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Study of the Relationships between the Dimensions of Information Quality and Knowledge Management Processes in Forensic Processes at Crimes against Life Locations

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Abstract

More and more public institutions seek efficiency, effectiveness and effectiveness in providing services to society. In this context are the Criminal Expertise Institutions, which play an important role in the inter-organizational network of public security and criminal justice, promoting an effective investigation of crimes based on the production of objective, reliable, transparent and impartial expert evidence. This work aims to analyze how the dimensions of Information Quality and Knowledge Management processes relate to the stages of the process of responding to a crime against life scene, carried out by criminal experts who work in the Crime Against Life of sector Life of ITEP/RN. The methodology used to achieve the research objectives includes the definition of characteristics as: support of Knowledge Management characteristics, support of the association of each Knowledge Management characteristic to the Information Quality dimensions, context of the Knowledge Management characteristics, context of the Information Quality dimensions, and the confidence of the association of each Knowledge Management characteristic Knowledge Management to the dimensions of Information Quality. As a result, nineteen dimensions of information quality were identified; twelve characteristics of knowledge management processes and thirty-three stages of the forensic process of attending a crime scene against life. It is also noteworthy that the Perceived Value and Currentness dimensions present a confidence of 100% with all the characteristics of the knowledge management process and the Conciseness dimension was the one that obtained the lowest

confidence values for the characteristics of the Knowledge Management process.

Keywords

Dimensions of Information Quality, Knowledge Management Processes, Expertise at the Scene of a Crime against Life

1. Introduction

Each public organizations are increasingly seeking efficiency, effectiveness and effectiveness in providing services to society. In this context are Criminal Forensic organizations. Criminal forensics plays an important role in the inter-organizational network of public security and criminal justice, as the criminal expert puts science in favor of justice, promoting an effective investigation of crimes based on the production of expert evidence. That said, the judicial authority highlights the importance of objectivity and impartiality of expert evidence for maintaining the central value of justice, impartiality (Rodrigues et al., 2010).

The law 13.675/18, in its Art. 12, states that: "The annual measurement of goals must observe the following parameters: II—expert activities will be measured using technical criteria issued by the body responsible for coordinating official investigations, considering the expert reports and the result in the qualified production of evidence relevant to the criminal investigation" (Brazil, 2018).

Complementary Law No. 669/2020, which promotes restructuring in the career of public servants at the Rio Grande do Norte Technical-Scientific Institute of Expertise (ITEP/RN), amends provisions of State Complementary Law No. 571, of May 31, 2016, which provides for the Organic Law and the Statute of public servants of the Technical-Scientific Institute of Expertise of Rio Grande do Norte (ITEP/RN), and provides other measures; brings in its Article 18-B: "Art.18-B. The Institute of Criminalistics (IC) is responsible for: (…) II - develop extension studies and research in the field of criminalistics, in order to improve new techniques and create new working methods, appropriate to technological and scientific development; (…)"

Thus, considering the need to produce qualified evidence and improve techniques and work methods in expert activity, the purpose of this article is to analyze how the dimensions of information quality and knowledge management processes relate to the stages of the process of assistance at the scene of a crime against life, carried out by criminal experts who work in the Crime Against Life sector of ITEP/RN.

It is also noteworthy that, despite the extensive literature on knowledge management and information quality, few studies relate these constructs to forensic activities at the scene of crimes against life. This research innovates by establishing relationships between a taxonomy of Knowledge Management processes and

the dimensions of information quality present simultaneously in the stages of the forensic process of responding to crime scenes against life. Using an exploratory approach, this work analyzes, based on theory, the relationship between knowledge management processes and expertise stages; the relationship between the dimensions of information quality and stages of expertise; and finally, the relationship between knowledge management processes and the dimensions of information quality present simultaneously in the forensic stages. Thus, the work contributes significantly to literature in the area and to criminal forensics by proposing a useful model that can be a management tool for the forensic area.

To achieve the objectives of the article, firstly, in Section 2, knowledge management processes are addressed. In Section 3 we discuss the information in organizations. Section 4 addresses the quality of information. Section 5 deals with forensic examinations in places of crime against life. Section 6 presents the model that relates the dimensions of information quality and knowledge management processes to the stages of the forensic process of responding to incidents at crime scenes against life. Section 7 describes how the model was applied, as well as its validation. And finally, in the Section 8 are presented the conclusions.

2. Knowledge Management Processes

According to Barclay and Murray (1997), Knowledge Management is a business activity that brings together two fundamental aspects:

- Treat the knowledge component of business activities explicitly as a business factor, reflected in strategy, policy and practice at all levels of the company;
- Establish a direct link between the company's intellectual bases—explicit (codified) and tacit (personal know-how)—and the results achieved. Nonaka and Takeuchi (1997) define Knowledge Management as a process by which organizations seek new ways to create and expand knowledge. This work adopts the vision of Servin and De Barum (2005), considering people, processes and technology as elements of Knowledge Management; since, according to the authors, culture and organizational behavior are absorbed by the people element, while leadership is covered by the process element.

For Batista (2012), Knowledge Management is mostly related to the organization's abilities to institutionalize knowledge, therefore, Knowledge Management processes can be represented as a linear process in which the steps enable the flow of knowledge between individuals and groups within the organization. In this context, Gonzalez and Martins (2017) report that Knowledge Management processes, according to experts on the subject, can consist of four stages: acquisition, storage, distribution and use of knowledge.

Considering the three elements that make up Knowledge Management, Servin and De Barun (2005) relate them by stating that the right knowledge must be available to people, when necessary, through the right process using appropriate technologies. Thus, for the development and application of knowledge, knowledge management methods, techniques and practices are fundamental (Servin & de Barun, 2005).

3. Information in Organizations

Organizations are made up of three environments: the first comprises the relationships between work units such as boards, management, sectors; the second environment is formed by the human resources structure and its relationships; and the third is composed of the informational structure composed of data, information and knowledge generated by the two previous environments (Valentin, 2002).

