**Text

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**Questionnaire for Arbitration**

Dear Professor Dr. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Greetings,

The researcher is conducting a study entitled:

**“The Impact of Digital Transformation on Sustainability in Jordanian Water Utilities”**

This study is in fulfillment of the requirements for a Master's degree in Business Administration from Petra University.

Accordingly, the researcher has prepared the attached questionnaire. As specialists and those interested in this field, I kindly request you to review the questionnaire in its preliminary form. I would be grateful if you would please read and evaluate the questionnaire's paragraphs in terms of:

1. The appropriateness of the paragraph to the topic of the study.

2. The extent to which the paragraph aligns with the field under which it falls.

3. Modify or delete as you see fit, or add any other comments or suggestions.

Your opinions and guidance will be instrumental in developing and producing the tool appropriately. Therefore, we kindly ask you to express your opinions on each paragraph of the tool by placing a check mark (✔) in the appropriate box. Please give your comments and feedback (deletion, addition, modification, merger, or rewording), and the extent of your agreement with the paragraphs of the tool.

Thank you for your cooperation. With my utmost respect and appreciation.

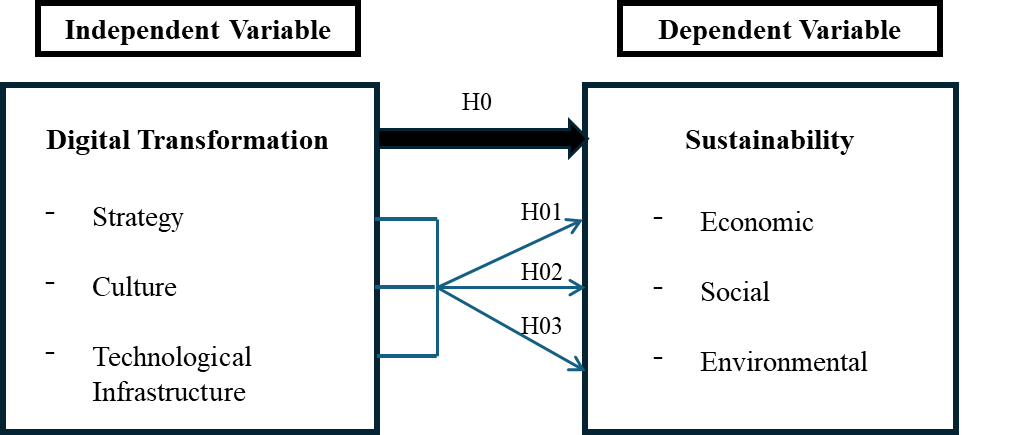
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Supervised by: **Dr. Mohi-Eddin Al-Qutop**

**Study Model:**



**Source:** This model is prepared by the researcher based on:

* Independent Variable: (Leite et al., 2024a); (Paiva & Willie, n.d.); and (Robertsone & Lapiņa, 2023).
* Dependent Variable: (Robertsone & Lapiņa, 2023); (Wang, 2025); and (Samir, 2023).

**Study Hypotheses:**

Based on the study problem, study questions, and study purpose and objectives, the main hypothesis and sub-hypotheses were formulated as follows:

**H0:** There is no significant impact of Digital Transformation (Strategy, Culture, and Technological Infrastructure) on Sustainability (Economic, Environmental, and Social) in Jordanian Water Utilities at a level (α ≤ 0.05).

**H01:** There is no significant impact of Digital Transformation on Economic Sustainability in Jordanian Water Utilities at a level (α ≤ 0.05).

**H02:** There is no significant impact of Digital Transformation on Environmental Sustainability in Jordanian Water Utilities at a level (α ≤ 0.05).

**H03:** There is no significant impact of Digital Transformation on Social Sustainability in Jordanian Water Utilities at a level (α ≤ 0.05).

**Questionnaire development structure**

All dimensions will be measured with a Likert five-point scale to evaluate the actual perceptions of the respondent regarding each dimension, as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
| 1 | **2** | **3** | **4** | **5** |

**Part one :**

**Demographic Data:**

Please indicate the answer by placing a check mark **(**‏‏✔**)** in the specific box ():

**Sex: **Male Female

**Age in years:**

****less than 30 30 to less than 40 years

40 to less than 50 years  50 years or above

**Experience in years:**

****less than 5 years  5 to less than 10 years

10 to less than 15 years 15 years or above

**Educational level:**

****Bachelor's High Diploma Master's Ph.D.

**Managerial level:**

Top Management Functional Management Operational Management

**Part two:**

**Study Variables Data:**

Please indicate the answer by placing a check mark **(**‏‏✔**)** in the specific box (): -

