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Russian Local Trends in Software

Girassol: A Mobile App to Measure Levels

Highlights

Sustainable Development in Block

Unified BPM Cycle for Public Credit

Discovering Thoughts, Inventing Future

VOLUME 20 ISSUE 4 VERSION 1.0

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Sustainable Development in Block Random Systems

By Ferenc Juhász

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Abstract- In paper [1], stability of a block random model was studied as a possible model for economic systems. Crisis means significant and quick change in the number of participants of a system. It was proved that a smaller system is more stable than a larger one with the same parameters. Further, the number of participants can significantly alter without any outer interactions resulting in crisis.

In paper [2], stability properties of a block random model with fixed number of participants was investigated. It was studied, that how two parameters of the model, density matrix and dispersion influence behavior of the system. It was shown that proportionally smaller in absolute value density matrix results in a shorter cycle time. Also larger dispersion makes the cycle time shorter. It was suggested that a longer cycle time makes it possible the participants to adapt themselves to circumstances and thus to avoid crises. In this case repeated recessions and growths appear which can be called structural cycles.

In the present paper we investigate connection between real parameters of economy and parameters of the block random model. We point out that base rate bounded by an appropriate level is useful for working the system without any crisis. As a result of these studies, it has become clear that sustainable development can be defined in terms of avoiding crisis rather than achieving growth.

Keywords: random matrices, eigenvalues, lyapunov stability, economics, ecology.

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I. Introduction

It is widely accepted that behavior of economy is quasi cyclic. One can observe time to time appearing small cycles which can be called structural cycles to which participants can easily adapt themselves. Besides, so called crisis cycles manifest too which can be interpreted as large and quick alteration in the number of participants. Accommodation to these changes is problematic, a certain amount of participants are unable to do that.

If one thinks of important parameters of economy as interests rates, incomes and wages, corporate profits, inflation, etc. it seems unclear why systems cannot work similarly with different but proportional level of these parameters.

It is widely known among economists that interest rates play crucial role in successful or less successful behavior of economic systems. In the present paper we draw attention to the connection between structural cycle time and level of interests.

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II. Block Random Model

We briefly summarize description of the model presented in [1]. The block the random model handles not only deterministic but random effects too. Its behavior depends on two parameters, density matrix and the dispersion of entries. The first relates to expected values, the second to variances of the entries. The model is piecewise linear which makes it possible to handle it easily while non-linearity is taken into account too.

a) Economic model

Denote X the n-dimensional space which we call Capital space and Y the n-dimensional space which is called Profit space. Coordinates of point $x \in X$ and $y \in Y$ are the capitals and profits of the participants, respectively.

Let us suppose that we know the $R^n \to R^n$ function F which maps the points of X to the points of Y. If we linearize F at time zero we get the following expression

$$y(t) \approx F(x(0)) + L(x(t) - x(0))$$

Where Jacobian L consists of partial derivatives of function F.

Let us differentiate by t, then we get $\dot{y}(t) = L\dot{x}(t)$ If we take into consideration that profit is change of capital, we get our main equation:

$$\dot{y}(t) = Ly(t) = \frac{1}{n} Ay(t)$$

Where the form of $L = \frac{1}{n} A$ is going to ensure that the equation is independent from the number of participants.

To interpret Jacobian $\frac{1}{n} A$ we assume that a_{ij} is the strength of action by which j^{th} participant affects the i^{th} participant. Then i^{th} participant is influenced by average effect of all of the participants.

Denote $P_k = (p_{ij})$ the projector matrix whose entries are zero except $p_{kk}=1$ and similarly let A_{ij} be the matrix whose entries are zero except the entry a_{ij}. Then

$$A = \sum_{i=1}^{n}\sum_{j=1}^{n} A_{ij} = \sum_{i=1}^{n}\sum_{j=1}^{n} P_i A P_j = \left(\sum_{i=1}^{n} P_i\right) A \left(\sum_{j=1}^{n} P_j\right)$$

where $A_{ij} = P_i A P_j$.

The elementary equation of index (i,j) $\dot{y}_i = a_{ij} y_j$ can be written as

$$P_i \dot{y} = P_i A P_j y$$

Thus for the sum all of n^2 elementary equations

$$n\left(\sum_{i=1}^{n} P_i\right)\dot{y} = \left(\sum_{i=1}^{n} P_i\right) A \left(\sum_{j=1}^{n} P_j\right) y$$

that is

$$\dot{y} = \frac{1}{n} A y$$

Which means that our main equation can be stated as sum of n^2 elementary equations.

b) Role of randomness

To have a rough picture, we assume that the participants form some groups consisting of similarly behaving elements. Consequently the system matrix A consists of some blocks whose entries are independent random variables having the same expected values. We collected these expected values into the density matrix. Thus block random system has two important parameters: the density matrix and the dispersion of the entries. In this case the system matrix is called block random matrix.

It is proved that spectra of block random matrices consists of a fixed number of n^{th} order eigenvalues while most of the eigenvalues are of order $\sqrt{n}$ around zero. From the point of view of our investigations, the most important case is slight unstable block random matrix which means that the large in absolute value eigenvalues of the block random matrix have negative real parts.

III. Effects of the Density Matrix and Dispersion

To characterize behavior of block random systems we divided the envelope of the bundle of trajectories into two parts, that is, into a convergence period and a divergence period of time [2].

If lengths of these periods, that is, convergence time and divergence time are suitable long then the participants are able to adapt themselves to conditions. In this case we are faced to a so called structural cycle and it is possible to start another cycle of the original nonlinear system.

If either convergence period or divergence period or both are too short, a certain part of the participants are unable to adapt themselves to circumstances and so crisis appears.

IV. Consequences in Economics

Statistical data show that most of enterprises are charged with repayable loan. Consequently, if base rate is raised then strengths of interactions between participants decrease. This can be taken into consideration by proportional reduction (multiplication by a positive number less than 1) of the density matrix. This results in a shorter cycle time, that is, in quicker changes which in some circumstances can turn into crises.

Furthermore, it is reasonable to assume that a higher base rate causes increased differences between participants, that is, results in a greater dispersion. Thus base rate influences both parameters - density matrix and dispersion - in one direction from the viewpoint of speed of changes [2 Table 1].

The appearance of crisis can be avoided if base rate is kept in an appropriate low level. In this case, repetitive so called structural cycles can be observed and the system is free from crises [2 Figure 9].

In general, one has to think about aims of economic policies. If we leave the paradigm of growth and instead we follow the paradigm of crisis avoidance then development is realized in a more natural way with less troubles.

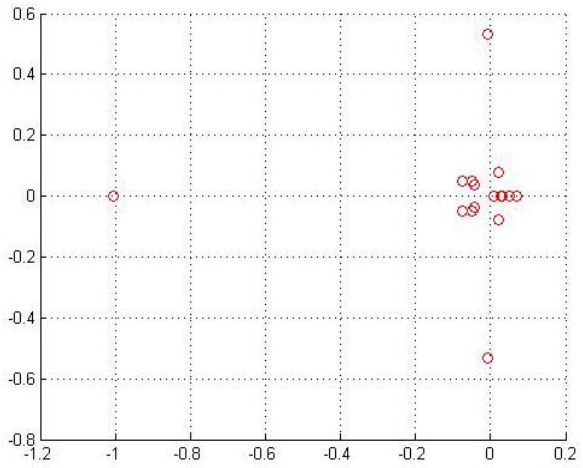

Figure 1: 16 Eigenvalues of a slightly unstable block random system

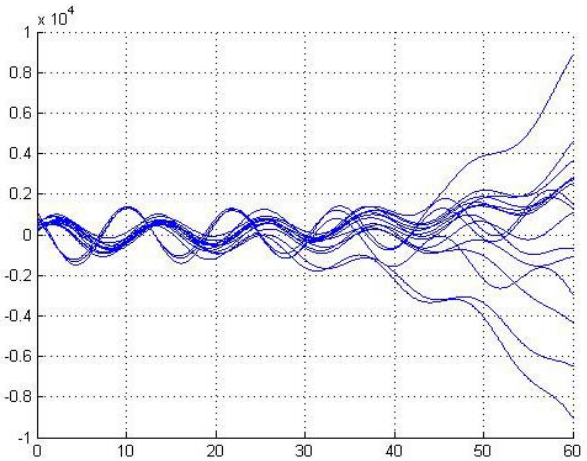

Figure 2: Trajectories of profits of 16 participants

V. Summary

Block random matrix has two important parameters, expected values of the entries which are collected into the density matrix and dispersion of the entries which is assumed to be a certain value. The connection between base rate and parameters of block random systems require further investigations. However, we emphasize that a higher base rate entails decreasing the magnitude of the density matrix as well and a larger standard deviation of the entries. Thus the alteration of both parameters results in faster processes which allow the crisis to appear. Otherwise an appropriate low level of interests makes it possible the participants to adapt themselves to the fundamentally nonlinear system and thus to avoid crisis.

