ITJ | The International Tax Journal

The role of smart (Digital) Systems in alertness to risks: A case study – Bechar Post Corporation

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Abstract---This study aims to demonstrate the role of smart (digital) systems in alertness to risks. While carrying out their various activities, institutions remain exposed to risks of all kinds, whether their sources are internal or external. The occurrence of these risks could threaten the institution's operations, or even its continuity and survival, necessitating the need to identify and address these risks before they occur. This process requires a set of tools. Alongside technological transformations and smart solutions, digitisation is considered one of the most important tools that institutions can utilise to provide comprehensive monitoring of the internal and external environments and send accurate and timely alerts and signals, keeping decision-makers vigilant about potential threats to the institution. The study's theoretical framework has been applied to the Bechar Post Corporation in a practical setting, concluding that smart digital systems help institutions stay alert to risks by providing advanced forecasting and sensing of the internal and external environment.

Keywords---systems, technology, smart, risks, institution, alertness.

Introduction

Algerian institutions are embracing modern practices and the changes brought about by information and communication technology. This significant development has led to new forms emerging, such as the ability to gauge reactions, track processes and messages, identify responsible parties and specify locations with high precision and clarity. These digital systems assist institutions in monitoring their internal and external environments, keeping them highly aware of their surroundings by facilitating the collection, analysis and timely usage of information, especially amid ongoing disruptions and threats. In this context, the aim of this research paper is to answer the following main question:

How to Cite:
Lamine, B. M. (2024). The role of smart (Digital) Systems in alertness to risks: A case study – Bechar Post Corporation. *The International Tax Journal*, *51*(6), 333–345. Retrieved from https://internationaltaxjournal.online/index.php/itj/article/view/543

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Submitted: 06 June 2024| Revised: 04 October 2024| Accepted: 05 November 2024

How do smart digital systems help institutions stay alert to risks?

1.1 Based on this main question, we address the following sub-questions:
- What is the concept of risk?
What is the concept of alertness?
What smart systems do institutions use in the risk alertness process?

1.2 Study hypothesis
Based on the main question and the proposed sub-questions, the following hypothesis can be presented:
Smart systems work to predict and enhance sensitivity to the internal and external environment by collecting, analysing and disseminating information.

1.3 Objectives of the study
Through this study, we aim to achieve the following objectives:
- To shed light on the state of technology in institutions through smart systems in the context of ongoing risks and threats in the business arena, as they are a current topic.
- Highlighting the benefits of smart systems in enhancing risk awareness in institutions.

1.4 Importance of the study
This study is significant because it considers institutional technology and its role in the alertness process amid recurring risks. The importance of this study is generally reflected in the following elements:
- The critical importance of smart systems as a modern technology that institutions seek to leverage to improve performance quality.
- The importance of enhancing the level of risk awareness amid repeated crises by incorporating digital methods within institutions.

1.5 Methodology of the study
To answer the main question of this study and verify or refute the validity of the proposed hypothesis, the following approach was taken:
- **Theoretical aspect:** we relied on descriptive methodology to understand smart systems technology and its contribution to risk alertness processes in institutions. This involved studying the topic and examining various elements in order to present concepts and literature that would help us to achieve our objectives.
- **Practical aspect:** we employed an analytical descriptive method, discussing a set of questions using an interview questionnaire to gather information and align the theoretical aspect with the Bechar Post Corporation as a model for the study.

1.6 Previous studies
There are a number of previous studies that have addressed smart systems technology and risk awareness processes. Some of these can be highlighted as follows:
Osama Maamri emphasised the importance of an electronic information system based on modern software and effective devices for activating the institution's internal control system and assessing the efficiency of the information system. The study concluded that the Hess institution possesses an efficient information system that activates internal control by following a special policy for information protection and security. This policy involves allocating a specific section for the maintenance of devices and equipment, protecting them from viruses, employing a network that prevents system breaches and manipulation of information, and enforcing laws that prevent the copying and insertion of information from outside the network (Maamri, 2022). (Maamri, 2022).
Aied Soufan discussed the implications and repercussions of crises, which led to attempts to develop and establish early warning indicators for crisis-related risks. One of the objectives of this study was to define the concept of an early warning system and its mechanisms, as well as the most important

