and service availability, intermediate indicators such as subscriptions, affordability, latency, upload performance, and reliability, and lagging indicators such as digital service use, SME digitalization, telehealth uptake, and digital economy value added. The paper concludes by proposing a KPI architecture and governance principles for aligning broadband measurement with Vision 2030 execution.

Keywords: FTTH, Broadband Policy, Vision 2030, Digital Transformation, Saudi Arabia, KPIs, Fixed Broadband, Quality of Experience.

1. INTRODUCTION

Saudi Arabia's digital transformation has moved broadband policy from a narrow telecom issue to a central instrument of national development. Vision 2030 treats digital infrastructure as an enabler of diversification, state capability, investment, and quality of life, while recent annual reports increasingly connect connectivity with digital government, entrepreneurship, cloud development, and platform based services (Vision 2030, 2024, 2025). In that setting, fibre to the home has strategic importance because it provides the fixed capacity, low latency, and service stability required by advanced household, enterprise, and public sector applications. Although mobile broadband remains critical, fixed fibre is the anchor for high capacity demand in homes, campuses, hospitals, industrial districts, and government facilities (CST, 2025a; OECD, 2022).

The Kingdom's recent progress makes more disciplined measurement necessary. Official reporting indicates that internet penetration has reached about 99 percent, fibre coverage has expanded to more than 3.9 million homes, and the digital economy contributes around 16 percent of GDP (CST, 2025a; MCIT, 2025; GASTAT, 2025). Saudi Arabia has also advanced sharply in global digital

government measures and maintained strong positions in ICT regulatory rankings (MCIT, 2024; DGA, 2025; ITU, 2024a; CST, 2025b). These gains suggest that infrastructure investment is interacting with wider institutional reform. Yet they also expose a measurement gap. Once rollout accelerates, the policy question is no longer whether fibre exists, but how its contribution to national goals should be assessed.

That question matters because broadband metrics are often too shallow for strategic governance. Conventional scorecards privilege coverage, subscriptions, and headline download speeds. These measures are necessary, but they are insufficient for judging whether FTTH is helping to achieve Vision 2030 outcomes in digital government, productivity, inclusion, innovation, and service quality. A network can pass millions of homes while still leaving weaknesses in affordability, take up, reliability, upload capacity, or effective use by firms and public services. Likewise, improvement in digital services may reflect governance reform, skills, trust, and platform design as much as network upgrades. National measurement therefore requires a framework that is broader than engineering reporting but tighter than generic digital transformation rhetoric (OECD, 2024; World Bank, 2023a).

This review addresses that need. Its aim is to develop a policy relevant KPI architecture for assessing how FTTH contributes to Saudi Arabia's digital objectives. Four objectives guide the paper. First, it identifies KPI families for national fibre assessment by comparing official benchmark systems and recent literature. Second, it organizes those indicators into a practical architecture that distinguishes rollout, service quality, adoption, inclusion, and outcomes. Third, it synthesizes the evidence on the effects that high speed broadband can generate, including where those effects are strong, conditional, delayed, or ambiguous. Fourth, it proposes a governance model for a Saudi national dashboard that can support Vision 2030 monitoring without overstating causal claims.

The paper is written as a review rather than a causal econometric study. It does not estimate the marginal effect of FTTH on a single variable. Instead, it asks what should be measured nationally if policymakers want a credible answer to a more difficult question: whether fibre investment is contributing meaningfully to digital transformation. This is especially relevant in Saudi Arabia because Vision 2030 integrates infrastructure, service reform, investment policy, and state modernization rather than treating them as separate silos (Vision 2030, 2025; NTP, 2024). A measurement system that remains stuck at the network layer will therefore miss the logic of the strategy itself.

2. Policy and Literature Background

High capacity broadband networks have become a standard policy concern because they are increasingly linked to productivity, public service modernization, and digital resilience. OECD work stresses that next generation networks should not be judged only by advertised download speeds. Upload performance, latency, reliability, and resilience matter more as societies adopt cloud services, telework, streaming, online learning, and other data intensive applications (OECD, 2022). The State of Broadband reports make a parallel point by emphasizing meaningful connectivity rather than nominal access alone (Broadband Commission, 2021, 2023). In this literature, FTTH occupies a distinctive place because fibre offers scalable capacity, better symmetry, and an upgrade path aligned with long term demand.