It seems clear that block random model is able to explain why economy is doing well with a relatively low level of base rate and crashes often in case of systems with high level of interests.

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Russian Local Trends in Software Development – Expectations and Reality. Resume of Studies in 2017-2019

By Denis Pashchenko

Abstract- Regulators of the Russian software market over the past 8 years have a significant impact on the market: from the serious requirements about the protection of personal data in information systems to the policy and state corporate's programs of import substitution. This article contains a part of the results of two author's researches (2017, 2019) that covered about 150 experienced engineers and managers in all federal districts of Russia. The expert's panel reviewed the change in costs and efforts in software development projects connected with stricter requirements for collecting and storing personal data, preventing of data leaks, evaluated import substitution of system and application software and determined the possibilities of using technologies, based on open-source code. The results of the both studies are accompanied by analysis of dynamic of last few years and the brief recommendations of the author.

Keywords: *software; development; regulation; Russia.*

GJCST-G Classification: *K.6.3*

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Keywords: software; development; regulation; Russia.

I. Introduction

Goals of research

Software industry is changing rapidly under the pressure of different aspects:

- Competitive challenges of global environment;
- Rapid development of organizational approaches and production technologies;
- Significant rising of customer's expectations.

One of the key factors in profitable IT business is tracking and adapting successful trends, modern tools and technologies in optimizing software production. At this moment global software industry almost finished the agile transformation, when leading software development vendors switched their production process to "agile model", using scrum, extreme programming, lean practices and other methods.

Software industry despite of its globalization has significant local trends in every region and even country. Eurasian Economic Union and Russian software market in particular have some local trends that placed in focus of author´s studies in 2017 and 2019:

- Software import substitution;
- Management of personal data in information systems;
- Using of open-source technologies in software solutions.

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Those trends have their own story and specific aspects in comparing with European Union and USA software market trends that makes them interesting for analyzing.

From the one hand state regulators almost everywhere in the world came in high-tech domain. Operations of governmental regulators are focused on adherence to the rule of law, but it always connected with additional costs to market's players. Area of software development in Russia isn't so overregulated as other economical domains, but during last 8 years there is a set of local requirements, supported by governmental organizations. First of all it is a trend of import substitution in application and system software. Russia during last 25 year became one of the world leaders on software out-sourcing market (of course, with huge lagging from China, India and, perhaps, Israel) [1]. But we couldn't find even 10 word-wide known software products, developed in Russia at any application domain. Governmental course on import substitution started as a declaration and now became a real and very hard process. Now state organizations are have to looking for any software from special Russian list called "registry of Russian software". They should include anything from that list in their own competitions despite of quality or reputation of that software.

Another local Russian trend is raising efforts in information system development and design focused on defending the personal data of customers. It has a long history from 2006 and in last 5 years received a continuation, connected with political reasons. Every regulation in that area makes software companies again and again rethink over this issue and (theoretically) spend more efforts.

Both of those trends are closely connected with using of open-source software solutions. Rising of its popularity in Russia is not only economical issue, for local companies it's a part of competition on the state and the municipal software markets.

This article presents some results of two author's research, conducted in all federal districts of Russia in March-April of 2017 and November-December of 2019 and included the opinions of about 150 experienced engineers, project managers, software architects. The main goal of those researches is to determine the demand for the global trends in the

organization of software development. The researches were conducted via a questionnaire with deferred feedback and with the opportunity for experts to comment on the summarized results. The studies have the following tasks:

1. To determine the relevance in the Russian regions of current global world trends in the development and design of information systems, approaches of the organization of software production;
2. To get expert's opinions about local Russian trends related to the regulatory role of the Russian government and the expectations of customers related with import substitution and open-source software, protecting of personal and business data.

In this article there are the analyzed results of the second task of the research. The main goal of paper is demonstrate the real reflection of different local trends in IT industry in practice of experts, who exactly do software projects. Such kind of reflection demonstrates the differences between state's declarations and the current overview in branch, based on geographically wide scientific research.

II. Expectation of Russian State Regulators

Defending of personal data became a first notable demand to market from Russian state regulators. The correspondent Federal Law No. 152-FZ "About Personal Data" was approved and entered in the force in 2006 [2]. In 2010 and 2017 the regulation has been strengthened and penalties were increased. For information systems as well as for internet commercials it became a real issue and risk only somewhere in 2010-2011. Practically it meant changing a lot of information systems in country – adding features to help adherence to the rule of law. Second part of personal data regulation is connected with amendment of 2015 [3] and meant a strong demand of storage personal data, collecting within Russia, on Russian territory. For example, LinkedIn has been blocked in 2015, Facebook and Twitter has been fined in 2020 for the second time, because of ignoring of that amendment.

Current Federal Law Act No. 152-FZ doesn't have any details and leave its defining to data operators. But approximately from 2012 defending of personal data in Russia became one of the mandatory issues and risks in information system design in state organizations. Current requirements of regulator shortly might be described in following list:

- All personal data, including name, address, date of ID documents should be stored within Russia;
- Personal data storing has period and goal of its storing;
- Process of personal data collecting include mandatory agreement of current person;
- Person at any time might cancel its storing.

So, modern information systems on stages of design, construction and exploitation should consider this regulation and contain relevant features for its users.

Another large area in regulation of software market is connected with Crimea's crisis and sanctions from side of USA and EU in 2014. Counter sanctions and products embargo gave a trend of import substitution in grocery area and one year later in hi-tech industries. Legally it based on Order of the Ministry of Communications about approval of the plan for import substitution of software from 01.02.2015 no.96 [4]. Following the Order no. 96 it went in three directions:

- Corporate software with competitiveness of domestic software;
- Corporate software without competitiveness of domestic software;
- Industry's specific software.

Segment of the market of corporate software, in which there is already a reserve of competitiveness of domestic developments on local market, might be described by several examples: antivirus software (like Kaspersky), browsers (like Yandex), business applications (like 1C.ERP or Terrasoft CRM). For sure, those examples might be comparable with world class solutions in their domains and even without assistance from government: those vendors have huge shares on CIS-market. The approach of the state in that direction is the granting of preferences in the implementation of public procurement. In other domains sometimes it leads to unpleasant situations when state organizations have to include in their competitions low-quality local software from "Registry of Russian Software" according demands of regulator.

Next direction is the segment of the market of corporate software, there is no any reserve of domestic competitive counterparts, but such kind of solutions are innovative and playing huge role in digital transformation of business [5]. Examples: mobile operating systems, tools for managing the "cloud infrastructure", database management systems (DBMS). The official state approach in that direction is assistance in the collective development of this software. Author didn't find any real projects in that direction, except disjointed supporting of Russian and "open-source based" different DBMS [6] in local projects of state organization in very little amount.

The third direction has a little share and huge potential: software related to industry specificity. Such systems are designed to ensure the development of health care, fuel and energy complex, financial sector, transport, etc. Approach of the state has a character of formal declaration - joint interaction with responsible ministries and departments.

Expectation of regulator in this area is focused on changing IT policy of all state organizations: slow replacing of USA and global corporate's application

software to local products and slow replacing of system software to products, based on open-source technologies. According Russian former ministers the share of Russian software purchasing in state and municipal organizations has grown from 20% in 2015 to 65% in 2019. A lot of Russian state corporations from Russian Railways to huge banks (VTB, Sberbank, etc) already have been built and now implementing their own import substitution programs till 2023-2025 [6].

Also it should be noticed that sensitive data leaks became a real problem for huge corporations like banks, insurance companies or telecom operators. During last 3 years the number of cases of violation of data security is increasing [7]. Russian regulator RosComNadzor is involved in preventing the distribution and publishing of stolen data on regular base.

III. Local Russian Trends in Software Development Market

One of the goals of author's researches in 2017 and 2019 was the defining the reflection of IT domain professionals, who directly do software projects in Russia, of governmental regulation of last 7-8 years. There were presented few main local trends in information system design, regulation of software business and the whole economy automation:

- The software import substitution in different aspects;
- The influence of increasing of the share of state and municipal competitions on local software market;
- The defending of personal data, restriction of it's an authorized using and protection from data leaks.

Import substitution in system and application software is the main demand, forced by Russian government on municipal and federal levels by laws, projects and official polices. Participants of expert panel gave their opinion about the import substitution in the software industry in reflection of real projects and visible changes in Russian IT-industry. During last few years the system software import substitution became the visible trend, but it's influence has a very low importance (Table 1). Practically it means, that despite of Russian governmental declarations software managers and engineers don't see any market's changes according author's researches.

Table 1: Import substitution in system software and technologies

Do you note in Russia the real processes of import substitution of system software and technologies (operating systems, development environments, data buses, etc.) in various sectors of the economy?		
Answers:	Study no. 1 from 04-2017	Study no. 2 from 12-2019
Software import substitution is going on actively	1,3 %	10,3 %
Software import substitution is going in very slow manner	82,3 %	79,4%
Difficult to answer	16,5 %	10,3 %

For sure, lagging with developed markets like USA, Korea or Japan is very huge, but system software is a key for "information independency" although if in global transparent IT-world it's still possible. By opinion of author, Russia as well as other IT outsource exporters (India or Turkey) would never build any competitive system technologies for current existing devices like personal computers, smartphones or tablets. The economic reasoned recommendation here could be only investing in attempts on new devices markets (like drones, quantum computers, etc).