In the age of knowledge, information is one of the most important organizational assets. Fialho et al. (2010) highlight that effectively managing information, knowledge and intangible assets is necessary for organizations to remain competitive. Thus, the way in which organizations access, organize, share, use information and create knowledge is extremely important for maintaining competitiveness and sustainability.

According to Prusak and Davenport (2003), knowledge originates from individuals, since the involvement of people in the transformation of information into knowledge is essential, since this transformation involves understanding through experiences and personal learning. The transformation of information into knowledge is carried out through the methods: comparison, consequence, connections and conversation, as presented in **Table 1** (De Sá et al., 2013).

According to Kakabadse et al. (2003), the three constructs: data, information and knowledge follow a flow composed of hierarchy according to the model proposed by Magnier-Watanable and Senoo (2008) as shown in **Figure 1**, the stages and evolution of the knowledge dimension.

Figure 1 presents the evolutionary process of knowledge, which, based on the observation and organization of data, begins a learning process, where particular knowledge is achieved (an individual or group of individuals) and ends with a gain of wisdom on the part of the individual, which grows with experience; in parallel, the routine process occurs, which begins with data about a specific context of the organization and ends when achieving the practice of a certain task (Kakabadse et al., 2003).

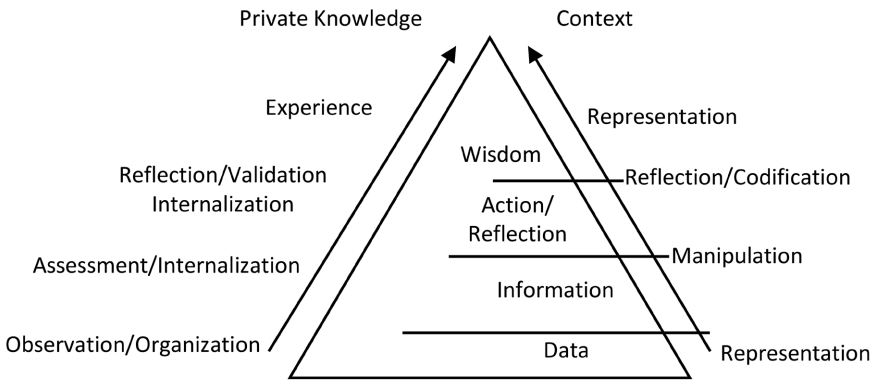

Figure 1. Stages and evolution of the knowledge dimension. Source: Gonzalez and Martins (2017).

Table 1. Methods for transforming information into knowledge.

Methods	Description
Comparison	How does the information regarding this situation compare to other known situations?
Consequence	What implications does this information bring to decisions and action-taking?
Connections	What are the relationships between this new knowledge and the knowledge already accumulated?
Conversation	What do other people think of this information?

Source: De Sá et al. (2013).

4. Information Quality

Organizations are producing, gathering and using more data every day; however, the use of more data does not mean more and better information, nor does it reflect decision-making based on quality information. Therefore, it is necessary for organizations to have correct and reliable information at their disposal for timely and strategic decision-making (Ferreira et al., 2014).

There is a consensus that the quality of information is essential for the survival of the organization, as it can be measured using fundamental basic measures based on the consumer's perception of how their needs are met and satisfied (Calazans, 2008). Thus, it can be stated that quality has dimensions that are defined as a set of data quality attributes that represent a unique aspect and that vary according to the business to which they apply (Wang & Strong, 1996).

That said, it is possible for information, capable of measurement and evaluation, to be approached as a product, where the characteristics of the product itself are observed; or as a service, where the function of offering information and serving the user stands out (Kahn & Strong, 1998; Bentancourt, 2015).

In the present research, the premise is adopted that dimension represents a specifiable aspect of a concept, or a grouping of characteristics, attributes or common behaviors of this concept (Pereira, 2019).

5. Expertise at Crimes against Life

It is clear that every day public institutions seek efficiency, effectiveness and effectiveness in the provision of services. According to Cavalhero (2020), the aspects that determine the quality of services and information offered by public institutions can influence the decision-making of public managers and the provision of services to society.

The Criminal Expertise institutions, which make up the Public Security system, are among the public organizations that provide services to society. Expert activity is regulated by the Code of Criminal Procedure (CPP) and is included in Chapter II, Examination of Criminal Procedure, Chain of Custody and Expertise in General, art. 158 to 184 (Decree Law No. 3689/41). Rodrigues et al. (2010)

describes the production process of the criminal forensics service in the state of Minas Gerais. The process is shown in Figure 2.

The production process of the criminal forensics service, presented in Figure 2, is made up of Front Office processes, which consist of the activation and preparation of the team, selection of materials necessary to respond to the incident and displacement; inputs, which consist of verification and action steps such as: isolation and preservation of the crime scene, collection of information from police officers and authorities present at the scene, photographs and collection of traces, taking measurements, among other activities; and Back Office processes, which consist of expert examinations carried out on traces collected at the crime scene and preparation of the expert report that documents the material evidence. The Report is then forwarded to the recipients: delegates, prosecutors, judges.

Considering the main elements that make up the production process of the Criminal Forensics service, the Technical-Scientific Institute of Forensics of Rio Grande do Norte – ITEP/RN, published Ordinance No. 001/2021 – IC/ITEP which provides for the adoption Standard Operating Procedure (SOP) for a Crime Against Life Site within the scope of the Criminalistics Institute of the Scientific Technical Institute of Rio Grande do Norte. Using the Hierarchical Task Analysis (HTA) method to detail the workflow of the forensic team when responding to Crime Scenes Against Life, Figure 3 presents the HTA of the responsibilities of the team responding to crime scenes against life. Life when carrying out processes to deal with this type of incident.