models used to predict banking crises. Another objective was to outline the steps involved in building an early warning model, including the selection of economic, financial, banking and monetary indicators and variables on which early warnings can be based, and the subsequent statistical evaluation and numerical estimation of these indicators. (Soufan)
Khloufi Sofiane addressed the issue of building and activating an early warning system for epidemic risks in Algeria as part of a strategic approach to risk management. The study concluded with a proposed model for activating the early warning system. This model starts with the system's inputs, which are represented by information monitoring, and ends with its outputs, which are represented by response, confrontation, and readiness. The system's processes, which are represented by detection and analysis, are included in the model to ensure coherence. (Sofiane, 2021).
Osama Boucherit aimed to shed light on the nature of risks in banks and the extent to which automated processes help to prevent such events at the Bank of Peace Algeria. The study employed interview techniques to gain insight into the software utilised by the bank and to pinpoint the risks that this software could mitigate. It was concluded that information systems played a pivotal role in mitigating risks by minimising human error. (Boucherit, 2022).

- Commonality with previous studies: Both this study and previous studies addressed smart systems as a future orientation in risk and crisis management processes.
This study differs from previous studies in that it will examine the role of smart (digital) systems in the risk alertness process through a field study of the Bechar Post Corporation, assessing its capability to utilise this technology in risk alertness operations. Other studies, in contrast, focused on the importance of developing technology to prevent such events. Therefore, this study complements previous studies by demonstrating the practical application of smart systems in risk alertness processes.

2. Theoretical aspect: The processes of monitoring and observing threats to organisations are among the most important administrative functions attributed by researchers to alertness. The effectiveness of this function is enhanced by ongoing digital transformation and its integration with risk alertness processes, through data collection and analysis, and rapid response — features that can be facilitated by smart digital systems.

2.1 Basics of risks
Risks encompass all potential events and conditions that disrupt the course of organisations and negatively impact their achievement of objectives. A good understanding of these events and their forms enables decision-makers to manage risks effectively, thereby ensuring stability and smooth operations.

2.1.1 Definition of risks: Different perspectives exist among researchers and writers regarding the definition of risks, similar to other scientific terms. They have formulated various definitions, each based on their view of the risks faced by the organisation. The table below outlines the most important definitions that we have selected:

Table 1: Definition of risks

Researcher/Author:	Concept of risk
Farida	Risk, in the sense of jeopardy or exposure to harm or loss, or the probability of an adverse event occurring. (Mustafa, 2019, p. 91).
Attia	An uncertain situation that affects the objectives of the entity exposed to it when it occurs. (Attia, 2018, p. 337).
Attia	3. It encompasses all unexpected events that impact the institution's activities and lead to changes in its financial position. (Samira, 2021, p. 329).

Source: Prepared by the researcher based on a collection of scientific articles.

Operational definition: A risk is a future event that may affect the institution, resulting in the stoppage of operations and a set of losses. However, it may also be predicted using a set of digital tools, enabling the institution to overcome it and become highly aware of it.

2.1.2 Types of risks: Institutions may be exposed to a range of risks that can lead to varying losses, depending on the type of risk that affects the institution. The table below highlights the most important of these categories:

Table 2: Types of risks

Types of risk	Definition of types of risk
Organisational risks	Organisational risks: These are risks related to internal business requirements, including changes in structure, culture and individual issues, and their connection to effective work processes.
Financial risks	Financial risks: This type of risk involves everything related to the financial aspect of the business, such as cash flow, budget requirements, tax obligations, and the management of creditors and debtors.
Legal risks	Legal risks: This category includes obligations relating to legal requirements, such as legislation, regulations, standards and contractual requirements. It also extends to policies, procedures and expectations set by the social environment, customers and contractors.
Operational risks	Operational risks: These risks encompass the activities, tasks, resources and support requirements involved in producing goods and services.
Commercial risks	Commercial risks: This type of risk relates to market activities, business growth, diversification, commercial success, and the viability and growth potential of products and services based on the customer base.
Security risks	Security risks: This category represents risks affecting anyone associated with the business, including individual, workplace and public safety, as well as the security of products and services offered.
Strategic risks	Strategic risks: These involve the risks associated with planning and the resources required to establish, grow and expand the business.
Equipment risks	Equipment risks: This includes risks that hinder the effective use of machinery and tools

Source: Prepared by the researcher based on a scientific article on the impact of risk management on strategic decision-making.