By the way the relevant example of China is remarkable – smartphone producing Chinese companies has started with cheap devices on Android, took a huge part of market and a bit later started to create their own system and tool software for smartphones. At the moment flagman smartphones of Chinese corporation could be counted as best in class in parameter "price\quality". But the current quality of system software produced by Chinese corporations couldn't be comparable with Google Android and it helps the consumers world-wide buy those cheap devices with updated versions of brilliant Android OS.

The import substitution of the application software as a trend in Russia is demonstrated in Table 2. Trend is not so obvious and experts said, that in last few years the import substitution of such kind slowed down. It could be explained by the common crisis in Russian economy and strong decreasing of investments in high-tech development in almost all Russian region state institutions – main objects for software import substitution.

Table 2: Import substitution in application software

Do you note in Russia the real processes of import substitution of application software (DBMS, CRM, ERP, etc.) in various sectors of the economy?		
Answers:	Study no. 1 from 04-2017	Study no. 2 from 12-2019
Software import substitution is going on actively	17,7 %	11,8 %
Software import substitution is going in very slow manner	60,8 %	70,6 %
Difficult to answer	21,5 %	17,6 %

There are several sub-domains where it's still possible to keep domination of Russian software products. For example, internet services of Yandex are withstanding an impact of powerful Google Corporation for many years. Moreover, after defeat of Sezam.cz on the local Czech market Russia took the place of the last European country with domination of local companies in Internet services. Another example is Russian ERP vendor - 1C: it is a local leader for SME segment at least for last 12 years. Also Russian vendors have chances in other niches: where there is not a lot of innovation, but customers are looking for cost reducing (CRM systems, Business Intelligence systems, some specified software).

From the other hand overregulation in competitions for state organizations might have very controversial economical effect. Of course, it slows down digital transformation in governmental services, leads to a lot of problems: from risky data migration (from current systems to new ones) to hackneyed corruption in projects and competitions, where world-class software should be on-demand replaced with local ones.

The trends of the import substitution and the growth of the state's share in the economy require development teams to comply with the requirements of official national standards (GOST) in software development. Despite of low actuality of those state standards for 2020 it could be assumed that GOST-34 and other relevant requirements of state customers might become the part of functional specifications and take a place in software project documentation. In next Table 3 there is the opinion of experts about the influence of GOST and other corresponding state standards on efforts of software development teams.

Table 3: Influence of GOST-34 on software teams efforts

Do you notice in your region the growth of real attention and efforts of teams to the requirements of GOST-34 and compliance with those requirements in practice?	
Answers:	Study no. 2 from 12-2019
Yes, real compliance with GOST is needed more often	23,5 %
Yes, but for the most part it formality	4,4 %
No, I do not notice this trend	72,1 %

According Table 3 compliance with GOST standards still extends on a small amount of projects. But it can be forecasted that with growing of state share in economy this demand and corresponding efforts would increase.

Open source technologies and solutions have a significant influence in software industry world-wide. It's the usage in Russia is strongly connected with import substitution in official polices of state corporation and declarations of relevant state bodies. In Table 4 there is a consolidated opinion of industry's experts about popularity of open-source solutions and its role in import substitution in Russia. According the author's researches usage of open-source technology is rising and it has an increasing impact on import substitution. In 2019 it became a visible trend, valuable for Russian economy.

Table 4: Use of open source technologies and solutions in import substitution

Quite often, import substitution at Russian private and state enterprises is associated with the use of open source solutions (whether it is Russian or not). Do you observe this trend in familiar projects in your region?		
Answers:	Study no.1 from 04-2017	Study no. 2 from 12-2019
I see an increase in the usage of open source solutions related with software import substitution	13,9 %	29,4 %
I observe the growth of open source Technologies demand, but related with others reasons	49,3 %	45,6 %
No, I do not notice this trend in my region	24,1 %	10,3 %
Difficult to answer	12,7 %	14,7 %

According panel view it's a notable and significant process, and Russian market in the same trend as European. But around half of experts connected rising of relevance of solutions, based on open source technologies, not with import substitution, but with natural economical and technical reasons. For sure, implementation of "open source based" solutions significant decreased project cost, because there is no any need to pay license fees to any vendor.

Another long-lasting trend, regulated by state in IT-domain, is storing and operating with a personal data. At first look it has similar roots with European or UK personal data regulation and legislation, but not for the last 5-6 years. Russian laws in data protection are focused on own state's rights firstly, and secondly refers to civil rights of corresponding persons. Official state demands should lead to additional efforts for software developments teams and in case of any abstract information systems it assumes the changing the whole cycle of data storage – from it receiving till utilization. The response from experts from author's research could be overviewed in next table (Table 5).

Table 5: Additional attention to the storage and operating with user's personal data

The tightening of Russian legislation in the field of collection and storage of personal data leads to additional requirements, which mean additional spend of resources and special attention to this issue. Do you mark extra attention, costs, complexity of the requirements for the collection and storage of personal data in information systems?		
Answers:	Study no.1 from 04-2017	Study no. 2 from 12-2019
Yes, the requirements are more complicated, the costs have grown	35,4 %	50,0 %
Yes, but insignificantly (like "ticks on the form")	34,2 %	29,4 %
No, I do not notice this trend in my region	12,7 %	7,4 %
Difficult to answer	17,7 %	12,2 %

Table 5 is demonstrating that formalized requirements and costs to meet them in software projects are rising; partly it's connected with tightening of Russian legislation, partly with maturing of Russian civil rights management.

For last few years in software development world-wide there is a strong demand of data protection and additional efforts in information security. There are new policies, new hardware and software data protection systems, new approaches in complex data leaks preventing. Russian huge corporation like Sberbank or MTS accepted terrible faults in the protection of confident data and disappointed their consumers [7]. In next Table might be observed the integrated opinion of Russian software engineers and managers from author's study about the rising of complexity of customer's requirements and rising of corresponding efforts of software development teams in this area.

Table 6: Attention to the security of information systems from leaks of business-relevant data

Business data leaks have become commonplace in the world and in Russia. Do you note the complexity of customer requirements and additional efforts of the development teams to ensure the protection of information systems from data leaks in your region in the last 2-3 years?	
Answers:	Study no.2 from 12-2019
Yes, the requirements are increasing, teams spend more effort	39,7 %
No, everything stays the same low level	47,1 %
Formally requirements (promises of software developers) increase, in practice – no	13,2 %

Table 6 is demonstrating that this trend is valid for Russian market, but in this area there is a strong potential for Russian software solutions and development teams to increase their level of competition. For sure, software development teams should spend more efforts in preventing of the data leaks.

IV. Learn More About the Expert Panel

The studies were conducted in March-April 2017 and November-December 2019 using a similar methodology, including two rounds. The composition of both panels was selected through a network of professional contacts of the author in the industry or recommendations of qualified colleagues with the obligatory observance of the following conditions:

- The proven experience of each expert in software development in recent years;
- Age over 20 years;
- One IT-company might be presented two employees with different roles (engineer, developer, analyst, project manager) maximum, currently working in different projects;
- An expert's experience in software development is relevant to the one of the Federal Districts in Russian Federation.

In the first round, each expert answered a set of questions in a Google. Form questionnaire with predefined answer options. There are four sections of questionnaire:

1. The popularity of the tools, technologies, and patterns in software development;
2. The approaches of the organization of production processes;
3. The approaches to the design of information systems;
4. Local specific Russian trends (import substitution, data protection, etc.).

Further, the answers were generalized into a research results document by Google. Form tools in an automated mode. In Round 2 this document was sent to each expert. Some experts sent their comments, objections and comments, which were added to the final version of the research results. This article is dedicated to the results of last section.

In next tables there is the considering of the characteristics of experts participated in studies in 2017 and 2019 in terms of age, professional experience and regions of obtaining such experience in software development. In the study no.1 from 04-2017, 79 experts participated, and in the study no.2 from 12-2019, 68 experts participated. The personal composition of the participants in both panels coincided by approximately 40%.

Table 7: Professional experience of experts who participated in the studies

How many years have you been involved in professional software development, related projects and teams?		
Answer:	Study no. 1 from 04-2017	Study no. 2 from 12-2019
1-3 years	2,5%	3,0%
3-6 years	32,9%	13,2%
6-10 years	20,3%	23,5%
10 + years	44,3%	60,3%

In both studies, a significant part of experts has been developing software for more than 10 years (Table 8), which means that during their careers the global relevant industry trends have been lasting for many years:

- Shift of development paradigms to "agile" methodologies;
- The rapid development of mobile software;
- Consolidation of the domination trend of web development,
- Active development of the concepts of three-tier, modular, micro service types of software architecture.