The empirical evidence supports a cautious but broadly positive view of high speed broadband. Briglauer, Krämer, and Palan (2024) conclude that benefits are most visible when availability is matched by active service adoption. They find especially consistent evidence for gains in growth, productivity, resilience, and some welfare outcomes, while employment effects remain more mixed. Cambini, Grinza, and Sabatino (2023) show that ultra fast broadband improved both labour productivity and total factor productivity among Italian firms, with stronger effects in service sectors and for full fibre networks. Newer work suggests that fibre based adoption adds measurable GDP effects beyond older broadband technologies, although the magnitude is modest and diminishing returns may appear as markets mature (Briglauer *et al*., 2025). Local studies from rural and lagging regions likewise show that the effects of broadband depend on business mix, regional density, and local demand conditions (Strover *et al*., 2024; González Val, 2025).

This conditional pattern is important for Saudi policy. FTTH is better understood as a foundational asset that expands the feasible set of digital actions available to households, firms, and the state. Whether that capability becomes economic or social value depends on adoption, skills, service design, trust, and regulatory coordination. World Bank analysis reaches a similar conclusion by treating digitalization as the interaction of infrastructure, firms, people, and public institutions rather than a simple hardware problem (World Bank, 2023a). That insight fits Vision 2030, whose digital ambitions range from digital government to startup growth and labour market modernization. Within Saudi Arabia, official policy has evolved in ways that

make KPI design both easier and more necessary. MCIT highlights the rapid expansion of the digital economy, fibre coverage, and infrastructure readiness, while CST has expanded public reporting on internet use and quality of experience (MCIT, 2025; CST, 2025a, 2025c). The Meqyas initiative is especially relevant because it recognizes the lived importance of download, upload, latency, packet loss, and jitter for home fibre users (CST, 2025c). Digital government institutions also increasingly report outcome oriented measures, including improvements in United Nations e government indicators and service maturity indices (MCIT, 2024; DGA, 2025). Together, these developments show a gradual move from rollout counting to service performance management.

Even so, three gaps remain. First, operator or regulator dashboards are still weakly linked to national development dashboards. Second, international benchmark systems rarely map neatly onto national priorities because they use different definitions and units (ITU, 2024a, 2025; OECD, 2024; FTTH Council Europe, 2024). Third, many policy narratives assume a simple sequence in which better broadband automatically produces better outcomes. Yet causality runs both ways. Wealthier, better educated, and institutionally stronger regions may attract faster upgrades precisely because they already show stronger demand. A national KPI system should therefore emphasize contribution analysis and dashboard triangulation rather than simplistic causal storytelling. A final background issue concerns inclusion. Recent Saudi scholarship warns that infrastructure expansion alone does not remove the digital divide, particularly where digital literacy, confidence, and the ability to convert access into value remain uneven (Alfalah *et al*., 2025). Similar concerns appear in health and digital government studies, where uptake depends not only on connectivity but also on behavioural readiness and service quality (AlShaikh *et al*., 2025; Alkorbi & Alrwais, 2025). For broadband measurement, this means that an adequate national framework must connect FTTH metrics to access equity, active use, and service outcomes across demographic and regional groups.

3. REVIEW METHODOLOGY

This review adopts a structured narrative methodology with explicit screening and synthesis stages. The source model attached by the user was used as a structural reference for sectioning, indicator logic, and the translation of broad goals into a practical benchmarking architecture, but the present paper applies that logic to broadband and digital transformation rather than municipal sustainability.

The review material was collected from two streams published between 2020 and 2025. The first stream comprised official and institutional sources, including Saudi Vision 2030 annual reports, the National Transformation Program report, MCIT and CST publications, Digital Government Authority releases, GASTAT outputs, and international frameworks from ITU, OECD, the World Bank, the Broadband Commission, and the FTTH Council. The second stream comprised peer reviewed and high quality research on broadband impacts, digital inclusion, measurement systems, and sectoral outcomes. Search terms combined “FTTH,” “fixed broadband,” “digital infrastructure,” “broadband KPIs,” “Saudi Arabia,” “Vision 2030,” “digital inclusion,” “productivity,” “telehealth,” and “e government.” Sources were retained when they proposed broadband measurement dimensions, provided evidence on the effects of high speed broadband, or documented Saudi digital transformation outcomes relevant to broadband enabled goals.