2.1.3 Stages of risks in the institution

Risks may arise suddenly or develop from one stage to another if preventive measures are not taken to avoid them. The development of risk occurs as follows:

Risk preparation stage: It is known that any institution consists of internal and external environments that interact with each other, affecting and being affected by them. The sources of risks do not go beyond these two environments.

- **Internal environment:** resulting from the difference between what has been planned and what has been achieved, or between what is desired and what exists, depending on the aforementioned categories.
- **External environment:** the institution is not isolated from its surroundings, especially in an era of globalisation and intense competition where threats loom over institutions. Risks may arise from undesirable, uncontrollable operations that, when accumulated, may overwhelm the institution.
- **Risk stage:** when it becomes difficult to overcome existing institutional gaps and there is a lack of forecasting and comprehensive surveillance of external threats, the shift to risk is imminent. The

institution is facing a serious situation and has entered a challenging phase that requires a series of efforts to overcome it, referred to as the risk stage. (Faisal, 2022, p. 386).

2.2 Basics of alertness

High levels of alertness depend on awareness, heightened sensitivity and the ability to analyse situations quickly and effectively. This function is considered a pivotal part of risk and crisis management processes.

2.2.1 Definition of alertness

Alertness is a broad concept involving the analysis of data and scenarios to enable continuous adaptation to a changing and turbulent environment. The following table shows several definitions of alertness as viewed by researchers:

Table 3: Definitions of alertness

Researcher/Author	Definition of alertness
- arousse Encyclopedia	The term 'veille' is derived from the Latin 'vigila', meaning 'monitoring' or 'continuous guarding'. It refers to being in a state of receiving and perceiving things, ready to discover something that may happen, without knowing exactly what, when or where. (Al-Zahra, 2022, p. 279).
- Aicha	It refers to a state of awareness and sensitivity to all signals and warnings from the internal and external environment, regardless of what they are, when they occur, or where they occur. (Aisha, 2010, p. 6)
- Jakoblak	It involves monitoring the environment by targeting specific information, which is then processed for decision-making purposes. (Hamida, 2022, p. 306).

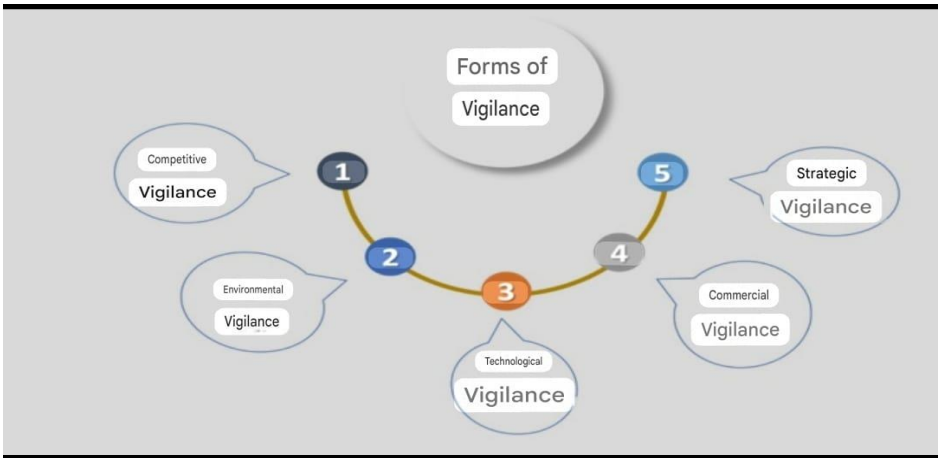
Source: Prepared by the researcher based on a collection of scientific articles.

Operational definition: Alertness in the institution involves recognising the various reactions of direct and indirect users and customers, understanding their needs, desires and concerns, and knowing how to respond to them.