Also it should be noted that a significant percentage of experts in both studies are between the ages of 30 and 39. This age is the most fruitful in IT professions and is associated with maximum performance and professional success.

Table 8: Data of ages of experts participating in the studies

Define your age group		
Answer:	Study no. 1 from 04-2017	Study no. 2 from 12-2019
20-29 years old	41,8%	22%
30-39 years old	53,2%	61,8%
40-49 years old	5%	14,7%
50+ years old	0%	1,5%

The following table 9 shows the distribution of experts by experience profiles related to the direction of software development. Among the experience profiles are:

- Development for the company's own needs (in-house development);
- Development as part of system integration projects;
- Development of software products for the market by the supplier (vendor - ISV);
- Custom software development according to unique customer requirements.

Table 9: Professional experience of experts who participated in the studies

The experience you have presented over the past 2-3 years is the most relevant to:		
Answer:	Study no.1 from 04-2017	Study no.2 from 12-2019
In-house software development	15,2 %	19,1 %
Projects of system integration	11,4 %	10,3 %
Software (service, technology) development by independent vendor	36,7 %	27,9 %
Custom software development (including out-sourcing)	36,7 %	42,7 %

The next table 10 there is the regional distribution of experts by capitals and federal districts. In both studies, more than a 30% of experts represented Moscow, which confirms the really high concentration of IT companies in the capital.

Table 10: Data by region of experts where experience was gained

Determine the region of residence (capital, federal district) in which the experience is presented:		
Answer:	Study no.1 from 04-2017	Study no.2 from 12-2019
Moscow	34,2 %	36,8 %
St. Petersburg and the Northwest Fed District	10,1 %	8,7 %
Central Fed District (without Moscow)	6,3 %	11,8 %
South and North Caucasus Fed District	7,6 %	7,4%
Volga Federal District	12,7 %	7,4 %
Ural Federal District	5,1 %	2,9 %
Siberia Federal District	21,5 %	11,8 %
Far Eastern Federal District	2,5 %	13,2 %

From the other hand Table 10 demonstrates that both panels of expert are presenting experience from all federal districts of Russia. It allows thinking that results of studies are demonstrating the real overview of the whole local software development market.

V. Conclusion

Mentioned in paper local trends in Russian IT industry has a strong impact on main branch parameters. Understanding of its current status and

corresponding forecasts could be the base of fundamental economic analysis.

Official declarations about import substitution in software development do not have a strong reflection in panel of software development experts in author's research. This study shows that current global system software vendors are keeping their strong positions on Russian market and for last 2-3 years there is a small change despite of official news, reports or single opinions of officials. By opinion of author capital investments and marketing positions of global vendors of system software and technologies aren't reachable now and for next at least 15 years. Experience of Chine demonstrates that state strong regulation in system software domain leads to huge wastes and possible only in case when local market have millions of IT specialists. It's absolutely impossible in economic conditions of Russia, who is staying in recession since 2013.

Situation with import substitution of application software is a little more optimistic, but it based on results of work of current Russian software leaders like Yandex or TerraSoft and do not have any connections with official state policy. Without a real aimed program of government author is not expecting any research projects in import substitution of application software. Last few years demonstrated that Russian company could reach a local leadership in very specific areas like computer vision or automatic combiner driving. Their governmental support in creating of positive business environment could give a relevant impulse to extend this temporary leading. By the way economically motivated private venture funds, focused on hi-tech development, already left Russian market.

Using open-source and replacement of proprietary software is a common trend for USA, EU and Russia. Russian system integrators are actively using open-source technologies for achieving competiveness on local market. According author's researches for last few years it became a part of import substitution trend, but mostly it has economic reasons – low costs of open-source software as a part of complex software solution. From the other hand the impact of state standards in software development still has a little level.

Regulation in area of personal data protection has an influence on software market: it took some attention of engineers and leaded to additional efforts in software development project. For last few years this trend became visible and experts in panel find the impact of regulator's demand and spent rising efforts to meet this requirement in their projects. Formal following to this demand in information systems in Russia might be done as "check mark" or other elements of graphical user's interfaces.

Data leaks still need more attention from engineer's team's side: despite of continues scandals with customers the real efforts of developers in this direction didn't rise a lot. Hopefully, protection of personal data and preventing of data leaks might be placed in focus of engineer's attention and customer's requirements.

In conclusion it should be added that strong and direct regulation in hi-tech domain is not working well, because the software market is global and transparent. Talented software teams are easily changing the country in case of overregulation, like it was with Pavel Durov Telegram Team in 2014. Or even big companies are changing their legislation and relocate the best teams in other offices, like it was with Luxoft in 2015. State policy in high-tech regulation should be soft and consider its leading role in the economy of new century.

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The Review of using Unified BPM Cycle for Public Credit Recovery Activites

By Nipuni Sashanka Perera

Abstract- Business Process Management (BPM) is a combination of Information Technology and management science, which applies to improve business process in order to improve operational excellence and business performances [1] leading to process automation. This review article based is on a case study in application of business governance in public sector organization, which was conducted by Abimael R. Do Nascimento, Roquemar de Lima Baldam, Lourenço Costa and Thalmo de Paiva Coelho Junior in 2018. The article analyzes the implementation of unified BPM in operational activities in a federal public advocacy body with evaluating corporate governance practices of the process. The study used mix method approach to gather data and to analyze them. Findings revealed the requirement of corporate governance practices, prioritizing BMP and auditing process.

Keywords: *business process management, bpm cycle, governance, operational excellence, public sector.*

GJCST-G Classification: *J.1*

Strictly as per the compliance and regulations of:

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I. Introduction

Business Process management (BPM) is a compound of data restructuring and overseeing which applies to achieve or produce something better than its earlier production in business process to upgrade business operations and execution with the help of information technology [1]. Business process management is development of workflow management, which lead to automate business process. Business Process Management (BPM) has got impressive consideration. Moreover, because of its potential for fundamentally operational efficiency and cost saving are expanded. In addition, an ample of Business Process Management (BPM) systems, such as conventional programing systems. These systems are driven by express procedure plans used to authorize and supervise operational business process [1]. Business Process Management (BPM) has a more extensive degree in business operation. The aims of Business Process Management (BPM) is improving operational business forms without using new technology. For an example, displaying and breaking down of a business procedure may be the best way to decrease costs while improving operational services. Business Process Management (BPM) regularly connect with the programs to supervise, control and support operational procedures. This is the main point of Work Flow Management (WFM). In any case, customary Work Flow Management (WFM) innovation focused on the mechanization of business forms fairly.

Business Process Management (BPM) examine a plenty of strategies, systems, and devices. Operational business forms are helped to structure, empower, manage and examine of above strategies, systems and devices. This article tries to discuss the outcomes and outlines of the survey, which was conducted by Abimael Rondon Do Nascimento, Roquemar de Lima Baldam, Lourenço Costa and Thalmo de Paiva Coelho Junior 2020 in “Applications of business governance and the Unified BPM Cycle in public credit recovery activities".

Furthermore, to improve the performance of public sector and adoption of innovative practices are the most important points of this article. Simply adopting innovative practices means transferring principles, techniques, which are adopt in private sector to the public sector. It increased the demand for better public services and it provides less expensive services to the public. When considering about the government systems impairment in the operations, this approach provides solutions such as effectiveness, efficiency and logical structures for the people to behave in rational ways to government systems impaired operations [2].

As the theoretical reference, authors used governance and operational activities. Simply, the system, metrics and roles and responsibilities can use to measure the improving of implementation. Furthermore, it can be identified as method that used to govern processes of the organization. The main responsibility of governance is to establish management practices. Similarly, it helps to increase probability of success. Furthermore, to maintain alignment of organizational objectives, execution of those objectives, manage them and through that improvement of the day-to- day activities [2].

To conduct the research authors chose the Federal Attorney in the State of Espirito Santo. They determined liquidity and credit certainty of public authorities as well as foundations [2].

II. Literature and Theoritical Review

Significantly, less has been written about the public sector broad writing in business process management, and what has been composed has been general. Subsequently, there is a disarray among public authorities on how business process the board ideas

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ought to be executed [3]. Public organizations should change their operational structures fundamentally just as their undertaking frameworks to actualize business process the board ideas effectively [3]. Public sector supervision and administration in these days tries to build the adequacy of the inward regulatory procedures offer higher level in administration towards residents or citizens. Business Process Management comprises of distinguishing and upgrading business forms. Furthermore, to increase business forms powerfully, effectively and progressively equipped for adjusting an ever-changing public sector associations. In public sector, specialists have colossal assistance covers on the grounds that the capacity to share information about business forms is restricted bringing about a plenty of waste, costs, when performing activities [4].

a) BPM in public sector

BPM is a methodology that devoted process driven organizations. It is focused on analyzing, improving and controlling procedures. Similarly, coordinating individuals, procedures and innovations are targeted. In that BPM is regularly applied and confirmed in the private sector. Though, it uses in private sector, it is not applied in public sector commonly. Public organizations need to upgrade adequacy and raise consumer loyalty. So most of the organizations implement strategies and methods which utilized the administration of profit oriented organizations. Effective process management decreases cost. Furthermore, residence is given high quality of services. Similarly, the productive utilization of assets is increased. Assets are included data and communication systems supporting government activities. [2].