Screening proceeded in four stages. Stage one removed sources outside the 2020 to 2025 window and sources focused entirely on mobile only network questions unrelated to fixed broadband capability. Stage two prioritized materials with explicit indicator content, transparent definitions, or evidence that could support dashboard design. Stage three filtered out narrow engineering studies that did not link technical measures to policy use. Stage four grouped the final literature into five analytical domains: access and availability, adoption and affordability, quality and reliability, inclusion and effective use, and outcome measures.

The synthesis strategy was comparative rather than meta analytic. The literature was too heterogeneous in methods, geographies, and outcomes for formal quantitative aggregation to be meaningful. Each source was therefore coded according to the type of claim it supported. Claims were divided into leading, intermediate, and lagging indicators. Leading indicators describe build and readiness conditions, such as homes passed or geographic service availability. Intermediate indicators describe the quality and realized use of services, such as take up, affordability, latency, or active use by households and firms. Lagging indicators describe wider outcomes, such as productivity, digital economy value added, telehealth use, or e government performance. This distinction clarifies sequence and avoids the common mistake of treating all indicators as if they offered the same kind of evidence. Three principles guided indicator selection. The first was policy relevance: an indicator had to connect clearly to Saudi digital objectives or to implementation mechanisms already visible in

official reporting. The second was analytical defensibility: preference was given to measures with recognizable definitions in international practice. The third was institutional tractability: indicators were favoured when Saudi institutions either already collect the data or could collect it without excessive reporting burden. This tractability principle is crucial because many indicator systems fail at the stage of institutional maintenance rather than at the stage of conceptual design (OECD, 2024; World Bank, 2023b). The review also distinguishes measurement for regulation from measurement for national strategy. Regulatory measurement focuses on market performance, service obligations, and consumer protection. Strategic measurement focuses on whether digital infrastructure is enabling national transformation. The two are related, but not identical. This paper therefore does not advocate replacing existing regulatory dashboards. It argues for an integrated national layer above them, where FTTH metrics can be linked to public value outcomes relevant to Vision 2030.

Finally, the methodology recognizes the attribution problem. National digital outcomes are co produced by networks, devices, skills, platforms, institutions, and private demand. Because of that complexity, the paper does not claim that any single KPI can isolate the causal effect of FTTH. Instead, it proposes a contribution oriented framework in which multiple indicators are interpreted together. A plausible contribution claim emerges when build indicators, quality indicators, adoption indicators, and outcome indicators move in a coherent direction and when the institutional narrative supports that movement.

4. National FTTH KPI Architecture

The central finding of the review is that a national FTTH dashboard for Vision 2030 should be organized as a layered architecture rather than as a flat list of metrics. Flat lists blur the difference between infrastructure progress and downstream public value, and they tempt decision makers to over interpret movements in any single metric. A layered architecture clarifies sequence, supports accountability, and helps institutions diagnose where performance is strong, weak, or blocked.

The first layer is access and availability. These KPIs answer the question: where can fibre service be obtained? The basic measure is homes or premises passed, but this should be disaggregated by region, municipality type, and urban density. Serviceability should be reported separately from physical presence because the practical availability of a commercial offer is more meaningful than trenching or backbone reach. Additional indicators include the proportion of public schools, universities, health centres, industrial zones, and government facilities connected by fibre or gigabit capable fixed networks. For Vision 2030 purposes, these facility based measures connect infrastructure to sector delivery rather than to household supply alone (Vision 2030, 2025; NTP, 2024). The second layer is adoption and affordability. Access does not guarantee take up. The literature repeatedly shows that socioeconomic gains depend on active service adoption rather than nominal coverage alone (Briglauer *et al*., 2024). A Saudi dashboard should therefore include active FTTH subscriptions per one hundred households, take up rates in premises already passed, churn adjusted continuity of subscriptions, and disaggregation by income proxy, region, and tenure type where possible. Affordability should be measured not only by package price but by price relative to income, ideally following ITU affordability conventions (ITU, 2025). Device readiness is also relevant here. A household with fibre but without appropriate devices or basic digital confidence may still fail to convert access into meaningful use.

