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Theoretical Framework to Preparation a measure for e-health readiness assessment in developing countries.

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Abstract

This study aims to develop a vision for a Theoretical Framework to preparing an e-health readiness assessment scale in developing countries, based on the importance of methodological approaches in rationalizing and credibility of scientific research results. Therefore, a methodological approach will be developed to help prepare scientific research related to the development of tools and frameworks for assessing e-health readiness in healthcare institutions. Therefore, the study will be exposed to comprehensive methodological approaches and integrated research design for research in the field of e-health readiness by introducing the concept of mixed methodological methods that seek to combine quantitative and qualitative methods and overcome the shortcomings suffered by the classical methodological approaches in this field. Also, the methodological approach must depend on logical and methodological steps that prove the harmony between the quantitative and qualitative aspects.

The study concluded that it is necessary to develop the methodological frameworks for electronic health in proportion to the complex nature of this phenomenon, on the basis that it represents a complex composition of technical and humanitarian factors that can only be covered through integrated methodological approaches that can touch the different aspects of this phenomenon.

key words: Theoretical Framework; Electronic Health; Readiness; Evaluation; Measurement.

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1. INTRODUCTION

Electronic readiness indicates the organization's willingness to successfully implement any ICT programme. Assessing electronic readiness can facilitate the process of change for individuals and organizations to adopt ICT, avoiding opportunities for relapse and failure. Many electronic readiness assessment tools have been developed and tested in different fields, but few have been created for healthcare environments. Recognizing the enormous differences in ICT access and the determinants of ICT access between developed and developing countries, it is necessary to develop e-readiness assessment models that are more specific to developing countries. This research is therefore an effort to encourage initiatives to develop models for developing countries and to test the validity and reliability of such models.

Most health information technology initiatives or so-called e-health in developing countries are still in the project stages, and few have become part of routine health care delivery owing to the lack of a clear roadmap for implementation. E-health readiness is defined as the readiness of health-care institutions or communities for expected change by ICT programmes. To ascertain the degree of readiness, there is a need to assess e-health readiness. The literature on e-health readiness assessment frameworks and tools shows a significant inconsistency in content, definitions and recommendations, none of which has been found to be fully appropriate for assessing e-health readiness in the context of developing countries. In most developing countries, e-health initiatives barely continue beyond the project phase.

The literature shows that a large number of studies have been conducted to address health improvement issues including the adoption, acceptance and use of e-health. However, it is important to note that health behaviors in developing countries deviate from those of many developed countries and therefore fall short of the neoclassical model. The WTO report also emphasized that, to the extent that there is an increase in the use of information technology in the form of mobile phones and the Internet in many developing countries, its use is still limited to social communication. It emphasizes that little has been done to extend information technology to the use of applications such as e-health, e-commerce and e-education. The sophisticated nature and high failure ratios of e-Health systems require an effective assessment of readiness to avoid increased failures

while increasing system benefits. However, the literature on assessing e-health readiness is many and heterogeneous.

This study seeks to present a theoretical and methodological scenario for the preparation of a scale to assess e-health readiness. Thus, the main research question for this study is: what is the appropriate theoretical and methodological design for the preparation of a scale to assess the readiness of e-health?

On this basis, the contribution of this study will be primarily systematic, with the understanding that its objective is to develop a systematic design that builds on developments at the level of research approaches, in order to assist researchers in conducting studies on the readiness of electronic health, whether at the local, national or even international level. The main thrust of this methodological design is the significant lack of systematic design for research in this area, as well as the encouragement of researchers for this area of research, on the understanding that the subject of readiness is one of the few subjects of interest in developing countries, despite its utmost importance to the success or failure of e-health projects.

To answer the problems of the study in a coordinated and systematic manner, we will rely on a balanced plan methodological design to measure e-health readiness, the methodological approach in general and the methodological design of this approach will be addressed. And then the methodology of mixed methods will be addressed as a very appropriate research approach to the essence of such research on the basis that it exceeds the binary quantitative research and qualitative research, It seeks to benefit from both quantitative and qualitative orientation. In a second place, the basic methodological tools for conducting research on the readiness of electronic health will be addressed: corresponding, Delphi technique, expert opinion, and questionnaire.