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Independent Variable and its dimensions:**  **Digital Transformation:**  The process of providing technological infrastructure to radically change the way Jordanian water utilities operate through adopting a digital strategy and digital support culture to improve operation and achieve customer satisfaction. | | | | | | |
| **Digital Strategy**:  A comprehensive plan that outlines how Jordanian water utilities will integrate digital technologies to achieve the mission and goals of their corporate strategy, from improving operations to increasing customer satisfaction. | | | | | | |
| **#** | **Item** | **Belonging to the domain** | | **Validity of the statement** | | **Proposed adjustment** |
| **Yes** | **No** | **Yes** | **No** |
| 1 | The utility has a well-defined digital roadmap. |  |  |  |  |  |
| 2 | The utility’s strategy is formulated to ensure effective digital transformation. |  |  |  |  |  |
| 3 | The utility’s digital strategy aligns with the utility’s mission and goals. |  |  |  |  |  |
| 4 | The utility’s annual budget includes planned investments for digital transformation projects. |  |  |  |  |  |
| 5 | The utility’s digital strategy is formulated to enhance the operations that depend on digital transformation. |  |  |  |  |  |
| **Culture:**  The mindset, behaviors, attitudes, and values that support digital adoption within the water utility. This includes digital literacy, overcoming resistance to change, and ensuring collaboration. | | | | | | |
| 6 | The prevailing mentality among the utility’s employees is that digital transformation is beneficial for the water sector. |  |  |  |  |  |
| 7 | The employees are not resisting the digital transformation process. |  |  |  |  |  |
| 8 | The utility is encouraging continuous learning in relation to digital transformation. |  |  |  |  |  |
| 9 | The employees continually encourage digital transformation improvements. |  |  |  |  |  |
| 10 | The employees collaborate to achieve a successful digital transformation. |  |  |  |  |  |
| **Technological infrastructure:**  The deployment and utilization of the latest technologies and digital tools, systems, and platforms in water utilities’ operations. This includes an accurate GIS database, SCADA, smart meters, pressure management, and integrated solutions comprising Internet of Things (IoT) sensors, data analytics platforms, automation systems, and mobile applications. | | | | | | |
| 11 | The utility leverages the latest technologies available for the water sector. |  |  |  |  |  |
| 12 | The utility relies on an accurate GIS database for decision-making. |  |  |  |  |  |
| 13 | All of the utility facilities are connected to SCADA for monitoring and control. |  |  |  |  |  |
| 14 | All of the customer meters are smart, enabling two-way communication, remote meter readings, detailed consumption data, and potential for dynamic pricing based on usage. |  |  |  |  |  |
| 15 | Pressure is properly managed at all distribution networks. |  |  |  |  |  |
| 16 | Digital platforms support the customers’ interactions. |  |  |  |  |  |
| 17 | The company uses advanced data analytics platforms for current and future decision-making. |  |  |  |  |  |
| 18 | The utility leverages the latest technologies available for the water sector. |  |  |  |  |  |
| **Dependent Variable and its dimensions:**  **Sustainability:**  The ability to provide reliable and affordable water services while maintaining or improving economic, social and environmental sustainability for current and future generations. | | | | | | |
| **Economic Sustainability:**  A measure of the ability of Jordanian water utilities to leverage resources efficiently, achieve cost recovery, strategic asset management and adaptive investment planning in a manner to achieve economic sustainability. | | | | | | |
| 19 | The Non-Revenue Water reduction targets are achieved. |  |  |  |  |  |
| 20 | The utility achieves a high cost recovery rate. |  |  |  |  |  |
| 21 | The utility cash flows recovered are sufficient for reinvestments. |  |  |  |  |  |
| 22 | Decisions related to asset replacement and maintenance programs are based on accurate and realistic data. |  |  |  |  |  |
| 23 | Optimization of energy costs is data-driven. |  |  |  |  |  |
| **Social Sustainability:**  The ability to ensure equitable, reliable, and accessible water services that protect public health, guarantee affordability, and community engagement through awareness campaigns. | | | | | | |
| 24 | The utility ensures equitable access to safe water in its service area. |  |  |  |  |  |
| 25 | The utility provides support programs for low-income households. |  |  |  |  |  |
| 26 | The utility ensures delivery of safe, high-quality water to protect public health. |  |  |  |  |  |
| 27 | The utility hires people with disabilities. |  |  |  |  |  |
| 28 | The utility conducts awareness campaigns for water conservation. |  |  |  |  |  |
| 29 | The utility has response plans during crises to maintain service. |  |  |  |  |  |
| **Environmental Sustainability:**  The ability of the Jordanian water utilities to minimize ecological impacts and operate within the carrying capacity of the environment through efficient water resource management, energy optimization, pollution prevention, and alignment with natural water cycle dynamics while adapting to climate variability. | | | | | | |
| 30 | The utility has a formal environmental management policy. |  |  |  |  |  |
| 31 | Water leakage is efficiently controlled. |  |  |  |  |  |
| 32 | The utility is incorporating renewable energy sources into its operations where it is feasible to reduce environmental pollution. |  |  |  |  |  |
| 33 | The utility reuses treated wastewater to protect the environment. |  |  |  |  |  |
| 34 | The utility is constantly protecting the Water resources from contamination. |  |  |  |  |  |
| 35 | The utility adapts its operations to climate change impacts. |  |  |  |  |  |

**Comments to the researcher:**

Your study of how Jordanian water utilities are changing to be more digital and environmentally friendly is relevant and worth noting. Your approach is simple and thorough. As you refine and enhance your research, contemplate incorporating a unique aspect, such as a comparative analysis with regional or international utilities, or qualitative insights derived from expert interviews or stakeholder involvement. This way of looking at things would make your study's analysis, creativity, and real-world importance stronger.   
  