6. Methodological Procedure

This section presents the methodological procedure adopted with the aim of identifying how the dimensions of information quality and knowledge management processes relate to the stages of the forensic examination process at a crime

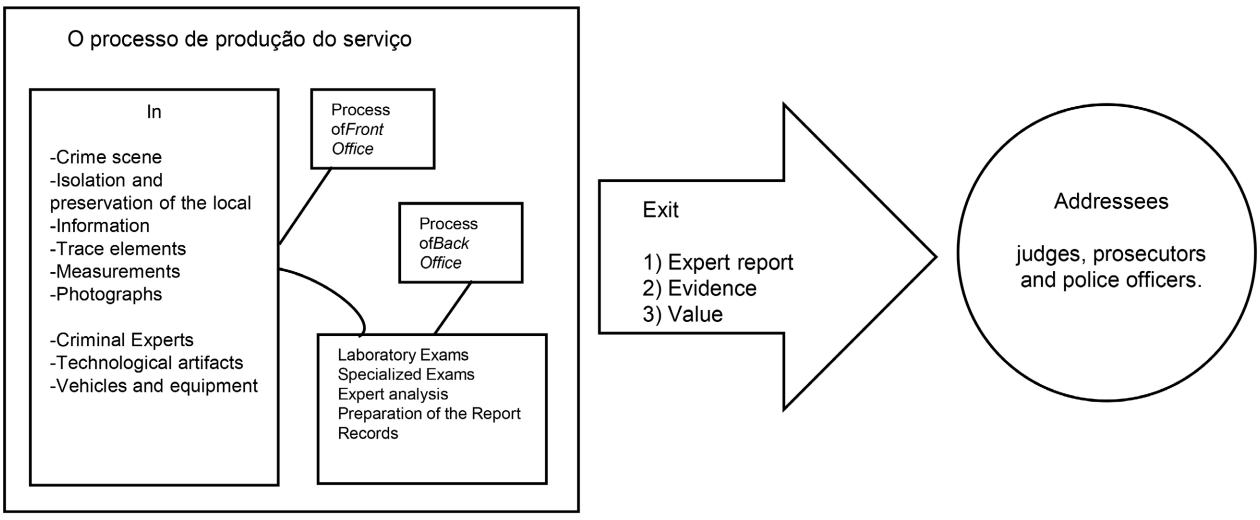

Figure 2. Production process of the criminal forensics service. Source: Rodrigues et al. (2010).

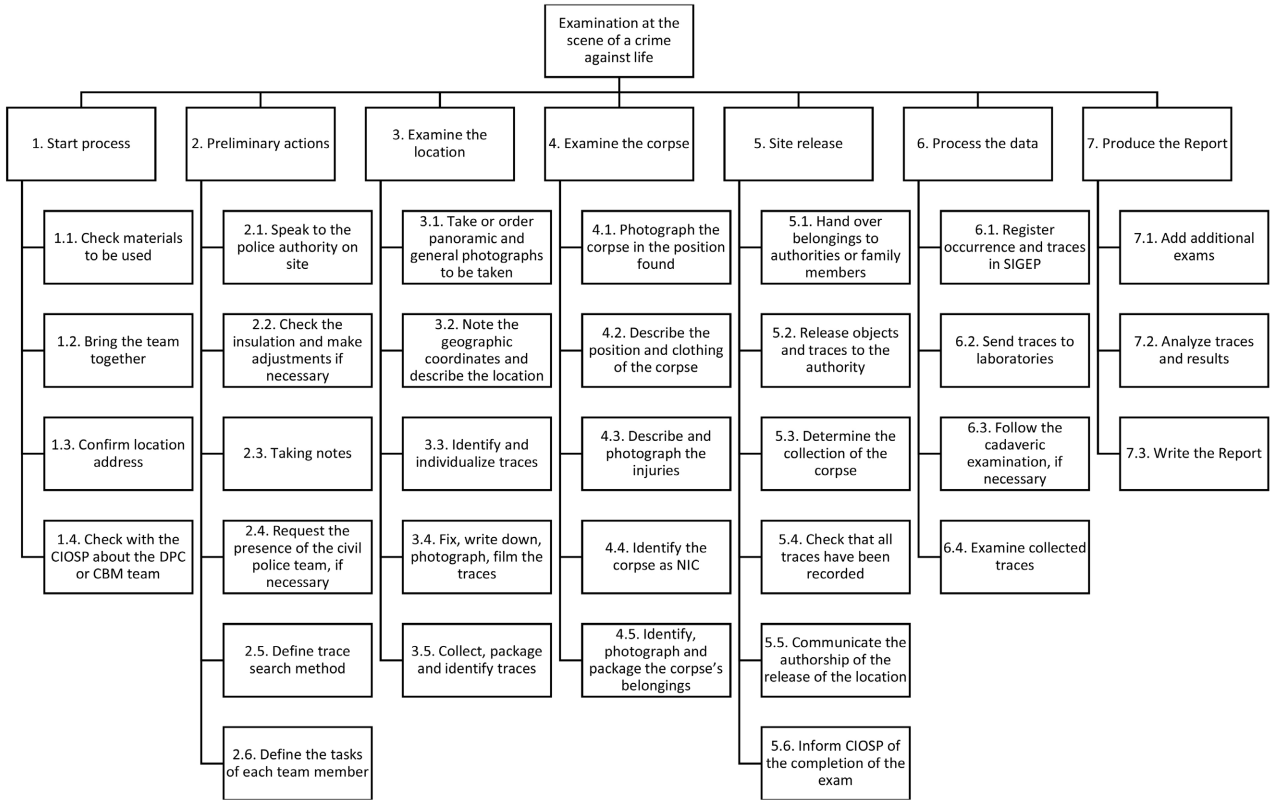

Figure 3. Hierarchical Task Analysis (HTA) of the responsibilities of the crime scene examination team against life considering the ITEP/RN SOP. Source: Prepared by the author.

scene against life. The methodological procedure is composed of four steps and makes use of the model developed by Macedo (2008). **Figure 4** shows the adapted Macedo (2008) model.