2. Methodological Design of E-Health Readiness Measurement Research:

E-readiness assessments have emerged as opportunities for ICT data collection, management, participation and management. It is designed to assess organizational capacities and opportunities provided through e-government

initiatives. Different definitions of electronic readiness and different evaluation tools are used based on their objectives and outcomes. E-readiness is defined as a measure of the quality of the State's ICT infrastructure and the ability of consumers, companies and Governments to use ICT for their own benefit. Thus, electronic readiness provides diversity to offer different uses in different ways. Thus, the readiness of e-health can be seen as the degree of society's willingness to participate and succeed in the implementation of e-health. Many e-readiness assessment frameworks are currently available in the health sector, each with its own strengths and constraints, which may lead to different outcomes in different contexts. Thus, through existing literature, this research examines various factors relevant to assessing e-health readiness. (Beebeejaun , Chittoo 2017, p.195).

1.2- Methodological approach to preparing a measure of e-health readiness:

A sequenced exploratory design using a mixed methodology will be selected as the best approach to developing a practical model for assessing e-health readiness based on evidence in the literature. Thus, this research focuses on using the qualitative approach initially to develop the first version of the electronic health readiness measurement model and during the validation process to revise the first version to the second. A quantitative approach is then used to further improve the second version to the third (final version) by applying it to the research sample of a number of hospital institutions on an experimental basis. This type of research design, where a qualitative approach follows a quantitative approach in a sequential manner, and where quantitative data and results help to interpret qualitative results, is called a serial exploratory design. This design is exploratory because this research in this area seeks to develop models that help explore the distribution of the phenomenon (e-health readiness level) within a selected

population group. This type of research design is often adopted when a researcher develops a tool and tests it in an empirical way.

To help achieve the research's objectives, it was necessary to envisage the process step by step, namely the development of a conceptual framework for the study. The process has been planned across a number of levels and steps (chowdhury 2008, p.p37-40):

(A) Preliminary evaluation: Needs assessment that can confirm the need for a practical and evidence-based tool that can assess the level of readiness of e-health.

(B) A systematic review of literature to: (1) Identification of the characteristics and areas of the model, (2) confirmation of the absence or existence of an e-health readiness measurement or equivalent model, (3) identification of the study methods to be used based on the existence or absence of such model, and (4) criticism of relevant tools, concepts or models in order to gain a perspective on the content of the relevant tools, concepts or models.

The objective of the review of academic and professional literature is to look at the history of improvement and use of e-health systems, basic theoretical frameworks, existing literature regarding the level of e-health readiness, potential obstacles and solutions to e-health implementation issues and current initiatives to promote better use of e-health services. The objective of the review of these literature is to provide a background on potential difficulties in assessing e-health readiness. A systematic review of literature aims to identify literature on e-health topics or modules designed specifically for developing countries. The search protocol is conducted in accordance with the elements of the preferred reports for the harmonized review, and searches will be carried out in the databases (Scopus), (Cinahl), (Web of Science), (Pro Quest.), (Clinicalkey), (Medline), (EBSCO),

(Science Direct), for a relatively long period of time and review. These databases are selected because they are linked to journals specializing in health informatics.

The search vocabulary is selected in the literature and tested experimentally to verify the identification of appropriate papers. Research terms relate to: (1) e-health readiness assessment models ("e-health assessment", "health informatics assessment", "health information technology assessment" and "health information systems assessment"), (2) readiness ("readiness" or "readiness"), (3) e-health readiness in developing countries ("e-health readiness in developing countries", "e-health readiness in middle-income countries", and "e-health readiness in developing countries". Additional articles can be identified for inclusion by collecting relevant references and searching for lead authors based on references' lists. In addition to reviewing all magazines specializing in electronic health classified in category (A) and (B). A search is also carried out on Google to identify additional non-magazine publications (grey literature, especially worksheets and reports) on e-health readiness frameworks. Finally, after reviewing all articles and extracting key data, summary tables containing mainly authors' names and study year, model name or framework and description, study design, dimensions or topics of readiness, settings or target groups and application can be relied upon. The compilation of data also includes the compilation and summarization of the results of the studies covered, and the synthesis of these results is in a descriptive (non-quantitative) manner. Topics that appear in the data compilation process are analysed thematically.