The third layer is quality and reliability. This is the point at which Saudi practice is already developing in useful ways through Meqyas. Modern broadband value depends heavily on latency, upload performance, packet loss, jitter, and stability, not just on advertised downstream speeds (CST, 2025c; OECD, 2022). A national dashboard should therefore include median and percentile download and upload speeds, round trip latency, packet loss, jitter, and time based availability. It should also include outage frequency, mean time to repair, and resilience measures for major events. These indicators help bridge the gap between engineering performance and lived user experience. The fourth layer is utilization and inclusion. These KPIs ask whether fibre availability is translating into meaningful and equitable use. Examples include the percentage of households using e government services regularly over fixed connections, the proportion of SMEs conducting e commerce or cloud based operations, digital payment use, home based work participation in sectors where remote work is feasible, and the intensity of online learning or telehealth activity. Inclusion indicators should disaggregate use by gender, age, region, and urban versus peripheral settlement where data systems permit. The same logic applies to public access points and community support infrastructure. Although public Wi Fi is not a substitute for household fibre, it can function as a complementary inclusion indicator in campuses, public facilities, and dense service areas. The fifth layer is outcomes. These KPIs are the most visible and the most analytically delicate. They may include digital economy value added, startup density, SME productivity proxies, employment in digital intensive sectors, telehealth uptake, digital government

maturity, cloud adoption, and educational performance measures that rely on effective digital access. Official Saudi data already provide useful anchors here, including the rising digital economy share of GDP and improved digital government rankings (GASTAT, 2025; MCIT, 2024, 2025). Yet outcome indicators must be handled carefully because they are influenced by multiple variables beyond FTTH. The correct question is not whether fibre alone caused an outcome, but whether improvements in fibre capability plausibly supported broader transformation when read alongside complementary reforms.

A practical dashboard should classify each KPI as core, supporting, or diagnostic. Core KPIs are the small number that ministers and public audiences can track easily. Supporting KPIs provide deeper context, such as packet loss, service inequality by region, or school level bandwidth adequacy. Diagnostic KPIs are used by regulators and operators to understand causes when core indicators stall. This layered model resolves a persistent weakness in national broadband debates. Coverage remains visible and politically attractive, but it becomes only the first stage of a larger measurement logic. In that logic, good national performance means not merely that fibre is built, but that it is affordable, high performing, widely adopted, equitably used, and connected to outcomes that matter to Vision 2030.

5. Measuring FTTH Impact on Vision 2030 Digital Goals

A review based KPI architecture is only useful if it reflects realistic impact pathways. The evidence suggests that FTTH can influence Vision 2030 goals through five major channels, but the strength of each channel depends on complementary conditions.

The first channel is digital government. High quality fixed connectivity supports reliable access to portals, identity systems, payments, records, and data rich services. Saudi Arabia's gains in digital government rankings have been driven by many factors, including platform integration, governance reform, and service redesign, yet infrastructure quality remains a necessary enabling condition for sustained uptake and user satisfaction (MCIT, 2024; DGA, 2025; UN DESA, 2024). For this channel, the most useful KPI bundle is coverage plus latency, reliability, regular use of digital public services, transaction completion rates, and user satisfaction.

The second channel is productivity and enterprise upgrading. High speed fixed connectivity lowers transaction costs, expands access to cloud tools, improves coordination, and supports new service models. The evidence from Italy and broader survey work indicates that full fibre networks are especially relevant for service productivity and for firms that rely on data intensive processes (Cambini *et al*., 2023; Briglauer *et al*., 2024). Evidence from England and rural United States settings also suggests links between broadband quality and business growth or entrepreneurship, though these effects are shaped by local business structures and regional conditions (Chen *et al*., 2023; Strover *et al.,* 2024). For Saudi Arabia, this channel matters because Vision 2030 seeks not only digital consumption but also enterprise competitiveness and startup growth. Suitable KPIs include FTTH availability in industrial and commercial zones, active business subscriptions, SME cloud and e commerce use, startup registrations in digital intensive activities, and sectoral productivity proxies where data systems permit.