Figure 4 shows the steps of the model used. In stage 1, a narrative and systematized bibliographic review of the constructs knowledge management and information quality was carried out, where the characteristics of knowledge management processes and the dimensions of information quality were identified for application in the proposed model. Step 2 represents the elaboration of the applied model, which is composed of the elements: Characteristics of knowledge management processes, Characteristics of the dimensions of information quality, Characteristics of the processes of attendance at places where crimes against life occur, Context of the characteristics of management processes and stages of the forensic investigation process for crimes against life, Context of the dimensions of information quality and stages of the forensic examination process for crimes against life, Support for the characteristics of knowledge management processes, Support for the association of criminal investigation processes knowledge management to the dimensions of information quality, Confidence in the association of knowledge management processes to the dimensions of information quality. Step 3 is the application of the proposed model and step 4 is the proof of concept, consisting of interviews with specialists in forensic assistance to local incidents of crimes against life and data analysis.

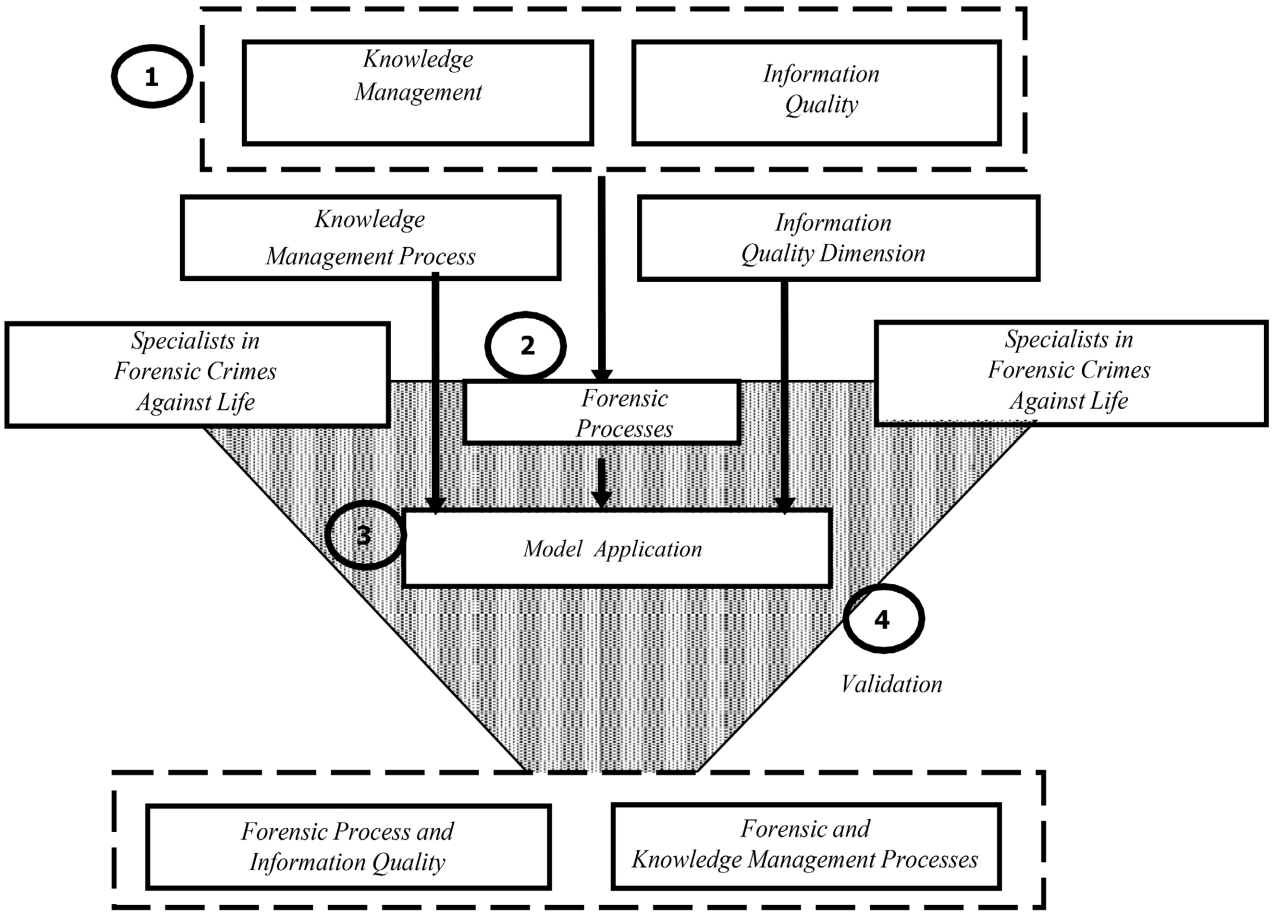

Figure 4. Schematic representation of the proposed model. Source: Adapted from Macedo (2008).

7. Application of Model

A application of model It consists in to analyze, with base at theory, to the characteristics of knowledge management processes, dimensions of information quality and the stages of the process of responding to incidents at the scene of crimes against life; and finally, the relationship between the characteristics of knowledge management processes and dimensions of the quality of information present simultaneously in the stages of the forensic processes involved in responding to crime scenes against life, by the number of characteristics of the knowledge management processes knowledge and the determination of confidence in the association of the characteristics of knowledge management processes with the dimensions of the quality of information present in the stages of the process of responding to the occurrence of a crime against life.

7.1. Characteristics of Knowledge Management Processes

The characteristics of Knowledge Management processes, which are presented in **Table 2**, correspond to the phases and stages of knowledge evolution listed by Gonzalez and Martins (2017), and method phases for transforming information into knowledge (De Sá et al., 2013).