2.2.2 Forms of alertness

There are several forms of the alertness process that vary according to context, field of work and orientation. The following figure illustrates the most important of these forms within the institution:

Figure 1: Forms of alertness



Source: Prepared by the researcher based on a collection of scientific articles.

Competitive alertness refers to the constant monitoring and listening out for changes occurring in all fields, in order to act pre-emptively before taking a specific action. The institution can understand competitors' behaviour by gaining knowledge of their current performance, strategies, objectives and capabilities encompassed in their activities.

Technological alertness: According to Jakoblak, this involves observing the technological environment and the latest innovations it offers. This involves analysing the scientific and technical environment and its impact on the current and future directions of institutions, in order to identify areas of opportunity.
Environmental alertness concerns the remaining elements in the environment not previously mentioned. It considers legislative, legal, political, financial and social aspects, as well as anything else that might impact the institution, either directly or indirectly. This type of alertness is difficult due to the need for carefully selected information.

- Commercial alertness: This type concerns marketing, meaning everything related to exchange relationships, buying and selling activities, and associated policies regarding surveys on consumer behaviour and trends, as well as emerging market skills.
- Strategic alertness: This type is considered an umbrella for all the previous types, as it helps to identify internal strengths and weaknesses, seize external opportunities and avoid external threats, based on information derived from various intelligence sources. (Attia, 2018, pp. 337–338).

2.3 Basics of Smart (Digital) Systems

Perhaps the most recent technologies that accelerate processes and provide accurate and high-quality information are smart systems. To delve into this concept and examine the most important definitions of it, we must break down its composition as follows:

2.3.1 Definition of information systems

There is a wide range of definitions for systems, which can be summarised in the following table:

Table 4: Definition of Information Systems

Researcher/Author	Definition of system
- Fatima	The term 'system' is derived from the Greek word 'systema', meaning a composite whole made up of parts. (Al-Aziz, 2014, pp. 88–89).
- Samira	A collection of elements (e.g. resources, software and individuals) that enables the collection, processing, storage and transmission of information. (Boukhamkhom, 2010, p. 6).
- Ayoub	A combination of mechanical and human elements that work together to collect and process data with the aim of converting it into information that aids decision-making. (Wafa, 2019, p. 178).

Source: Prepared by the researcher based on a collection of scientific articles

2.3.2 Definition of smart (digital) systems

Smart systems represent the latest and most advanced aspect of information systems, which can be defined as follows:

Table 5: Definition of smart systems

Researcher/Author	Definition of intelligent systems
IEEE Computer Society	Systems that perceive, reason, learn and act.
Fritz	They communicate with their environment and continuously evaluate the responses they receive regarding their variables, determining their appropriateness. They are characterised by two elements: 1) a high

Researcher/Author	Definition of intelligent systems
	capacity for sensing and 2) the ability to learn from actions in order to maximise the likelihood of achieving objectives. (Ayoub, 2018, p. 65).
Ben Halima	They comprise a set of interconnected components and processes that are governed by rules in order to achieve specific, quantifiable goals. This indicates a series of signals and pulses that translate information into binary (0, 1). (Karima, 2022, p. 279).

Source: Prepared by the researcher based on a collection of scientific articles.

Competitive alertness refers to the constant monitoring and listening out for changes occurring in all fields, in order to act pre-emptively before taking a specific action. The institution can understand competitors' behaviour by gaining knowledge of their current performance, strategies, objectives and capabilities encompassed in their activities.

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Expert systems are capable of performing cognitive and mental operations that simulate human thinking. They provide advice and solutions to problems, as well as innovative ideas and proposals, in a manner similar to an expert. They rely on the information and knowledge stored within their applications to benefit the end user (Shkard, 2022, p. 70). (Shkard, 2022, p. 70).
- Early warning systems: These systems collect and process data to predict the future by providing advance warnings. They include alert systems, warning dissemination systems, and sensor devices.

Decision support systems are a wide range of information systems aimed at supporting decision-makers by collecting, processing, analysing and providing data in a form that can facilitate timely decision-making.
- Geographic Information Systems (GIS): The scientific value of maps in crisis management is worthy of explanation. GIS is a digital version of traditional maps that allows data on locations to be updated, analysed and visualised in a timely manner, thereby enhancing decision support processes.