The third channel is human capital and employability. FTTH contributes to digital learning continuity, home based upskilling, and access to online labour markets. However, the effect is filtered through device availability, household conditions, platform quality, and digital skills. A national dashboard should therefore link household fibre access to indicators such as participation in online training, completion of digital skills programmes, and labour market use of remote work tools in eligible sectors. Broader digital inclusion studies reinforce the importance of skills and confidence as mediators between access and outcomes (World Bank, 2023a; Mhaske *et al*., 2025; Alfalah *et al*., 2025).

The fourth channel is health and public service access. Broadband quality can reduce distance related frictions in health systems by enabling consultations, diagnostics, follow up communication, and data exchange. Chai *et al*., (2024) provide evidence that broadband infrastructure can reduce mismatches in medical resource allocation, while Saudi digital health work highlights the importance of equitable digital health readiness for sustainable uptake (AlShaikh *et al*., 2025). Here again, the lesson for KPI design is that fibre contribution is best measured through bundles: facility connectivity, household fixed access in catchment areas, telehealth completion, platform reliability, and user readiness.

The fifth channel is inclusion and territorial balance. Fibre rollouts are often justified in part by their ability to reduce digital exclusion and support more balanced development. Yet inclusion effects are not automatic. Regions can receive upgraded networks while still facing weak take up because of cost, low confidence, or limited relevance to everyday life. This is why inclusion metrics should extend beyond coverage to actual usage, skills, and distributional outcomes. Saudi scholarship on digital

divide issues makes this point sharply, noting that psychological resilience, literacy, and effective participation remain uneven even under rapid infrastructure expansion (Alfalah *et al*., 2025).

A cross cutting lesson from the literature is that adoption often matters more than availability for realized socioeconomic gains. Positive effects generally take hold only after users and firms adopt and integrate high speed services into practice (Briglauer *et al*., 2024). If policy institutions monitor only homes passed, they may overestimate progress. If they add take up, affordability, quality, and active service use, they gain a much better picture of whether investment is being translated into public value.

The review also suggests caution about benchmark use. International rankings are politically useful, but they can distort policy if taken as complete proxies for national progress. FTTH penetration rankings provide a sense of infrastructure maturity, yet they reveal little about affordability, reliability, or the depth of digital service use (FTTH Council Europe, 2024). Similarly, broad ICT or e government rankings capture important national performance but should not be treated as substitutes for sector specific broadband dashboards. A strong Saudi measurement system should therefore use rankings as external reference points while relying on nationally tailored KPI bundles for management.

For implementation, a tiered reporting frequency is advisable. Technical and quality indicators can be updated quarterly where systems exist. Adoption and affordability indicators can be reviewed quarterly or semi annually. Outcome indicators such as digital economy value added or multidimensional inclusion measures are more suitable for annual reporting. The value of a layered dashboard lies partly in this temporal logic: fast indicators reveal operational issues, while slower indicators show whether structural transformation is taking place.

In summary, FTTH can support Vision 2030 goals through government capability, enterprise performance, human capital, health access, and inclusion. But the review shows that these benefits are conditional, lagged, and co produced. A serious KPI framework must therefore track not just network extent but the chain by which capability becomes use and use becomes value.

Figure 1: FTTH impact pathway for Vision 2030 digital goals

Table 1: Proposed national FTTH KPI framework for Vision 2030 monitoring

Layer	Illustrative core KPIs	Vision 2030 relevance	Reporting cadence	Likely lead institution
Access and availability	Homes passed; serviceable premises; public facility connectivity	Tracks physical reach and readiness	Quarterly	MCIT / CST
Adoption and affordability	Active FTTH subscriptions; take-up; entry-level price burden	Shows whether infrastructure is actually used	Quarterly	CST / GASTAT