Since mid-90, the public sector has been confronted difficulties and desires. Expanding customer requirements, IT improvements, competition among economies are required effective operation in public sector with innovations in a cost effective way [5]. This reality may also affirm the solid enthusiasm for the system of BPM execution. Moreover, enormous number of papers discussed about this exploration issue, and recommends the need in building up a BPM system for the public sector organizations [6]. The study focused local government capabilities of business process management and the findings revealed that this method is under developing stage in public sector. Similarly, at the medium stage there are governance, information technology, strategic alignment, culture and people [6]. Dysfunction should be the investigation of public setting. Furthermore, it is important to consider multifaceted nature and the size of the public sector exercises that make it hard to gather and procedure data about administrations, execution and make it trying to investigate public segment's wellsprings of information and improve the inner procedures [7]. Majority of literatures suggests that majority of public sector associations are at initial level of business process management life cycle. In this level, organizations are considered process design, which consist with modules used to gain knowledge of operational process and capabilities [7]. When moving to innovative practices adoption size of the public sector and complexity of activities are important areas to be concerned. Similarly, those factors are difficult to collect, and process. Furthermore, knowledge source of public sector is difficult to identify and it makes internal process improvement difficult [2].

Organizational efficiency and effectiveness related problems increased because of the uncontrolled processes they used. The reason is those activities are repetitive and identified as operational activities. Moreover, to meet financial, political and social challengers' public organizations should think differently, and adapt and change their processes. Through implementing BPM methods organizations are focusing on improvement of their day-to-day performance. BPM promotes knowledge, management, process improvement and process alignment with objectives of the organization. Therefore, BPM is the possible answer to the above challengers [2].

Similarly, in the perspective of public administration, implementing BPM methods will have greater possibility to increase effectiveness and efficiency. So public sector pays their attention on implementing BPM processes in the organizations. When implementing PBM methods organizations have to consider about several factors such as complexity of operational activities and diversity of not only public organizations but also private organizations. Those factors should consider about both internally and externally [2].

The particular study focused business governance and business process management in public sector, many of literatures argued that there is a contextual gap in the field of the study, which is business process and governance principles in public sector [8]. Contends that most issues with hierarchical productivity and viability have fundamental uncontrolled procedures, and specific gathering of exercises that are tedious and allude as operational exercises. Public sector should re-examine, adjust and change procedures to overcome new and developing financial, social and political threats and challenges [8].

To achieve their objective, they performed a theoretical survey of BPM. Unified BPM Cycle model chosen and implemented. Through the findings and the analysis of results, authors identified construction structure to corporate governance with the implementation and maintenance activities. Authors prioritized main processes, analyzing and modelling of processes, how those processes implement in an

effective method, how to optimize processes and finally how to monitor and audit those processes [2].

b) Governnce and operations

Before implementing a BPM, it is important to get better understanding about organization. It includes both external and internal environment, main processes within organization, impairments in the operations of a system and its most relevant characteristics. Then, corporate governance should be established as initial measures for the successful planning of Business Process Management actions [2].

Furthermore, the experience level of the team, state the project implementation management process, organize and provide both implementation and maintenance actions to Business Process Management. In the perspective of scare resources, prioritize the processes, modelling the processes and create plans for optimization of processes, specify their sources for its success [2].

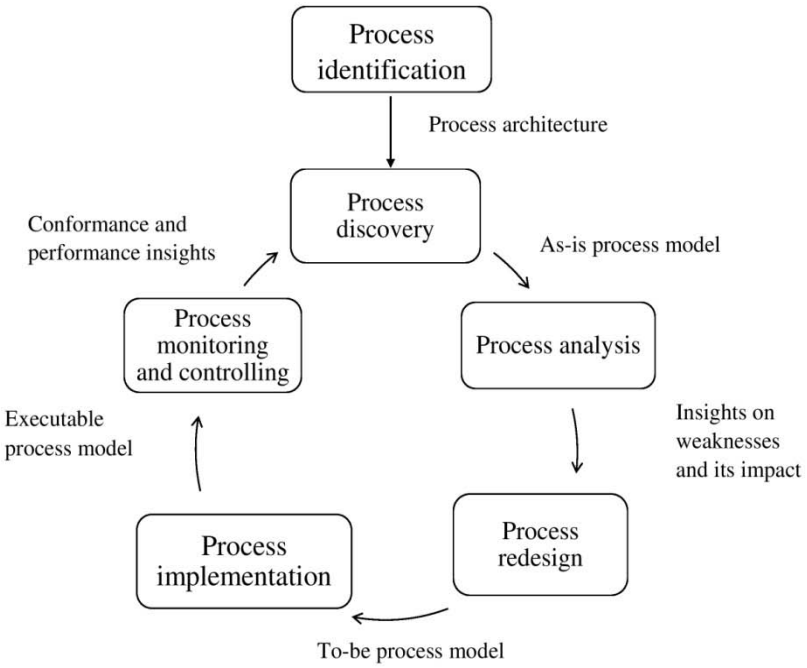
Moreover, get appropriate comprehension of the setting in which the organized procedures are embedded, recognizable proof of potential holes in comprehension and execution, information on the present condition of these procedures, distinguishing proof of opportunities for development and use of the outlining strategy picked to formalize. At last, implemented processes, monitor the execution, checked and confirmed the previously planned audit procedure with the current procedure is must [2].

The paper discussed governance practices in public operation. Setup governance practices are key successful factor in business process management [9]. The term governance describes solutions for agency problems and it origins with separation of ownership of the business and control. The paper analyses the application of governance concept with business process management in order to gain maximum benefits of operation with transparency [9]. Best practices in business context is important for achievement of business forms. The term business process administration alludes to the course, coordination, and control of people, gatherings, or associations that are at any rate self-governing: that is, not legitimately dependent upon the equivalent various levelled authority [10].

c) From work flow to unified BPM

The mid 1980s saw development in work process items for human-confronting forms, for example, the endorsement stream for a huge buy request. Incorporation between big business applications and these work process forms must be exceptionally constructed, so they were normally costly and unyielding. Moreover, after it has all said and done, these work process items had an exceptionally huge effect. In his book, The World is Flat; Thomas Friedman distinguished work process as the number three driver for the new level world by empowering an "unrefined establishment of a totally different worldwide stage for coordinated effort." During a similar period, venture application joining (EAI) items developed to improve framework to-framework interchanges so the information in one framework could consequently show up in another without the requirement for a human to re-type it. In spite of the fact that there was some cross-fertilization of highlights and capacities between the two, the two arrangements of items kept on developing freely. Indeed, even as of late as 2007, driving industry investigators were dividing the business procedure the executives advertise into human-driven, framework driven, and report driven. Unadulterated play BPM sellers—the individuals who had developed from the work process legacy—tended to the human-driven space, middleware and combination merchants tended to the framework driven market, and substance the board merchants tended to the record driven market [11].

This fragmentation was problematic for clients who found that as procedure activities develop they seldom fit inside the limits of one of the storehouses. Along these lines, largely, the underlying choice was an inhibitor in a more extensive rollout of the venture. Likewise, this implied most clients had three or four items with partners vested in each, acquiring superfluous individuals and political contemplations into dynamic. The outcome was that BPM was fundamentally constrained to departmental organizations. A BEA highlights development overview finished by about 1,200 business and IT experts all through 2007 indicated that only 18 percent of organizations were right now conveying venture wide BPM. Luckily, for clients, this circumstance quickly changed. In 2008, Oracle obtained BEA, and later IBM procured Lombardi. There was other solidification right now.