Table 2. List of characteristics that integrate Knowledge Management processes.

Phases of Knowledge Management Processes			
Acquisition	Storage	Distribution	Use
Comparison	Consequence	Connections	Conversation
Manipulation	Reflection	Validation	Assessment

Source: Prepared by the author.

7.2. Characteristics of Information Quality Dimensions

The dimensions of information quality that are related to the processes of attending the scene of a crime against life are listed in Table 3. Based on the dimensions of information quality found in the literature, nineteen dimensions of information quality were identified that, in the authors' perception, are present in the stages of crimes against life processes. The definitions of the dimensions of information quality selected are based on what was exposed by de Carvalho Costa (2021), Ferreira et al. (2014) and Trindade et al. (2008).

7.3. Stages of the Forensic Assistance Process at Crime Scenes against Life

The stages of the process of responding to incidents of crimes against life, from the crimes against life sector of ITEP/RN, presented in Table 4, correspond to the stages extracted from the Standard Operating Procedure contained in Ordinance No. 001/2021 – IC/ITEP, which is represented in Figure 3.

7.4. Context Characteristics of Knowledge Management Processes and Stages of the Forensic Process of Responding to Incidents of Crimes against Life

At each stage of the process of responding to crime scenes against life, it is possible to establish an appropriate context related to the characteristics of knowledge management processes. Table 5 presents the context described in each of the stages, representing the characteristics present in them.

From the analysis of Table 5 it can be said that the phases acquisition, storage, distribution, use, comparison, consequence, connections, conversation, manipulation, evaluation, validation and reflection of the knowledge management process are, consequently, presented in seven, twelve, ten, twenty, eighteen, twenty, twenty-three, eight, twenty-two, twenty-one, nineteen and fifteen stages of the process of responding to incidents at crime scenes against life.

7.5. Context—Dimensions of Information Quality and Stages of the Process of Responding to Incidents of Crimes against Life

At each stage of the process of responding to incidents of crimes against life, it is possible to establish an appropriate context related to the dimensions of the quality of information that are present at each stage, as shown in Table 6.

Table 3. Dimensions of the quality of information that are related to the processes involved in responding to crime scenes against life by ITEP/RN.

Number	Dimension	Definition
1	Reliability/Reputation	Credibility in the content and source of information
2	Precision/Accuracy/Error-free	Refers to the form of recording faithful to the fact represented. The information is correct
3	Completeness/Integrity	Inclusion of all necessary data relating to a given problem. All necessary information must be provided
4	News	It represents the new, the recent.
5	Present	It implies consonance with the pace of information production, opposing obsolescence.
6	Efficiency	Degree of adequacy of information in solving the problem of the subject-information user
7	Perceived value	The subject's understanding of the value of information.
8	Relevance	Measure of effective contact between a source and a recipient
9	Coverage	Volume of data needed for information to become effective
10	Objectivity	Extent to which information is unbiased and free from bias.
11	Credibility	Extent to which information is considered to be true and reliable
12	Ease of understanding/Clarity	Information is easily understood
13	Consistency	Extent to which information is presented in the same format. Information can be presented in narrative, numerical, graphic or other form.
14	Interpretability	Extent to which information is in an appropriate language, symbol, or unit and definitions are clear
15	Accessibility	Extent to which information is available, or easily and quickly retrievable.
16	Security	Extent to which access to information is restricted, in order to maintain security
17	Conciseness	The information is presented in a compact form. Only the information that is necessary should be provided
18	Detail	Information can be provided in detailed or summarized form.

Continued

19	Absence of bias/Neutrality	There is no bias toward a predetermined outcome. Ability of the measurement procedure to provide an accurate description of the information.

Source: Prepared by the author.

Table 4. Steps extracted from the standard operating procedure for responding to the scene of a crime against life by ITEP/RN.

1	Start Process	Check materials to be used
		Gather the team
		Confirm location address
		Check with the CIOSP about the DPC or CBM team
2	Preliminary actions	Speak to local law enforcement
		Check insulation and make adjustments if necessary
		Make notes
		Request the presence of the civil police team, if necessary
		Set trace search method
		Define tasks for each team member
3	Examine the place	Take or order panoramic and general photographs to be taken
		Write down the geographic coordinates and describe the location
		Identify and individualize traces
		Fix, annotate, photograph, film the traces
		Collect, package and identify traces
4	Examine the corpse	Photograph the corpse in the position found
		Describe the position and clothing of the corpse
		Describe and photograph the injuries
		Identify the corpse with the NIC
		Identify, photograph and package the corpse's belongings
5	Site release	Hand over belongings to authorities or family members
		Release objects and traces to the authority
		Determine the collection of the corpse
		Check that all traces have been recorded
		Communicate the release of the location to the authority
		Inform CIOSP of the completion of the exam
6	Process the data	Register the occurrence and traces in SIGEP
		Send the traces to the laboratory
		Follow the cadaveric examination, if necessary
		Examine the collected traces

Continued

		Add additional exams
7	Produce the Report	Analyze traces and results
		Write the Report

Source: Prepared by the author.

Table 5. Context of the characteristics of knowledge management processes and stages of the forensic process at crime scenes against life.