(C) Model Development: In the absence of such a model, it will be necessary to develop a tool based on the best evidence of literature. The critical process enables a perspective on the content of relevant tools, concepts or models through criticism of literature, which will provide an insight into possible topics and indicators to be considered on each topic. Based on the outcome of the cash

process, an electronic health readiness measurement model is designed that includes topics and indicators, and the development of version 1. Then, instructions for the electronic health readiness measurement model and indicator guide are developed.

(D) Form verification: Validation and stability (psychometric properties). After the development of a functional electronic health readiness measurement model, the authenticity of the form and content of the model should be determined by expert opinions, thus improving the electronic health readiness measurement model from version 1 to version 2. In order to determine the practical and functional application of Issue No. 2 of the Electronic Health Readiness Measurement Model, it must be applied to a sample of health care institutions, resulting in the improvement of Issue No. 2 to Issue No. 3, the final planned release of the E-health Readiness Measurement Model. At this stage, the results of the empirical application are applied to design a matrix of recommendations to guide the use of electronic health based on evidence provided by the model.

Apply the model: That is, applying the model in the study in order to start running the e-health strategy.

3. Mixed Methods Methodology:

Mixed Methods research is one of three research approaches (qualitative research, quantitative research, and Mixed Methods research) found in many disciplines or fields to address research problems or pronouns. Mixed methods research is recognized as the third major research curriculum, and “both Creswell” and “Tashakkori” define mixed methods research as research in which the investigator collects and analyses data, integrates results and draws conclusions using both qualitative and quantitative methods in one study or in one inquiry programme (tashakkori , Creswell 2007 , p04). Quantitative research (the postural

model) has historically been the cornerstone of social science research, with fundamentalist stakeholders in this research tradition calling on researchers to eliminate their prejudices and to remain emotionally separate and non-selfless in their studies or justify their experimentally proven assumptions. While qualitative fundamentalists support a constructive or interpretive model and assert that facts are multifaceted, that generalizations without time and context are neither desirable nor possible, that research must be linked to values, that it is impossible to distinguish between causes and effects altogether, that logic flows from private to public, and that self is the only source of reality. (johnson , onwuegbuzie 2004, p.14)

On the other hand, several names were given to the third methodological movement, which is an intellectual and practical combination of quantitative and qualitative imitation, including: mixed research, integrative research, multi-method research, multiple methods, three-dimensional studies, residual ethnographic analysis, and mixed research. In general, all researchers agree that this new methodological movement is based on the integration of qualitative and quantitative methods, and perhaps the term "mixed methods" is more appropriate because mixing provides a comprehensive term to cover multifaceted actions to combine, integrate, link and use multiple methods. Creswell and his colleagues emphasize that a more detailed definition must determine the nature of data collection (both simultaneously and sequentially), the priority that each form of data receives in the research report (equal or unequal), and the stage of research where data "mixing" occurs at the data collection, analysis or interpretation stage. Incorporating all of these features into a single definition, the authors provide the following definition: mixed methods studies involve the collection or analysis of quantitative and/or qualitative data in a single study where data is collected simultaneously or sequentially, and involves the integration of data at one or more stages of the research process (creswell 2003, p.165).

With regard to the relationship between quantitative and qualitative research, studies of mixed methods promote understanding of phenomena in a way that is not possible using a single method. In terms of time distribution, it must be determined if qualitative and quantitative data are collected in stages (sequentially) or simultaneously. When data is collected in stages, their definition first depends on the initial idea of the researcher. Qualitative data are first collected when the idea is to explore a topic of particular interest with participants.

Later, the researcher expands understanding by collecting quantitative data. When qualitative and quantitative data are collected simultaneously, implementation takes place almost simultaneously due to the nature of the research question. The concept of consolidation relates to the way data are mixed, which means determining whether qualitative and quantitative data are actually integrated, whether they will remain separate, or will be incorporated in some way. Data in mixed research can be said to be associated when there is a combination of quantitative and qualitative research with data analysis from the first phase of the study and when data is collected in the second phase. Integration occurs when the qualitative and quantitative database is integrated and produces information that supports each other. The theoretical perspective guiding the implementation of the hybrid modality project is another factor to be taken into account. All researchers have theories, hypotheses or guiding structures in their investigations, even when these theories are implicit or not mentioned. Based on the definition of these factors, the procedures of mixed methods studies can be understood as one of several research strategies as described in the literature: serial interpretation, serial exploration, serial transformation, simultaneous triangulation, overlapping synchronization and simultaneous conversion (Santos 2017, p03).