A well-planned extension could set your research apart from other work in the field and make it more relevant for scholars and policymakers. You are obviously getting smarter, and this strategic addition might make a big difference in the conversation about digital transformation and sustainable infrastructure. Keep going; your work is making a useful study.

Again, this is a fine piece of work. We might get things better by considering the following comments:

1. Benefits of Cover Letter and Introductory Section:   
  
Respectful and formal.   
  
Specifies the study's goal and reviewer's role.   
  
Provides researcher and supervisor contact information.   
  
Improvement Potential:   
  
The study title should be bold or italicised.   
  
Indicate the questionnaire's target audience (water utility professionals, digital transformation specialists, arbitrators).   
  
Explain the term "paragraphs," which appears often in the questionnaire as "statements" or "items".   
  
“Please evaluate each questionnaire item for relevance and clarity.”   
  
2. Research Framework and Hypotheses ✅ Benefits:   
  
Provides accurate citations for conceptual model sources.   
  
Clearly states theories about independent and dependent variables.   
  
 Improvement Potential:   
  
The "Study Model," which appears to be missing, should be shown schematically.   
  
Maintain reference consistency (“Robertsone” vs. “Robertson”). Check for typos.   
  
Rewrite null hypotheses uniformly.   
  
  
3. Benefits of Questionnaire Scaling:   
  
Traditional 5-point Likert scale.   
  
Different response tier labels.   
  
Improvement Potential:   
  
Define anchor points like “Strongly Agree” and “Agree”.   
  
Final formatting should represent the scale equally and with proper spacing and alignment.   
  
4. Section 1: Demographics

Gender, age, experience, education, and managerial level are relevant.   
  
Improvement Potential:   
  
Use gender-inclusive language (“Sex” → “Gender”).   
  
Add "Other" for and education.   
  
Rephrase "Managerial level" as some respondents may not fit any category.   
  
Management Level:   
  
• Executive/Senior Leadership   
  
Intermediate Management   
  
The frontline/operational personnel   
  
  
  
5. Section 2: Research Variables

Benefits:   
  
Separate independent and dependent variables.   
  
Most items are relevant, structured, and sensible.   
  
5.1 Digital Strategy   
  
Advantages:   
  
Describes digital transformation well.   
  
Enhancement Opportunities:   
  
Some elements overlap or are unclear. For instance:   
  
Question 5—"improve the operations reliant on digital transformation"—needs clarification.   
  
The utility's digital strategy emphasises on improving processes.   
  
5.2 Culture   
  
Advantages:   
  
Concentrate on mindset and cooperation.   
  
Enhancement Opportunities:   
  
Items 6–10 should be clarified and not double-barreled.   
  
Illustration:   
  
Item 6: “The predominant mindset…” → Use simpler language like “Employees perceive digital transformation favorably.”   
  
Item 7: Because “not resisting” may confuse Likert scales, rewrite as “Employees endorse the digital transformation process.”   
  
Technology Infrastructure   
  
Advantages:   
  
Fully water utility-specific.   
  
Addresses critical technologies like SCADA, GIS, IoT, etc.   
  
Enhancement Opportunities:   
  
Item 18 duplicates Item 11 and must be removed or changed.   
  
Item 14 is lengthy; please split it in two.   
  
Smart meter deployment   
  
Features like remote monitoring and dynamic pricing   
  
Recommend division:   
  
Utility smart meters provide bidirectional connection.   
  
“Smart meters enable remote reading, usage monitoring, and flexible billing.”   
  
6. Dependent Variables: Sustainability ✅ Benefits:   
  
Broad economic, social, and environmental sustainability coverage.   
  
6.1 Economics Sustainability   
  
Enhancement Opportunities:   
  
Consider rewording to improve clarity:   
  
21: "Utility revenues are adequate to meet reinvestment requirements."   
  
Use the same names for all economic components.   
  
6.2 Social Stability   
  
Advantages:   
  
Covers equity, safety, inclusivity, and public participation.   
  
Enhancement Opportunities:   
  
Item 27: Disability employment is important, but without context, it may seem unrelated to core service sustainability.   
  
Focus on customer satisfaction or trust.   
  
6.3 Sustainability Environmental   
  
Advantages:   
  
Water reclamation, pollution control, and climate adaptation integrated well.   
  
Enhancement Opportunities:   
  
To simplify analysis, items might be classified logically (leakage management, energy, climate).   
  
Use clearer language for 35: “Modifies its operations in response to climate change effects”. Be specific (drought resilience, infrastructure improvements, etc.).   
  
7. Formatting and Structure Guidelines   
  
The well-structured evaluation table (Yes/No for domain + validity + proposed improvements) could be improved by:   
  
Column headings repeat on subsequent pages.   
  
Quality comments—possibly a column.

**Best Wishes,**

**Dr. Firas Omar**

**Business Intelligence**

**Business Faculty**

**Al Zaytoonah University of Jordan**