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ORIGINAL ARTICLE

Interpretive Structural Modeling of Social Networks and Mobile Messengers Indicator's for the Development of Internet of People (IoP) in Iran

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EXTENDED ABSTRACT

Interdiction:

In recent years, the concept of the Internet of People (IoP) has emerged as a novel paradigm extending beyond the Internet of Things (IoT), with an emphasis on human-to-human and human-to-machine interactions within digital ecosystems. Whereas the IoT primarily concerns the interconnectivity of devices and sensors, the IoP foregrounds the role of human engagement, collective intelligence, and digital participation in shaping networked societies. Against the backdrop of accelerating global digital transformation, understanding how social networks and mobile messengers contribute to the development of the IoP has become a critical concern—particularly in developing nations such as Iran, where digital infrastructure and governance are undergoing dynamic transition.

This study aims to explore and model the indicators of social networks and mobile messengers that influence the development of the IoP in Iran, employing the Interpretive Structural Modeling (ISM) approach. The necessity for this research stems from the absence of a clear, structured framework to elucidate the interplay between digital communication platforms and socio-technical constructs such as the IoP within the Iranian context.

The primary objective of this study is to identify and structurally model the indicators related to social networks and mobile messaging platforms that significantly affect the development of the Internet of People in Iran. The research seeks to address the following core questions:

- What are the most influential indicators of social networks and mobile messengers in shaping the IoP?
- How do these indicators interact with and influence one another within a hierarchical structure?
- What policy implications can be derived for the Iranian digital governance ecosystem, particularly within the framework of the Supreme Council of Cyberspace?

This research is applied in nature and follows a mixed-methods design, integrating qualitative exploratory techniques with quantitative modeling, grounded in an inductive-deductive logic.

Method:

This study adopted a two-phase methodological design.

Phase 1: Qualitative Data Collection and Coding

In the first phase, semi-structured interviews were conducted with university professors and domain experts in information and communication technology (ICT) and the social sciences. Purposive sampling was employed, and interviews continued until theoretical saturation was achieved. The transcribed data were analyzed and coded using MaxQDA 2020, resulting in the identification of 14 primary indicators relevant to the development of the IoP. These indicators encompassed concepts such as digital literacy, data privacy, cultural shifts, crowdsourcing, and infrastructure development.

To ensure the validity and reliability of the qualitative phase:

- Content validity was assessed through expert reviews.
- Reliability was confirmed via Cohen's kappa coefficient, which measures inter-coder agreement and consistency in qualitative coding.

Phase 2: Quantitative Modeling via ISM

In the second phase, a structured questionnaire was developed based on the identified indicators. This instrument was administered to 63 experts, including:

- Policy-makers and directors at the Supreme Council of Cyberspace;
- Senior managers, department heads, and deputy ministers from various executive bodies in Iran's digital governance space.

Purposive sampling was again employed to ensure the participation of decision-makers possessing strategic insights. Questionnaire validity was reaffirmed through expert feedback, and reliability was assessed using test-retest correlation.

The Interpretive Structural Modeling (ISM) method was subsequently applied to analyze responses and derive a hierarchical model. ISM is particularly suited to this type of study, as it facilitates the mapping of complex relationships among variables and presents them in structured levels of influence.

Findings:

The ISM analysis yielded a six-level hierarchical model representing the structural relationships among the 14 indicators. The principal findings are as follows:

- Most influential indicators (bottom of the hierarchy):
 - X11: Data Privacy and Security Concerns
 - X2: Upstream Documents and Strategic Policies
 - X14: Digital Literacy

These indicators were identified as driving forces that significantly shape the structure and effectiveness of other indicators within the IoP ecosystem. Their foundational nature positions them as key targets for policy reform and technological investment.

- Linkage variables (mid-level, bidirectional influence):
 - X4: Cultural Shifts
 - X8: Standardization and Protocols
 - X9: Infrastructure Development

These variables act as bridges, both influencing and being influenced by other variables, thereby highlighting their dynamic role in system evolution.

- Most dependent indicators (top of the hierarchy):
 - X7: Empowerment through IoP Cooperation
 - X13: Facilitation of Dialogue and Participation

These were shown to be highly susceptible to influence, indicating that their realization depends on the establishment of other foundational conditions such as literacy, standards, and policy support.

Conclusions

The model underscores the interconnected nature of technological, cultural, and policy-related factors in the development of the IoP. Although empowerment and civic participation constitute key goals of the IoP, their achievement is contingent upon prior investment in education, infrastructure, and regulatory mechanisms.

Particularly within the Iranian context—where digital sovereignty and cybersecurity concerns are at the forefront of national strategy—understanding these interdependencies is crucial for the successful implementation of Internet of People initiatives. Furthermore, the Supreme Council of Cyberspace is identified as a critical stakeholder whose decisions directly affect the viability and direction of IoP projects.

This research contributes a context-specific interpretive structural model that reveals how diverse digital, cultural, and infrastructural indicators interrelate to support the development of the Internet of People in Iran. The study provides a framework for strategic decision-making by identifying both foundational and dependent variables.

Implications for Practice and Policy

- **Policymakers** should prioritize data privacy legislation and integrate it into national cyberspace strategies.
- **Educational initiatives** focused on digital literacy must be scaled, particularly among vulnerable and marginalized populations.
- **Standardization bodies** should accelerate the development of interoperable frameworks for mobile messengers and social platforms.

- **Cross-ministerial collaboration** (e.g., ICT, Education, Culture) alongside engagement with civil society is necessary to realize the full potential of the IoP.

Data Availability Statement

Data available on request from the authors.

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Ethical considerations

Not applicable.

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Conflict of interest

The authors declare no conflict of interest.

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