On the understanding that most frameworks for assessing E-Health readiness have been developed for application in developed countries, it is important to

conceptualize and develop an E-Health Readiness Assessment Framework suitable for use in developing countries. Here, types of E-Health readiness can be identified in line with these countries' data as follows (Mauco, 2020, p04):

Organizational readiness: The extent to which institutional environment and culture are supported, e-health awareness is promoted and implemented and innovations are used in their multiple areas (relevant policies, support for senior management).

Technological readiness/infrastructure: The availability and affordability of ICT resources to implement the proposed e-health innovation (such as skilled human resources, ICT support, high-quality ICT infrastructure and energy supply).

Government readiness: The extent to which the Government of the State and politicians support and promote awareness of e-health and its implementation and the use of innovations in its multiple areas (the existence of relevant policies and financing).

Community readiness: the degree of interaction associated with health-care institutions. The interaction is described by three parameters: the interaction between members of a healthcare institution, the interaction of a health care institution with other health care institutions, and the interaction of a health care institution with its communities.

Readiness of health care providers: the extent to which a healthcare provider's personal experience affects, and the perceptions and acceptance of health care providers to use e-health technology.

Readiness of participation: the extent to which members of society are exposed to the concept of e-health and discuss its perceived benefits and negative

effects. and measuring community members' willingness to accept e-health training.

Basic readiness: the extent to which members of society are dissatisfied with the current situation of providing their own health care services and seeing e-health as a solution, and expressing their need and readiness for e-health services.

4. Methodological tools used in e-health readiness measurement research:

In most research on the development of metrics and tools to assess the readiness of e-health, and based on the methodology of mixed methods, the process of combining quantitative and qualitative tools is very necessary. Thus, in general, four basic methodological tools are relied upon: (1) the interview, (2) Delphi technique, (3) expert opinion and (4) questionnaire. Many other tools, especially technical ones, may be of wider use.

•**The interview:** It is a data collection technique that involves oral interrogation of interviewees, both as individuals and as a group, and will be relied upon by the open question pattern. Interviews can contribute to understanding the social impact of the proposed e-health framework, understanding the issue of acceptance and use of e-health readiness clauses. The term "qualitative interview" is often used to express different types of interviews used for qualitative research. Qualitative interviews vary considerably on the basis of the interviewer's approach. These differences range from an unstructured interview, which comes with an interview guide, to a quasi-organizational interview with a list of questions or fairly specific topics to cover, often referred to as an interview guide, but the interviewee has a great deal of freedom in how to respond. Unlike quantitative quantitative research interviews with organized questions, qualitative interviews tend to be flexible and respond to the direction in which the interview takes place. An in-depth or unstructured interview is a qualitative research method involving

extensive individual interviews with a small number of respondents to explore their views on a particular idea, programme or situation (salifu 2017, p.p 38-39).

The interview is essentially a conversation in which a researcher can ask questions in structured, semi-structured or unregulated format to get first-hand insights into some topics. The employment of interviews in a combination of posture and post-situational epistemology comes from the point of view of the social construction of knowledge. The interview can be used as a single data collection tool, can be used as a guide or introduction to the design of a questionnaire, or to explore or test hypotheses, or can be an aid to the questionnaire. The choice of a particular type of interview depends on the study's purpose and research objectives. The research interview can be used at almost any stage of the research investigation and on any subject. Interrogators are often recruited through some forms of intentional sampling, or if there are particularly groups of informants, the snowball method can be used (brown, 2018, p.p 99-100).