Training applications are tools for generating exercises that utilise data for risk assessment and scenario setting in virtual reality, enabling individuals to learn about potential real-life situations. (Gretzel, 2011, p. 759).

2.4 Contribution of smart system technology to risk alertness in the institution

Moked states that technology for alertness is a necessary support tool for medium- and long-term decision-making. (Jozef, 2011, p. 61).
Information and communication technology encompasses a wide range of technologies used in the operation, transmission, storage and digital processing of information. This includes computers,

communication devices and networking, such as the internet. The following table outlines the ways in which we can benefit from technology:

Table 6: Contributions of technology

Researcher/Author	Definition
- High Efficiency from Sources	Technology provides organisations with a wide range of official and unofficial information sources, such as sector-specific databases, competitor websites, journals, specialised sites for intelligence and alertness, specialised and non-specialised press, and reports from conferences and seminars.
- Processing Efficiency	Using technology enables rapid processing, which can be measured by the number of operations of various types that can be performed within a given time frame.
- Transmission Efficiency	This can be quantified by the amount of information that can be transmitted within a specified timeframe, as well as the distance and channels through which the information will be sent.
- High Efficiency in Information Storage	This is evident in the vast amount of information that can be stored and retrieved, and in the significant flexibility to reprocess it at minimal cost.
- Reliability	It also demonstrates high capability and speed in correcting errors and documenting the steps taken during storage, processing and transmission operations.

Source: Prepared by the researcher based on a scientific article on the impact of information and communication technology on strategic alertness

3. Practical aspect:

Risk alertness processes are considered fundamental to success and sustainability in the highly turbulent and ever-changing business world. In this context, technology plays a vital role in helping institutions to achieve a higher level of alertness and control over challenges. Thanks to their automated learning and intelligence capacities, smart systems can provide early risk detection by offering powerful means to collect, process and rapidly and effectively analyse large volumes of data. Overall, smart systems represent a significant technological evolution that helps institutions maintain safety and achieve their goals.

3.1 Method and tools

To answer the study's research question and verify the validity or invalidity of the hypothesis, this study used a descriptive methodology to analyse the results obtained. A field study was conducted to collect information using an interview tool, with the aim of achieving greater truth and credibility in the results. The interview was conducted with an inspector at the Bechar Post Corporation between November and December 2023. The interview included a set of questions about the role of smart (digital) systems in the risk alertness process, summarised in Table 7 below:

Table 7: Interview model

Number	The phrase
01	'risk' refers to an unexpected event that leads to losses. How do you perceive the risks concerning your organisation?
02	What plans and procedures does your organisation use to deal with risks?
03	What methods and tools does your organisation use to analyse risks?
04	What internal and external factors does your organisation consider when estimating risks?

05	What are the main risks that you believe currently threaten the organisation?
06	How does the organisation assess the long-term effectiveness of risk management and improvements?
07	Modern technology has helped organisations become more alert to risks before they occur. How is this achieved?
08	Does the organisation have intelligent systems for risk alertness?
09	Does the organisation use an early warning system?
10	Does the organisation use a geographic information system?
11	Are there applications for user training?
12	Are there any other systems?
13	What role do these systems play in enhancing risk awareness?
14	How can intelligent systems analyse data to detect risks within your organisation?
15	In your opinion, what data do these systems focus on collecting and monitoring to improve risk awareness?
16	Can you provide examples of the systems successfully detecting risks?
17	How can the effectiveness of intelligent systems in enhancing risk awareness be measured?
18	How can the security and protection of information and privacy be ensured when operating the systems?
19	What barriers and challenges does the organisation face when using intelligent systems to enhance risk alertness?
20	On what standards and indicators are these systems based?

Source: Prepared by the researcher based on the theoretical aspect of the study.