Layer	Illustrative core KPIs	Vision 2030 relevance	Reporting cadence	Likely lead institution
Quality and reliability	Median download/upload; latency; jitter; outage rate	Captures quality of experience and service robustness	Monthly to quarterly	CST / operators
Utilization and inclusion	Digital government use; SME cloud use; regional equity measures	Links broadband to participation and inclusion	Quarterly / annual	DGA / GASTAT
Outcomes	Digital economy share; telehealth uptake; productivity proxies	Assesses contribution to national transformation	Annual	GASTAT / Vision 2030 units

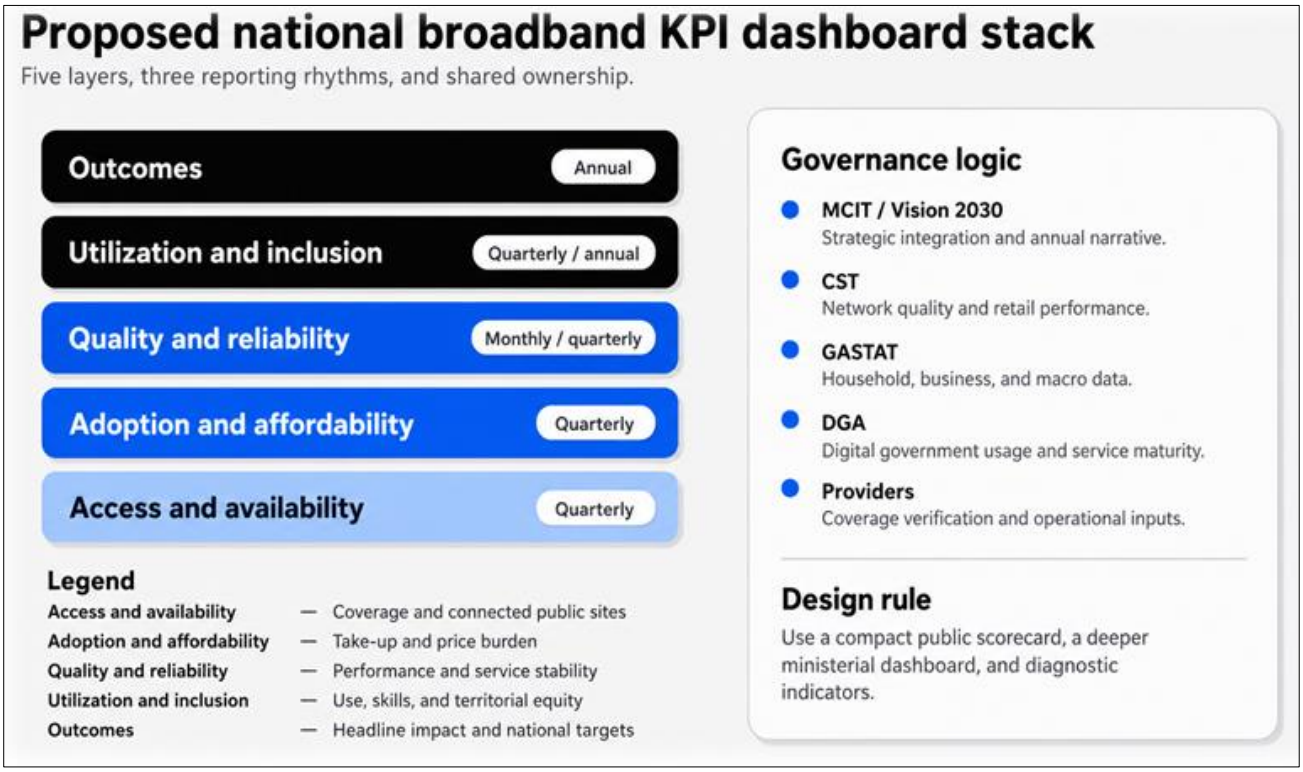

Figure 2: Proposed national broadband KPI dashboard stack

Table 2: Vision 2030 linkage matrix for interpreting FTTH contribution

Goal area	FTTH pathway	Lead indicator	Intermediate indicator	Lagging indicator
Digital government	Stable access to portals and transactions	Government sites on fibre	Latency and completion rates	Digital service maturity and usage
SMEs and productivity	Cloud use, coordination, e-commerce	Commercial zone fibre availability	Active business subscriptions	Digital economy value and firm productivity proxies
Education and employability	Learning continuity and remote work readiness	Household fibre coverage	Affordability and digital skills participation	Remote work and training participation
Health access	Teleconsultation and data exchange	Health facility fibre connectivity	Platform reliability and household access	Telehealth uptake and service coverage
Inclusion and territorial balance	Reduced digital exclusion	Peripheral area serviceability	Take-up by region and income proxy	Equity in digital use outcomes