•**Delphi Technology:** Delphi technology is a collective process used to survey and gather expert opinions on a particular topic. Linestone and Turoff provide a basic definition of Delphi technology where Delphi technology can be described as a way to build a collective communication process so that the process is effective in allowing a group of individuals to deal with a complex problem. Delphi's technique is applied whenever policies, plans or ideas must be based on informed judgement and are useful when expert and practitioner opinions and judgements are needed (linstone and turoff, 1975, p.03). The main purpose of the Delphi method is to obtain a reliable consensus of a group of experts through a series of extensive questionnaires along with feedback. By obtaining the consensus of a group of experts using this technique, researchers can identify and prioritize issues and develop a framework for identification. The researchers emphasize that Delphi's modified techniques, Delphi policy, and Delphi's real-time techniques

have been used, and that there are many other types of Delphi technology, with three generic categories generally used: (1) Classic Delphi (2) Political Delphi (3) Decision Delphi. Delphi's technique is applied as a tool and consensus-building method using a series of questionnaires to collect data from a group of participants. By definition, Delphi's technique is a collective process involving interaction between the researcher and a group of specific experts on a specific topic, usually through a series of questionnaires. Delphi's technique was used to obtain consensus on future trends and projections using a systematic process of information collection. This technique is useful when experts' and practitioners' opinions and judgements are necessary. As an interactive measure, Delphi's technique could extend to several rounds, with fewer views needed after the third round, but an important stage had to be taken care of before the commencement of the rounds of expertise, namely, the assessment of the willingness of potential members of the Commission to participate in the study. In general, we can talk about several steps to Delphi's technology (imran, 2007, p03):

- ✓ Identification of the expert body.
- ✓ Determine individuals' willingness to serve on the panel of experts.
- ✓ Collect individual inputs on a specific issue and then compile them into the underlying data.
- ✓ Analysis of data from the expert body.
- ✓ Compile information in a new questionnaire and send it to each Panel member for review.
- ✓ Analysis of new inputs and return to team members to distribute responses.
- ✓ Request each Panel member to study the data and assess their position on the basis of the Group's responses. When individual responses differ greatly from

those of group criteria, each individual is required to provide a rationale for his or her different point of view, and limitations are placed on observations in order to keep the responses brief.

✓ Analysis of inputs and sharing of minority-supporting data with the Commission. Committee members are again asked to review their position and, if not within a specified scope, justify the position with a brief statement.

•**Questionnaire:** The questionnaires are used in the paper phase of the research which will be performed on doctors, nursing staff, pharmacists and management of hospital institutions, as well as recipients of health services and their future any patients. The questionnaire tool consists of three sets of questions. The first set of questions is directed to the administrative staff of the hospital institutions while the second group was for the medical and paramedical staff. The third group is for patients. The purpose of the first set of questions is to create a background on the environment of current ICT institutions and ICT infrastructure. The second set of questions is intended to establish a basic database of processes and procedures for keeping patients' health records, consultation among health care professionals, prescription processes and referrals. The purpose of the third cluster is to familiarize members of the public and patients with e-health services and their affordability and access. It also includes measuring the impact of their personal experiences on their perception and acceptance of using e-health technology. Questions have been drawn from the e-Health Readiness Assessment Framework (colman, 2010, p.p 133-136). During the preparation of the questionnaire's elements, the following must be taken into account (salifu, p104):

✓ To make the questionnaire effective, interrogators must be provided with the context of questions by publicizing the subject and determining the time frame for events or behaviors to be included in the answer.

✓ The questionnaire is designed well enough to meet research objectives and to reduce the problem of leaving some basic questions unanswered.

✓ The questionnaire is developed in a way that allows for the most complete and accurate information. To achieve this, the questionnaire must be structured and formulated to encourage respondents to provide accurate, impartial and complete information by requiring them to arrange cases according to a specific measure.

✓ The questionnaire is also designed to make it easier for respondents to provide the necessary information and record answers with minimal error.

•**Expert opinion:** Experts' opinion is defined as a method of data collection involving the use of expert perceptions and knowledge in functional areas as indicators of the results of a particular programme. In this research study experts will be consulted in the field of medical research, health technology assessment and the development of e-health models. Research questionnaires and interviews are developed after interaction with experts. Once the e-health framework is developed, experts will be consulted to improve it. The expert opinion method became widely used in the second half of the twentieth century. Kendall had a significant impact on the development of this method by publishing his study dedicated to the use of the binding bands method in expert opinion analysis (kendall, 1948). The expert method is widely applied in both social and human sciences. The expert opinion method is one of the most appropriate ways to gather, analyse and evaluate information. The expert opinion method is used in social research to carry out the following tasks (iriste and katane, 2018, p75):

✓ Make predictions if information about the subject matter is unavailable or inaccurate.