3.2 Results and discussion

After interviewing the inspector at the Bechar Post Corporation using the interview tool and carefully reviewing their statements through the theoretical aspect, it was necessary to present the most important results from the Bechar Post institution, which was considered the field of study, in the following table:

Table 8: Interview Results

Number	Response
01	As a public institution, our organisation generally does not face external risks because we operate in a monopolistic environment without competition. However, we are exposed to internal risks, such as the embezzlement of public funds, which can result in losses for the organisation, threaten its stability and damage its reputation.
02	Our organisation's plans and procedures are modern and relate to technological developments.
03	We use digital tools for risk analysis, as well as traditional logical methods to address risks arising from human factors within the organisation.
04	Our organisation's message is to be closer to you, and we are committed to being everywhere. We consider all factors, both internal and external, that could harm customers, and study any suspicious behaviour before danger occurs.
05	The risks currently harming the organisation are organisational risks due to instability in the institution's personnel.
06	Since 2016, we have adopted the Total Quality principle, which aims to satisfy customers at the lowest cost and highest quality. Achieving this confirms the effectiveness of our risk management.
07	The organisation has multiple technological systems and programmes that document any suspicious operations and send notifications and warnings, classifying them as first-, second- or third-degree risks.

08	We certainly have a wide range of systems, each with specific expertise.
09	Yes, we have a customer notification system that sends text alerts for any transaction. If there is any suspicion of fraud or theft involving the customer, they are warned and notified.
10	There are also systems that operate as maps, divided into local and international sections. Examples include "Trace Mail" and "IPs", which track shipments, cheques and payment cards. This facilitates tracking and identifying any problems and the responsible person.
11	While this type of application does not exist, there are applications for reporting and warning about suspicious operations.
12	Jesper House monitors the financial and accounting conditions of the organisation.
13	These systems enhance the detection and notification of risks, such as alerts for suspicious operations, and facilitate oversight for those responsible for these activities.
14	The effectiveness of this depends on the readiness and advancement of the systems. For example, some systems analyse signature data and alert users when there is no match, indicating a potential suspicious operation.
15	Camera and anti-theft systems collect relevant data, and human resources gather additional information to assist the systems.
16	The IBP system saves all types of organisational data, enabling inspectors to check operations and match them with the system to distinguish between legitimate and suspicious transactions. Several operations of this kind have occurred in one of the organisation's branches, and the system has managed to preserve traces of the suspicious operation until the inspector intervenes.
17	The systems' high accuracy in detecting very small errors enhances awareness of risks. Initially, workers were unaware of these systems, which detected many risks. However, after they became aware of the systems, the number of errors detected decreased, indicating that operations were proceeding according to performance standards.
18	Information security protection primarily lies in the hands of those operating the systems. For example, if there is a breach from other entities, the system will notify you to change your password. Additionally, the system protects customers when they use their card in the presence of another person by requiring a different password and deactivating the card, thereby protecting the information.
19	There are obstacles to these systems, particularly with regard to the personnel who manage and programme them, such as a lack of training.
20	Each operation has its own icon with guiding instructions and steps.

Source: Prepared by the researcher based on a scientific article on the impact of information and communication technology on strategic alertness

Practical aspect:

Risk alertness processes are considered fundamental to success and sustainability in the highly turbulent and ever-changing business world. In this context, technology plays a vital role in helping institutions to achieve a higher level of alertness and control over challenges. Thanks to their automated learning and intelligence capacities, smart systems can provide early risk detection by offering powerful means to collect, process and rapidly and effectively analyse large volumes of data. Overall, smart systems represent a significant technological evolution that helps institutions maintain safety and achieve their goals.

The adoption of smart systems by institutions in response to digital transformation is evident, particularly among service and banking institutions. The inspector of the Bechar Post Corporation confirmed this, indicating that there are programmes and applications that control suspicious

operations, as well as monitoring and reporting systems and mapping systems that track operations, among others.