Stages of the Forensic Processes for Responding to a Crime Scene	Start process			Preliminary actions				To examine the place									Examine the corpse							Release from the location						Process the data				To produce the report			
	Check materials to be used	Gather the team	Confirm address	Check with the CIOSP about the DPC or CBM team	Speak to the authority on site	Check insulation and make adjustments if necessary	Make notes	Request the presence of the civil police team, if necessary	Set trace search method	Define tasks for each team member	Take or order panoramic and general photographs to be taken	Write down the geographic coordinates and describe the location	Identify and individualize traces	Fix, annotate, photograph, film the traces	Collect, package and identify traces	Photograph the corpse in the position found	Describe the position and clothing of the corpse	Describe and photograph the injuries	Identify the corpse with the NIC	Identify, photograph and package the corpse's belongings	Hand over belongings to authorities or family members	Release authority objects and traces	Determine the collection of the corpse	Check that all traces have been recorded	Communicate site release authority	Inform CIOSP of the completion of the exam	Register the occurrence and traces in SIGEP	Send the traces to the laboratory	Follow the cadaveric examination, if necessary	Examine the collected traces	Add additional exams	Analyze traces and test results	Write the Report	TOTAL
Phases of Knowledge Management Processes																																					
Acquisition	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	07
Storage	0	0	1	0	0	0	1	0	0	0	1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	12
Distribution	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	1	10
Use	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0	0	0	1	1	1	0	1	1	20
Comparison	1	0	1	0	0	1	0	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	1	0	0	0	1	1	1	0	1	1	18
Consequence	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	0	0	0	1	1	0	0	1	0	0	0	0	1	1	1	0	1	1	20
Connections	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	0	0	0	0	1	1	0	1	1	23
Conversation	0	0	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	08
Manipulation	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0	1	0	0	0	1	1	1	1	1	1	22
Assessment	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	1	0	0	1	1	0	0	0	0	1	1	0	1	1	21
Validation	1	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	1	1	0	1	1	19
Reflection	1	0	0	0	0	1	0	0	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	15

Source: Prepared by the author.

Table 6. Context of the dimensions of information quality and stages of the process of responding to incidents at crime scenes against life.

Stages of the Forensic Processes for Responding to a Crime Scene	Start process	Preliminary actions										To examine the place										Examine the corpse										Release from the location								Process the data				To produce the report				
	Check materials to be used	Gather the team	Confirm address	Check with the CIOSP about the DPC or CBM team	Speak to the authority on site	Check insulation and make adjustments if necessary	Make notes	Request the presence of the civil police team, if necessary	Set trace search method	Define tasks for each team member	Take or order panoramic and general photographs to be taken	Write down the geographic coordinates and describe the location	Identify and individualize traces	Fix, annotate, photograph, film the traces	Collect, package and identify traces	Photograph the corpse in the position found	Describe the position and clothing of the corpse	Describe and photograph the injuries	Identify the corpse with the NIC	Identify, photograph and package the corpse's belongings	Hand over belongings to authorities or family members	Release authority objects and traces	Determine the collection of the corpse	Check that all traces have been recorded	Communicate site release authority	Inform CIOSP of the completion of the exam	Register the occurrence and traces in SIGEP	Send the traces to the laboratory	Follow the cadaveric examination, if necessary	Examine the collected traces	Add additional exams	Analyze traces and test results	Write the Report	TOTAL
Dimensions of Information Quality																																													
Reliability/ Reputation	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	25
Precision/ Accuracy/ Error-free	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	26
Completeness/ Integrity	1	1	1	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	08
News	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1	1	1	1	19
present	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	33
Efficiency	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	1	1	1	1	1	28
Perceived value	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	33
Relevance	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	29
Coverage	0	0	1	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1	17
Objectivity	0	0	0	0	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	10
Credibility	0	0	1	0	1	1	1	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	14
Ease of understanding/ Clarity	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	28
Consistency	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	11
Interpretability	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	04

Continued

Accessibility	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29
Security	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	17
Conciseness	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1	1	1	0	0	0	0	0	11
Detail	0	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	0	0	1	0	0	0	1	1	1	1	1	22
Absence of bias/ Neutrality	0	0	0	0	1	1	1	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	1	17

Source: Prepared by the author.

Analyzing Table 6, it is observed that the dimensions of quality: reliability/reputation, precision/accuracy/error-free, completeness/integrity, novelty, timeliness, effectiveness, perceived value, relevance, comprehensiveness, objectivity, credibility, ease of understanding/clarity, consistency, interpretability, accessibility, security, conciseness, detail, absence of bias/neutrality are present, respectively in twenty-five, twenty-six, eight, nineteen, thirty-three, twenty-eight, thirty-three, twenty-eight nine, seventeen, eleven, twenty-two and seventeen stages of the process of responding to incidents of crimes against life.

7.6. Support of the Characteristics of Knowledge Management Processes

Table 7 presents the support of each knowledge management characteristic, that is, the number of stages in the forensic process of responding to incidents of crimes against life that presents each characteristic.

7.7. Support for the Association of Knowledge Management Processes with the Dimensions of Information Quality

The association of a knowledge management process with a dimension of information quality, presented in Table 8, is determined by the number of stages in the forensic process of dealing with the occurrence of crimes against life that the knowledge management process and the dimension of information quality they share.

Analyzing Table 8 and giving examples, it can be stated that the process of knowledge management acquisition and the dimension of information quality reliability/reputation are present, sharing seven stages of the process of responding to incidents at crime scenes against life.

For the other characteristics of knowledge management processes and dimensions of information quality, the analysis is similar to that described in the previous paragraph.

7.8. Confidence in the Association of Knowledge Management Processes with the Dimensions of Information Quality

The confidence in the association of a knowledge management process with a dimension of information quality is determined based on the relationship be-

tween the number of characteristics present simultaneously in the knowledge management processes and in the dimensions of information quality divided by the number of characteristics of each knowledge management process. Table 9 presents the confidence in the association of knowledge management processes with the dimensions of information quality.

Table 7. Phase support.

Acquisition	07	Connections	23
Storage	12	Conversation	08
Distribution	10	Manipulation	22
Use	20	Assessment	21
Comparison	18	Validation	19
Consequence	20	Reflection	15

Source: Prepared by the author.

Table 8. Support for the association of knowledge management processes with information quality dimensions.