- ✓ Make predictions if the prediction area is new and there is no equivalent available.
- ✓ Detailed description of the main requirements of the search method and explanation of its procedures and selection of methods and types of data acquisition and processing.
- ✓ Evaluate the health of surveys and modify surveys widely.
- ✓ Detailed analysis of results and prediction of changes in the research phenomenon.
- ✓ Confirmation and review of data obtained by other means.
- ✓ Clarification of the factors influencing the development of the research topic contained in the models.
- ✓ Analyze the results especially if there is an opportunity for different interpretations.

When empirical data are incomplete or contradictory, expert opinion can often provide a valuable resource for assisting decision-making. In fact, systematic designs involving groups of experts to elicit judgments have a long history. Delphi's technique is a way of elaborating a collective judgment involving many experts. In particular, it is a scanning process with three features: anonymity, frequent feedback and surveillance, and compilation of responses. These specific features of the Delphi technique were designed to reduce the influence of the Committee's dominant members and the discussions unrelated to the information obtained, as well as the Group's pressure towards consensus (sharon, 1998, p248).

4. CONCLUSION

At the conclusion of this study, it can be said that attention to systemic issues in the fields of scientific research is a top priority for all researchers and scholars. Even the low return of scientific research is due primarily to the reluctance to take advantage of developments in the field of scientific research methodology and research designs. In the field of electronic health, there has been a significant shift in the level of methodological approaches adopted and the methodological tools applied. Studies have demonstrated the importance of combining quantitative and qualitative approaches within the framework of mixed methodological research in providing a clear and realistic picture of field realities of health care issues.

In the field of studies on e-health readiness assessments, although modern, they have demonstrated new methodological traditions that can be relied upon for credible and effective research and studies. This study provided an integrated methodology for such research, both at the level of comprehensive methodological approach and research design as a whole and at the level of approved methodological tools. At the level of a comprehensive methodological approach, recent trends should be used to combine quantitative and qualitative approaches within the framework of what are known as mixed methodological methods, by drawing on precise methodological steps that combine qualitative and quantitative methods in an integrated methodological framework according to logical steps that seek to achieve scientific credibility results. At the level of methodological tools adopted, the study concludes that all quantitative and qualitative tools should be used in a manner that accommodates all manifestations of synchronization and synergy that characterize the phenomenon of electronic health, as well as the complex nature that characterizes this phenomenon as a technical phenomenon that can be understood only through its human and social dimensions. The study presented four dominant methodological techniques in the field of e-health studies: (1) the questionnaire, as a very important quantitative technique in surveying researchers' opinions by relying on quantitative methods to analyse their results. (2) The interview is one of the most important methods in the field of e-health studies, and it is more appropriate to seek the views of specialists and decision

makers at the level of health care organizations. and (3) the Delphi technique, which is the most widely used technique in the field of e-health studies on the basis that it is a technical area that needs many tours of specialists' opinions. and (4) expert opinion, a technology directly linked to Delphi technology that seeks to benefit from experts' views on health digitization.

Relying on mixed and diverse methodological approaches that can understand the complex nature of e-Health projects, which can help develop e-Health readiness assessment frameworks and tools in a way that can ensure the success of e-Health projects and reach high levels of technological maturity. This will reduce e-Health project failures and reduce expenditures in effort, money and time.

The availability of e-Health readiness assessment tools should help improve the quality of e-Health programme planning in healthcare institutions, as well as increase awareness and trust among staff and planners associated with e-Health applications used. They should also help address technology and staff learning issues, support improved communication between health-care institutions, clients and caregivers, as well as reduce barriers to the use of ICTs related to gender and social and economic conditions. Through appropriate contextual assessment, e-health readiness assessment tools resulting from the study's methodology are expected to be more widely applicable in different States, groups and institutions.

E-health readiness assessment models resulting from authentic methodological studies can help policymakers present realistic plans for implementing e-health projects and help them identify strengths and weaknesses in current systems and plan for future improvements. At national levels, these assessments can help measure the digital divide between hospitals in urban and rural environments. Using the information and results available through these assessments, key stakeholders and decision makers will be able to select priorities and concentrate resources to improve the e-health situation.

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