6. DISCUSSION AND POLICY IMPLICATIONS

Three broad policy implications follow from the review. First, Saudi Arabia should move from an infrastructure centric narrative to a contribution centric narrative. The infrastructure story remains important, and the Kingdom's reported gains in fibre coverage and internet penetration are significant. But as Vision 2030 enters its delivery phase,

measurement should emphasise whether high capacity fixed broadband is enabling strategic outcomes rather than simply expanding physical reach. A national dashboard that continues to privilege homes passed and top line speeds would underuse the maturity that Saudi institutions have already achieved.

Second, dashboard governance should be distributed but integrated. MCIT, CST, DGA, GASTAT, and Vision 2030 delivery bodies each own different parts of the evidence base. The challenge is not only data collection but data harmonization. A viable solution would assign indicator ownership by domain while establishing a shared metadata standard, common definitions, and an annual integration cycle. CST may lead network quality and retail performance; GASTAT may lead household, business, and macro outcome indicators; DGA may lead public service usage and maturity indicators; and Vision 2030 reporting units may curate the strategic narrative. Without such coordination, the national system will remain fragmented across institutions that each report accurately within their own boundaries but cannot explain national contribution coherently.

Third, the dashboard should be explicitly designed for policy learning. That means every major KPI should be paired with an intervention logic. If take up is weak despite strong availability, affordability or relevance may be the issue. If speeds are high but user satisfaction is low, reliability or in home networking may be the constraint. If digital government usage stalls despite strong connectivity, service design or trust may be responsible. In other words, the purpose of the KPI system is not merely to celebrate success but to reveal bottlenecks that can be acted upon.

The review also supports the use of disaggregation as a core design principle. Saudi Arabia's national averages are impressive, but effective governance requires visibility into regional, social, and sectoral variation. Minimum disaggregations should include region, urban versus peripheral settlement, household income proxy, business size, and service domain. Where feasible, additional breakdowns by gender, age, and disability inclusion would further strengthen the social value of the dashboard.

A final implication concerns public communication. Apple style minimal visual design, which the user requested for the figures, is not merely an aesthetic choice. Clean visual hierarchy, limited colour palettes, and small numbers of well defined signals can improve executive understanding and public accountability. Broadband dashboards often fail because they overwhelm users with technical detail. A layered visual system that separates strategic indicators from diagnostic indicators is more likely to support good decisions.

7. CONCLUSION

This review has argued that Saudi Arabia now needs a national broadband KPI system that treats FTTH as an enabling capability for Vision 2030 rather than as an isolated telecom asset. The evidence from international frameworks, Saudi official reporting, and the empirical literature suggests that measurement should be organised across five layers: access and availability, adoption and affordability, quality and reliability, utilization and inclusion, and outcomes. Such a structure is better suited to the Kingdom's current stage of digital transformation than older dashboards based mainly on coverage and download speed.

The paper has also shown why measurement must be contribution oriented. FTTH can support digital government, enterprise productivity, employability, telehealth, and inclusion, but these benefits are mediated by skills, institutions, pricing, service design, and trust. Strong measurement therefore depends on bundles of indicators rather than single headline metrics. A Saudi dashboard that combines infrastructure data with service quality, active use, and sector outcomes would provide a clearer account of progress than today's fragmented reporting environment.

For policymakers, the recommendation is clear: preserve rollout momentum, but upgrade measurement logic. As Vision 2030 moves deeper into implementation, success should be judged by whether fibre based connectivity is affordable, high performing, widely adopted, equitably used, and visibly connected to the Kingdom's broader digital goals. A disciplined KPI system can help Saudi Arabia manage that transition confidently.

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