Dimensions of Information Quality	Reliability/Reputation	Precision/Accuracy/Error-free	Completeness/Integrity	News	present	Efficiency	Perceived value	Relevance	Coverage	Objectivity	Credibility	Ease of understanding/Clarity	Consistency	Interpretability	Accessibility	Security	Conciseness	Detail	Absence of Bias/Neutrality
Phases of Knowledge Management Processes																			
Acquisition	07	07	02	06	07	07	07	07	05	04	06	07	02	03	07	05	00	07	05
Storage	12	12	03	11	12	12	12	12	10	03	04	11	09	02	12	09	02	11	07
Distribution	08	08	02	06	10	09	10	08	04	03	05	09	02	04	10	04	04	06	04
Use	18	19	07	13	20	19	20	19	14	09	13	19	08	04	18	13	03	17	13
Comparison	17	18	07	10	18	18	18	18	12	07	11	17	08	03	16	13	02	16	12
Consequence	18	19	07	13	20	19	20	19	13	09	13	19	08	04	18	13	04	16	11
Connections	20	21	08	15	23	22	23	22	16	09	12	21	10	04	20	14	04	18	14
Conversation	08	08	02	04	08	08	08	07	06	04	05	08	01	02	08	03	02	06	04
Manipulation	21	22	07	15	22	22	22	22	16	10	14	21	09	04	20	15	02	20	15
Assessment	19	20	07	14	21	20	21	20	15	09	12	19	09	04	19	13	03	18	13
Validation	18	19	06	13	19	19	19	19	14	09	11	18	09	03	17	13	02	17	14
Reflection	14	15	06	11	15	15	15	15	12	07	08	15	09	02	13	12	02	13	09

Source: Prepared by the author.

Table 9. Confidence in the association of knowledge management processes with information quality dimensions, in percentage.

Dimensions of Information Quality	Reliability/Reputation	Precision/Accuracy/Error-free	Completeness/Integrity	News	present	Efficiency	Perceived value	Relevance	Coverage	Objectivity	Credibility	Ease of understanding/Clarity	Consistency	Interpretability	Accessibility	Security	Conciseness	Detail	Absence of Bias/Neutrality
Phases of Knowledge Management Processes																			
Acquisition	100	100	28.57	85.71	100	100	100	100	71.42	57.14	85.71	100	28.57	42.85	100	71.42	0	100	71.42
Storage	100	100	25	91.66	100	100	100	100	91.66	25	33.33	91.66	75	16.66	100	75	16.66	91.66	58.33
Distribution	80	80	20	60	100	90	100	80	40	30	50	90	20	40	100	40	40	60	40
Use	90	95	35	65	100	95	100	95	70	45	65	95	40	20	90	65	10	85	65
Comparison	94.44	100	38.88	55.55	100	100	100	100	66.66	38.88	61.11	94.44	44.44	16.66	88.88	72.22	11.11	88.88	66.66
Consequence	90	95	35	65	100	95	100	95	65	45	65	95	40	20	90	65	20	80	55
Connections	86.95	91.3	34.78	65.21	100	95.65	100	95.65	69.56	39.13	52.17	91.3	43.47	17.39	86.95	60.86	17.39	78.26	60.86
Conversation	100	100	25	50	100	100	100	87.5	75	50	62.5	100	12.5	25	100	37.5	25	75	50
Manipulation	95.45	100	31.81	68.18	100	100	100	100	72.72	45.45	63.63	95.45	40.9	40.9	90.9	68.18	9.09	90.9	68.18
Assessment	90.47	95.23	33.33	66.66	100	95.23	100	95.23	71.42	42.85	57.12	90.47	42.85	19.04	90.47	61.9	14.28	85.71	61.9
Validation	94.73	100	31.57	61.9	100	100	100	100	66.66	42.82	52.38	85.71	42.85	14.28	80.95	61.9	9.52	80.95	66.66
Reflection	93.33	100	40	73.33	100	100	100	100	80	46.66	53.33	100	60	13.33	86.66	80	13.33	86.66	60

Source: Prepared by the author.

Analyzing Table 9, it can be seen that when applying the model, the knowledge management process "acquisition" is expected to be present in seven stages of the forensic process at a crime scene against life, and the "reliability/reputation" dimension presents in the seven stages of the process of responding to incidents involving a crime against life, which represents 100% (7/7). In other words, 100% is the confidence in the association of this dimension of information quality in this knowledge management process. The same analysis is carried out for the other characteristics.

7.9. Model Validation

The validation of the proposed model was carried out through interviews with three experts in forensic analysis of the loci of crimes against life. To validate the model, a guided interview was carried out with experts. Initially, the objective of the interview was explained, the objective of the model, the structure of the model, the stages of the crime scene investigation process against life, the knowledge management processes, the dimensions of information quality, trust and how the model is applied.

Then, leaving them free to answer what they think, the following questions were asked to the experts: what they thought about the relationship between the dimensions of information quality and knowledge management processes; whether they would like a model of this type and whether it would be useful; what other dimensions of information quality and stages of the crime scene forensic process could be used in the model; whether they agreed with the results; what they thought of the model in action and what its strengths and weaknesses were; and, what would change.

The analysis of the results of the validation process was carried out following some criteria. Are they: model feasibility, use, model weaknesses and suggestions (da LUZ, 2024). The results are summarized in **Table 10**.

Table 10. Summary table of the interviews.

Features	Specialists in Crime Scene Investigation		
	1	2	3
Model feasibility	Objective measurement, identifying points susceptible to failures or inaccuracies and possible corrections.	The suggested action model serves as a tool to identify possible failures, allowing objective measurement and even possible corrections.	Simple method of processing and measuring results, mathematical model, objective model even though it is a qualitative information method.
Use	It would be of great value in the forensic process at the scene of crimes against life and other types.	Relevant for the organization and its decision-making processes, including serving as a management tool and creation of new SOPs.	(…) in addition to being useful, it presents itself as an efficient tool in knowledge management as it provides important information about the quality of the information analyzed and indication of comparison parameters related to the knowledge obtained.
Weaknesses	It requires mastery of the specific technique and the employment of more employees at the beginning of its implementation.	It is important to highlight that the applicability of the proposed model requires professionals with specific knowledge and mastery of the methodology.	Little tested and lack of more comparative data to make the model more robust.
Suggestions	I would adapt the steps to the ordinance that deals with the chain of custody of traces.	Insertion of specific steps regarding matters related to the chain of custody of the traces found.	I would make some adjustments (optimization process) in some elements of the matrix (qualities and dimensions) to measure the degree of correlation in the characteristics of Knowledge Management processes and association of information quality dimensions to the characteristics of KM processes with the use of hypotheses to assess the statistical and probabilistic consistency of the model.