Despite these digital trends, there are still obstacles related to training human resources, as was also confirmed by the Bechar Post Corporation.
Being sensitive to events and monitoring to detect warning signs in unknown situations allows one to deal with ambiguity. What may initially seem obscure can become clearer and easier to anticipate with a discerning perspective based on those signals. According to Mitroff & Anagnos, it is impossible to eliminate all risks, but early preparation can help to avoid threats before they occur. To grasp ambiguity, smart systems and sensors are required. The following virtual model illustrates how smart systems contribute to risk alertness:

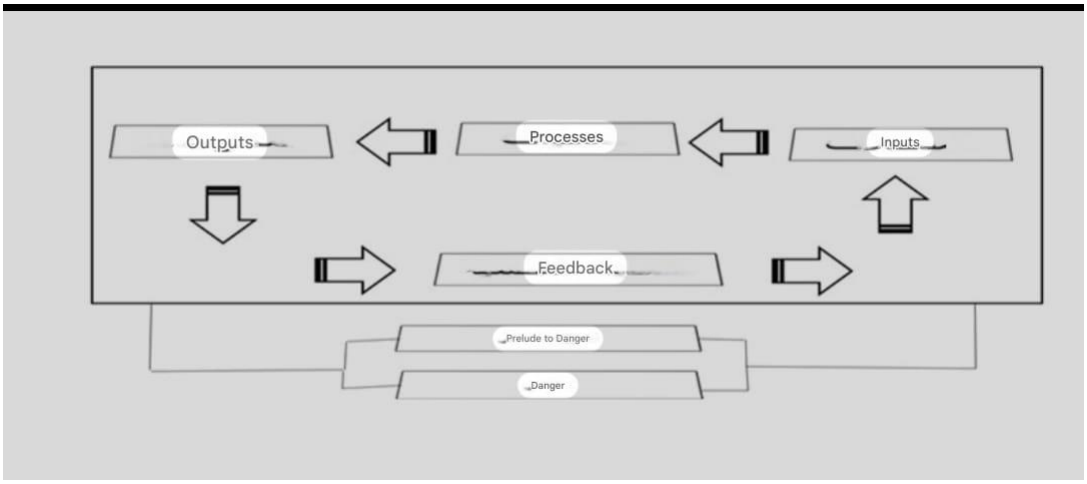

Figure 1: Virtual Model of a Smart Information System in Risk Alertness.
Source: Prepared by the researcher based on responses from the inspector at the Bechar Post Corporation.

The results are explained in the following points in the table above:
- The Bechar Post Corporation, like other institutions, remains susceptible to risks as long as there are changes related to either the internal or external environment.
- Risks undermine the stability of institutions and threaten their survival; therefore, institutions must adequately prepare for these phenomena by utilising the latest technologies offered by digital transformation. The Bechar Post Corporation has responded to this transformation by introducing a series of technologies into its business models.

The Bechar Post Corporation has several methods to combat the risks it faces. These can be classified, based on the interview results, as either traditional methods — those adopted by the institution to manage risks with an organisational dimension, where the variable is the behaviour of employees or customers — or digital methods. Other digital methods, such as smart systems, are used to detect warning signals for potential risks.
Digital tools increase institutional alertness to risks, and the Bechar Post Corporation's adoption of total quality to improve processes with the latest technologies is testament to the effectiveness of the risk alertness process.
- Risk Stage:The smart system may utilize the information returned from the risk feedback, in addition to a large amount of data related to the existing risk that it automatically collects from various sources that provide it with everything related to this risk, such as its causes, forms, factors that led to its occurrence, and past experiences in dealing with this risk, etc.

It uses the obtained data as inputs, performing rapid processing to extract a set of solutions that it broadcasts as outputs to help the decision-maker navigate the institution out of the situation.

3.3 Conclusion

The recent series of crises, beginning with the pandemic, created an environment in which risks were exacerbated, making the business environment more turbulent and ambiguous. However, it also highlighted the need to transition from traditional methods to smart digital methods in business models and operations. This digital transformation has provided institutions with all the requirements for digitisation. The Bechar Post Corporation is a case in point, having provided a large set of smart systems as part of the Total Quality project. These systems provide sufficient capabilities for anticipating, monitoring and sensing all risks in the internal environment, through a dynamic mechanism equipped with smart system technology that collects, analyses and broadcasts information. Therefore, based on the results obtained, the study was able to address the research question and prove the study's hypothesis: 'Smart systems contribute to high-sensing forecasting of the internal and external environment through the collection, analysis and dissemination of information.' Consequently, we can conclude that the Bechar Post Corporation has successfully integrated a comprehensive suite of smart systems into its operational management, particularly in the risk alertness process. This enables the efficient and effective sensing and management of risks, thereby enhancing risk management within the institution.

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