Source: (M. Dumas, M. La Rosa, J. Mendling, and H. Reijers, Fundamentals of Business Process Management, Heidelberg: Springer, 2016)

Fig. 1: Traditional BPM cycle

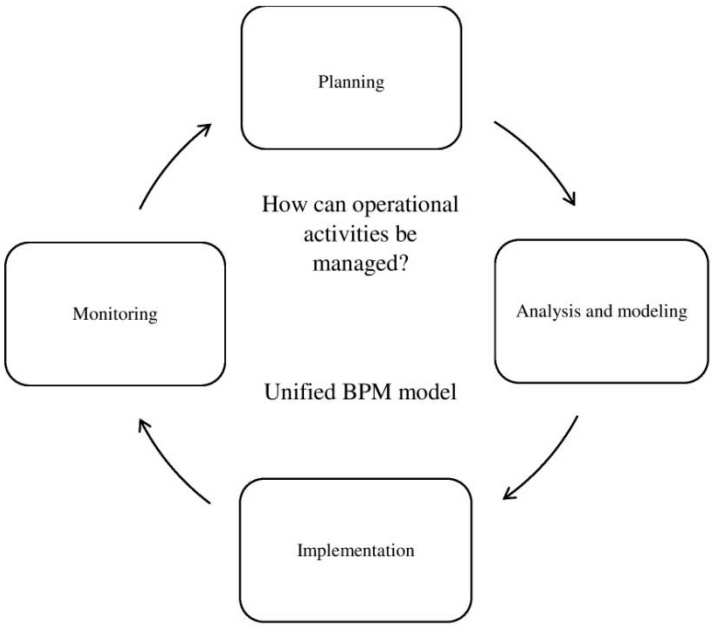
This combination moved the conversation of BPM's business request overlaid on a powerful venture grade SOA stage from the domain of a hypothetical design to genuine item contributions. This offered clients three essential advantages:

- The capacity to coordinate their procedures with any application or framework it expected to incorporate with, utilizing benchmarks based powerful and make sure about joining innovations
- The confirmation that the procedure would scale to any exhibition and volume necessities and that the innovation could be utilized for strategic procedures
- Enterprise-grade the board, organization, and checking apparatuses

Preceding this unification, BPM and business rules motor were distinctive item classes. BPM has an inalienable requirement for business rules and most unadulterated play BPM sellers tended to this with scripting, for the most part putting a business-accommodating facade on top. Another advantage of this unification was the meeting up of BPM and business rules—with the main merchants giving combination at run time and a totally bound together experience traversing demonstrating, execution, and the board [11].

When consider about unified BPM model main focuse of Business Process Management is improving organizational performances through managing business processes. It indicates continuous improvement of processes in the organization and adding value to them. Through that organizations can make their processes efficient. Similarly, knowledge is sharing among the people in the organization. From the operations perspective BPM trying to identify the process, analyzing, designing, execution, monitoring and improvement of business process with the colllaboration of every resource in the organization. Simply every resource means people, applications and information sources. Furthermore, it consider about organizational implementation, performance control in the organization and leadership without limited their focus in analysis and modelling of the operations [11].

Unified BPM model provides numerous benefits to the organizations. It improves productivity and the service quality of the organization. It controls the cost of the organization. It improves both process and the compliance of the organization. It provides clear definition about roles and responsibilities of the employees within the organization and it will help to improve the employees' contribution to the organization. Furthermore, it will provide greater visibility of personal results of the employees. Organizations must understand how they are going to approach their methodology and how they are going to create a model, which is capable of guiding the organization actions to promote better understanding about Business Process Management. The results of this study provides a referenced Unified BPM Cycle model and it depicts the BPM lifecycle optimization. It consists with main four stages such as planning the process, analysis, modeling and optimization the process, implementation the process and monitoring the process [11].



Source: (Abimael Rondon Do Nascimento, Roquemar de Lima Baldam, Lourenço Costa and Thalmo de Paiva Coelho Junior, "Applications of business governance and the Unified BPM Cycle in public credit recovery activities," Business Process Management Journal, pp. 312-330, 2020)

Fig. 2: Unified BPM cycle

Business Process Management is not an isolated discipline. It uses different techniques, tools and technologies when necessary. As an example lean thinking, BPR, procedure standardization, project and quality management and simulation of processes can be identified. Furthermore, multi-method approach needs to use for the application, which has several techniques and tools. It combines two distinct methods, including qualitative and quantitative methods. This study carried round activities and because of that action research, can be taken as most appropriate method as mentioned by the authors. That method has relation to solve collective problems because of that authors and research participants got the ability to engage in cooperative way. What's more, it encourage more adaptable origination and utilization of methods for examination and gave, through the activation that happened in the gathering forms, the catch of data in a more profound and increasingly sensible level [12].

The study conducted through "multi-method" approach, which is a combination of many of research tools. Multi method is mix method, which is consists of qualitative and quantitative data, methodologies, methods, and paradigms in a research study or set of related studies. The research method overcome various disadvantages in varicose research approaches [13]. The most proper research technique to help this methodology was activity inquire about, on account of its connection to tackling aggregate issues in which analysts and participants take part in an agreeable manner. Likewise, it encouraged the more adaptable origination and utilization of the methods for examination and gave, through the assembly that happened in the gathering forms, analysis information in deeper and realistic way.

At the initial step, the study focused on understanding organizational context, which consists with external and internal environments, stakeholders' expectations, internal controls mechanisms, process, critical characteristics and establishment of corporate governance principle to review and measure business process management activities and plans. The research method is clearly elaborated in Figure (Fig.3).

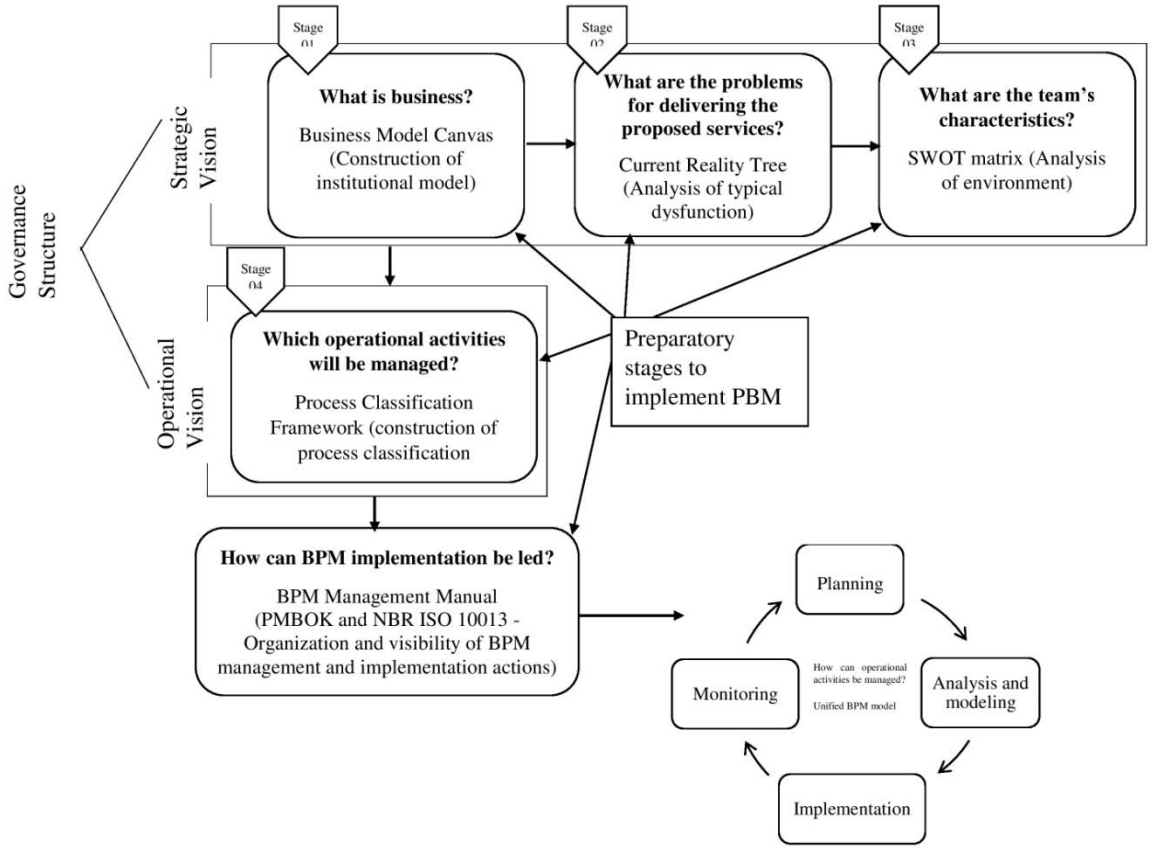


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Fig. 3: Structure of corporate governance

Next, the study focused to investigate the level of engagement of teams in management and implementation of projects, organization of business process, optimizing process and allocating resources based on scarcity and prioritization of the work. Later the study aimed to identify performances gaps, current level of knowledge in process, identification of possibilities for improvement. Application of the diagramming method is chosen to formalize them.

Further study was based on Federal Attorney in the State of Espírito Santo. It represents the Federal Union judicially and extra judicially. The study concentrated on the normally authoritative operational exercises of credit collection and recovery. Moreover, an enormous portion of exercises performed by the body which is legitimate in nature and not repetitive.

III. Research Findings

Authors collected data through preliminary consultations. They are expert in present practices of laws, ordinances, instructions and dispatches of administrative-managerial content relating to BPM. After comprehensive understanding of credit recovery business, the study has been come up with results of identification with 22 typical types of dysfunctions, which are lead to generate inefficacies (Refer Annexure 01). Further, the study revealed that there were eight positive internal strengths, two external opportunities or positive factors, seven internal weaknesses and eight external threats according to SWOT analysis, which was conducted by the author.

The analysis of BPM maturity was revealed that the particular public organization is at initial step of process management initiatives. Based on six factor survey which includes IT, Methods, Governance, People, Culture and Strategic alignment, BPM consumes considerable resources and the organization is at the initial stage of BPM maturity in surveyed six factors. Prioritization of BPM is at higher level in the particular public sector organization. Organizations face greater challenge of prioritizing business process because of limited resources and political decisions [14].