Source: Prepared by the author.

- Viability of model

Experts agree that the model presented is useful and viable, that it is a tool to identify flaws and allow for possible corrections; in addition to facilitating decision-making based on reliable information.

That said, we agree with the experts as the model identifies the dimensions of information quality that are present in each stage of the crime scene investigation process, as well as the confidence of the association of information quality dimensions with knowledge management processes; allowing, based on the results obtained, managers to identify gaps in information and knowledge management, supporting decision making.

- Use

Experts 1 and 2 state that the proposed model can be used in other Standard Operating Procedures for other types of expertise. It corroborates the experts' opinion as the model allows us to define the management processes and the dimensions of the quality of information that are presented at each stage of the expertise process; in addition to the trust in the relationship between knowledge management processes and the dimensions of information quality that appear in the stages of the expertise processes. Thus, it appears that the application of the model to other POPs is viable as it is a methodology to verify how knowledge management processes and information quality dimensions relate to the stages of the expertise process.

The perception of experts 2 and 3 stands out, reporting that the model can be a management tool. The application of the model allows us to analyze the relationship between knowledge management processes, the dimensions of information quality and the stages of the expertise process, presenting the support and confidence of the association of these factors; thus making it easier to identify the knowledge management processes present at each stage of the expertise process and subsequently implement knowledge management practices.

- Weaknesses of model

Regarding the weaknesses of the model, expert 3 points out the lack of comparative points and that it is little tested. Diverging from the spatialist, it is noteworthy that the proposed model has already been used by Macedo (2008) and Pfleger (2022).

Experts 1 and 2 highlighted that to apply the model it is necessary to master the methodology; while expert 3 considers the model to be simple. At this point, it is believed that to apply the model it is not necessary to master the methodology; but knowledge of knowledge management processes, dimensions of information quality and how they relate to the stages of the process of responding to a crime scene against life.

- Suggestions

Regarding the results presented, we agree with experts 1 and 2 when they state the need to consider the steps related to the chain of custody of traces as stages in the process of responding to the occurrence at the scene of a crime against life.

Regarding the model's conclusions, these are limited to existing factors, whether they are knowledge management processes, the dimensions of information quality or the stages of the crime scene investigation process. Thus, in the case of new stages of the expertise process, the model results will be appropriate to these stages.

Expert 3 suggests using hypotheses to assess the statistical consistency and probability of the model. It is agreed with the expert, although the proposed model met the objective, that the model can be improved by adding a statistical method.

8. Conclusion

This study aims to analyze how the dimensions of information quality and knowledge management processes relate to the stages of the process of responding to incidents of crimes against life. To this end, the adapted Macedo (2008) model was applied, which determines the contexts, supports and confidence in the association of the characteristics of knowledge management processes with the dimensions of information quality in the stages of crime scene forensic processes against life.

The main results of the research include the identification of nineteen dimensions of information quality that relate to the stages of the crime against life forensic processes; twelve characteristics of knowledge management processes identified from the literature review and thirty-three stages of the expert process of attending a crime scene against life, listed from the Standard Operating Procedure published by Ordinance No. 001/2021 – IC /ITEP. These factors were used in the application of the model for analyzing the relationship between management processes and the dimensions of information quality with the stages of forensic processes for crimes against life.

The application of the model begins by establishing the context of the characteristics of Knowledge Management processes, where it was identified that Knowledge Management processes comprise seven to twenty-three stages of the forensic process of attending a crime scene against life. The "Connections" feature appears in twenty-three stages of the expertise process, and "Acquisition" appears in only seven stages of the expertise processes.

In the context of information quality, it was identified that the dimensions of information quality were presented in four to thirty-three stages of the forensic process of attending a crime scene against life. The dimension of information quality "Interpretability" appears in four stages of the expertise process, while the dimensions "Perceived Value" and "Actuality" appear in thirty-three stages.

From the analysis of trust data, it is identified that the dimensions "Perceived Value" and "Actuality" present a trust of 100% with all the characteristics of knowledge management processes (Acquisition, Storage, Distribution, Use, Comparison, Consequence, Connections, Conversion, Manipulation, Evaluation, Validation and Reflection). The dimension of information quality "Conci-

sion" was the one that obtained the lowest confidence values for the characteristics of the knowledge management processes and, it is noteworthy that Concision did not obtain confidence (0%) with the knowledge management process of Acquisition.

The analysis of interviews with experts showed that the model is useful for application in Standard Operating Procedures of other types of expertise, makes it possible to identify flaws and serves as a management tool. As a suggestion, there is the introduction of steps relating to the chain of custody process; and, the use of hypotheses to assess the statistical and probabilistic consistency of the model. However, it should be noted that the suggestions listed by experts do not affect the use and effectiveness of the model.

That said, it is concluded that the dimensions of information quality and knowledge management processes are related to the stages of the forensic process of attending a crime scene against life. Regarding the dimensions of information quality, it was observed that Perceived Value and Timeliness are dimensions that qualify all stages of the expertise process; and that Conciseness is the dimension that is least related to the stages of the expertise processes, in light of knowledge management processes. In this context, the main contribution of this research was to present a useful method to analyze how the dimensions of information quality and knowledge management processes relate to the stages of forensic processes.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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