The study revealed that the requirement of documentation of the process and improvements are lead to curse grate visibility. The process, which implemented to be defined and the detailing is required. The reports were made accessible in a spot normal to the group in a corporate system condition. The modifications were overseen utilizing spreadsheets

created for this reason, in this way guaranteeing command over the progressions made.

The observations and results acquired with the review of the procedures executed, when contrasted and the numbers got through the observing and dysfunction uncovered with the corporate governance structure. Affirmed need to execute in this stage of BPM usage, particularly when checking is centered on ex-post examination. In addition to above findings, the study revealed that the transaction cost of activities engages in business process management is at higher level and the study revealed new parameter allocating resources with credit recovery activities or even reveal undetected inefficiencies in the monitoring phase.

IV. Conclusion

A commitment of this article, both focused in hypothetical and functional areas, are introduced an administration structure which represent exercises and procedures appropriate for public organization, that coordinates different activities required, by the distinguishing proof of association's finished extent with conveyance, by conveyance dysfunctions, exercise structures and how they ought to be overseen. This article does not cover a total and appropriate structure of public sector organization and the study is to fill the contextual and theoretical gap of the field of study.

Governance structure of public sector organization is lead to ensure transparency, accountability of process implemented. It likewise allowed elaboration of a durable structure for the characterization and the board of the organized procedures and other authoritative procedures, therefore fortifying the benefits of gathering procedures to catch data with profundity and authenticity. The simple method to be used to prioritize business process through set of credit recovery process instead of process-by-process comparison. Business and industry factors are evaluated processes in terms of efficiency, effectiveness and relevance by the stakeholders. This evaluation, is related to prioritization of business process. It serves as a foundation for the management decision-making process and improvement and redesign [15]. The away from of the jobs and duties of the parties who are associated with the prioritizing business process, accomplished from the recognizable proof of the present situation and its streamlining to ideal situation, and plan of charts, process manuals, operational guidelines and as well as reciprocal archives gave regular comprehension among the group with respect to the execution of these exercises, along these lines diminishing the varieties and vulnerabilities in their execution.

Based on the study findings and discussion, the study provides insights to develop and improve business process in public sector. There may not be seen numerous studies in public sector organizations with regarding to business process management and the paper provides border view of implementing business process in public sector embedded with corporate governance practices which ensure process efficiency to meet increasing requirements of general public. Six factor surveyed which is consists with IT, Governance, Culture, People, methods, strategic alignments are not at maturity levels and process manager can focus such factors carefully before implementing or improving existing business process. Based on the findings capacity and implementation of particular factors are at initial stages with compared to privet sector organizations. At last, the paper provides fruitful insights in public sector to apply business process management with corporate governance practices.

Finally, according to the above findings; study of the development and the application of execution indicators are suggested as future research [2].

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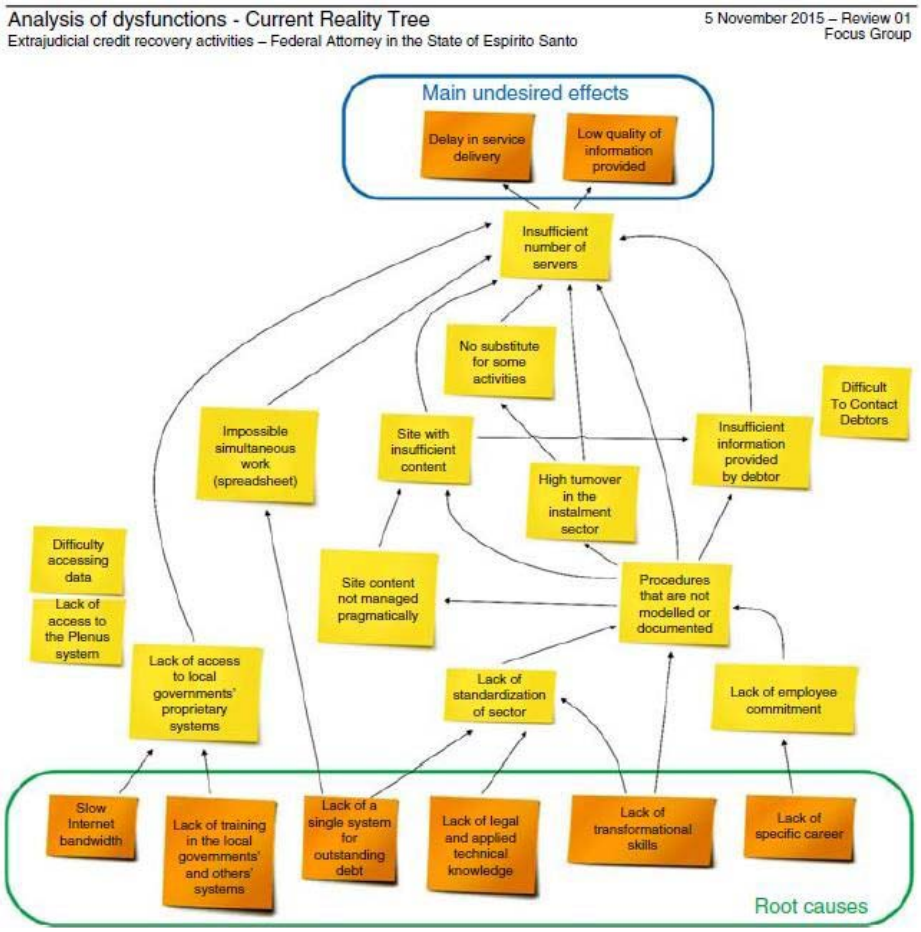
Anexture 01



Source: (Abimael Rondon Do Nascimento, Roquemar de Lima Baldam, Lourenço Costa and Thalmo de Paiva Coelho Junior, "Applications of business governance and the Unified BPM Cycle in public credit recovery activities," Business Process Management Journal, pp. 312-330, 2020)

Fig. 4: Analysis of dysfunction- Current Reality Tree

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Factors Influencing Adoption of Cryptocurrency-based Transaction from an Islamic Perspective

By Al-hussaini Abulfathi Ibrahim Saleh, Adamu Abubakar Ibrahim, Mohamad Fauzan Noordin & H Mohd Mohadis

International Islamic University

Abstract- This paper presents a user study of "perception of the cryptocurrency-based transaction from the Islamic views". The motivation lies with the fact that some users of cryptocurrency-based transaction raised concern on the nature of transactions with Bitcoin. Specifically, some argued that Bitcoin can be easily used for illegal purposes. Therefore, "Technological Acceptance Model" was adopted and quantitative research methodology was utilized, to formulate and test some hypothesis that will lead to an establishment of a model. Sample of 306 participants was used in the study. The result of the hypothesis testing indicates that "Behavioral Intention to Use Cryptocurrency from the Islamic perspective" is influenced directly by Shari'ah Compliance, Perceived Ease of Use, Emotionality, Perceived Usefulness, and Financial Concern. As evident from the analysis, Emotionality is influenced directly by Financial concern and Shari'ah Compliance. Whereas, Behavioral Intention is influenced indirectly by Financial Concern. The sample is general and does not specify a specific group of study. This study has contributed to understanding the Islamic issues behind the implementation of Cryptocurrency. This study adopted.

Keywords: *blockchain, cryptocurrency, bitcoin, behavioral intention, sharia compliance.*

GJCST-G Classification: *H.2.4*

Strictly as per the compliance and regulations of:

Factors Influencing Adoption of Cryptocurrency-based Transaction from an Islamic Perspective

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I. Introduction

Shari'ah represent the pathways Muslims perceived any affairs of "human being" and/or human-to-human as well as human-to-environment should be performed. In many cases, human being activities are naturally Shari'ah-based for examples speaking only the truth and preventing yourself from a threat. Conventionally, performing these activities is described are the basis for common sense. Therefore, Shari'ah can simply represent the act of applying common sense. It is only when certain things are preformed out of the Sharia'ah pathways that the issue of Shari'ah compliance was raised, even though some of the events might be part of some common sense, but critical analysis brings about the implementation of Sharia'ah consequences. Cryptocurrency has emerged as a way of making a transaction with money easier and faster. This aid in preventing the complications faced during the other forms of transactions with money. Consequently, makes life better and improve the standard of human-to-human transactions with money. For the fact that Shari'ah represents a blueprint on Muslims affairs, this new way of a transaction with money (cryptocurrency) even though it's easier, is currently facing Shari'ah setbacks. Sharia compliance in a transaction with cryptocurrency-based requires the application of principles of the Islamic law of contract. This is one of the most important factors, cryptocurrency could rely on.

Currently, there are many research studies on investigative the permissibility, in a transaction with a cryptocurrency-based system (Habib and Adekunle, 2019). Nakamoto (2008) makes it clear that cryptocurrency is intended for peer-to-peer monetary transactions, eradicating a central authority. Practically, the transactions involved raises a lot of doubt. In some cases, it is described as a system with no value, it is not an asset or commodity and it's not like other currencies such as fiat money. Moreover, uncertainty issues arise where volatility and obscurity in the transaction with the cryptocurrencies become obvious. Another issue is if the Islamic Rules of Jurisprudence and Fundamentalism criteria are followed or not.

This current research followed a pattern of the previous approach on the implementation of the cryptocurrency-based transaction and the speculation as either its right or wrong from an Islamic perspective. The research particularly aims at addressing the situations surrounding the legitimization of cryptocurrency-based systems from an Islamic perspective. It's a hypothesis-testing based research, where a model is proposed. The model was developed from a conceptualization of the: "Sharia'ah Compliance", "Financial Concern", "Emotionality", "Perceived Ease of Use", and "Perceived Usefulness" impact toward "Behavioural Intention" of the use of cryptocurrency systems from an Islamic perspective. The research is a user study, where the Shariah point of view on the cryptocurrency-based transaction and the uncertainty issues related to the area are studied. The main contributions dwell on recognizing the permissibility effects for resolving the uncertain issues.

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II. Related Work

When addressing the Islamic perspective, it means examining to what extent something contributes to the attainment of maqasid al shariah. If a practice does not help realize the fundamental objectives of Islamic law, it is found to be un-Islamic and if practice helps realize the fundamental objectives, it is found to be Islamic. Shari'ah-compliance entails that a financial product or activity complies with the requirements of the Shari'ah. Islamic finance derives its principles from the Shari'ah, which is based on the Qur'an and the Sunnah. The key defining characteristics in the application of Shari'ah to financing structures are that transactions should be based on tangible assets and should not involve interest (riba). Shari'ah principles also prohibit uncertainty (gharar), speculation or excessive uncertainty (maysir) and gambling (qimar).

Sifat and Mohamad (2018) explain that the objectives of the Shari'ah are fixed and unchangeable and applicable in all times and places even though the discipline of Islamic economics and finance has grown in politico-economic importance over the past three decades. According to Todorof (2018), the introduction of FinTech in Islamic banking can increase its general competitiveness and inclusiveness by incorporating a greater number of products and services, lowering their existing price and closing the credit gap that exists in many Muslim countries. Nurhisam (2017) argues that when viewed from the perspective of Islamic law, the issuance of money as a means of transaction in a country constitutes a matter protected by Islamic law. Evans (2015) observes that cryptocurrency might be a more appropriate medium of exchange in Islamic banking and finance than the interest-backed central bank fiat currency, especially in cross-border trade. Zubaidi and Abdullah (2017) caution that the area of digital currencies and blockchain requires further research from a Shari'ah perspective to facilitate a better understanding on the topic, yet acknowledge the possibility of introducing a Shari'ah-compliant digital currency once all the issues on validity have been addressed and resolved. Similarly, Muedini (2018) argues that cryptocurrencies are highly compatible with Islamic finance and can provide solutions to problems of government-controlled currencies. Unlike traditional fiat, the supply of digital currencies is fixed, thereby eliminating the issue of uncertainty and also inflation. In opposition, Kameel and Meera (2018) examine the implications of Bitcoin in Islamic finance and question its acceptance as a medium of exchange based on its compliance with Shari'ah and find that cryptocurrency contains a certain prohibited element of gambling and uncertainty. Oziev and Yandiev (2018) assume a middle position by defining the status of cryptocurrency in the financial system by determining the extent of its influence and comparing the characteristics of paper money and cryptocurrencies before concluding that using cryptocurrency is permissible, albeit with strict reservations.

III. Research Methodology

This study adopts a quantitative research methodology to yield a valid quantitative result that will be generalized. Several experts in the area of quantitative research were consulted to review the 103 proposed items. Their review and recommendations were very useful in developing the final items. The objective of this research is to investigate cryptocurrency user acceptance based on the three theories of the technology acceptance model, the theory of reasoned action, and deindividuation to identify the factors that indirectly influence cryptocurrency behaviour. The results of the collected data analysis by the analysis techniques are presented. Firstly, the descriptive statistics are presented including the respondents' cryptocurrency awareness background. Secondly, the findings of the exploratory factor analysis are reported. Thirdly, the results of the assessment of the measurement model, the structural model, and the hypotheses testing using partial least square structural equation modelling are analyzed and explained in detail.

IV. Measurement Model Estimates

The measurement model consists of the indicators and the paths that connect them to their latent variables which they intend to measure as shown in Figure 5.5: The assessment of the measurement model specifies the relationship between the indicators and their latent variables (Henseler, Ringle, and Sinkovics, 2009). The purpose of assessing the measurement model is to evaluate its validity and reliability and thus evaluate the inner path model estimatesÉ (Henseler et al., 2009).

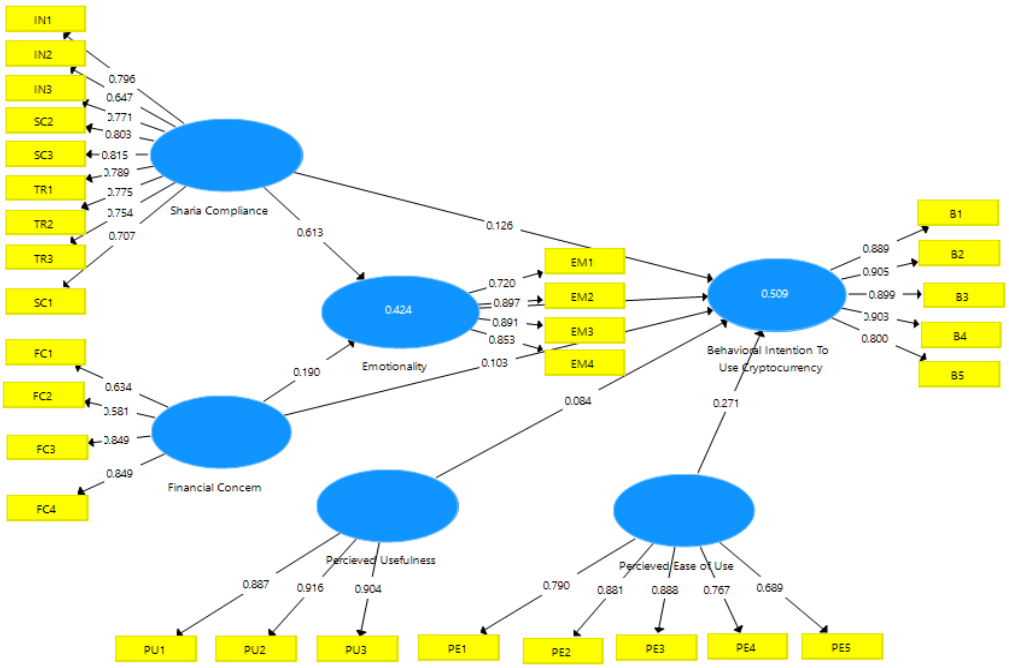

Fig. 1: Research measurement model

a) Internal consistency reliability

The internal consistency reliability of the measurement model is evaluated using Cronbach's alpha and composite reliability (CR). For the measurement model to have satisfactory internal consistency reliability, the Cronbach's alpha and composite reliability of each construct should exceed the recommended value of 0.70 (Hair et al., 2010; Hair et al., 2017).

Table 1: Composite reliability and Cronbach's alpha

Construct	CR[c]	Cronbach's alpha
Shari'ah Compliance	0.926	0.910
Financial Concern	0.824	0.756
Emotionality	0.907	0.862
Perceived Ease of Use	0.902	0.863
Perceived Usefulness	0.93	0.887
Behavioral Intention	0.945	0.927

As shown in the table, the CR values ranged from 0.824 to 0.945, while Cronbach's alpha values ranged from 0.838 to 0.927. All values were above the recommended threshold value of 0.70 Also, comparing the CR values with the Cronbach's alpha values indicates that the CR was indeed a stronger measuring criterion for assessing the internal consistency reliability. Based on the results of Cronbach's alpha and CR, the indicators used to measure the constructs in this research had satisfactory internal consistency reliability.

b) Convergent validity

Convergent reliability is assessed using the average variance extracted (AVE) comparable to the proportion of variance explained in factor analysis (values between 0 and 1). AVE > 0.5 (Fornell and Larcker, 1981).

Table 2: Average variance extracted

Construct	AVE[b]
Sharia Compliance	0.583
Financial Concern	0.545
Emotionality	0.711
Perceived Ease Of Use	0.65
Perceived Usefulness	0.815
Behavioral Intention	0.775

The analysis shows that the AVE for the constructs ranged from 0.583 to 0.815, exceeding the recommended threshold value of 0.5. These results demonstrate that the measurement model has adequate convergent validity and indicates that the measures used were robust.

c) Discriminant validity

Discriminant validity is the extent to which a given construct does not correlate with other constructs that are different from it (Joe F Hair, Sarstedt, Ringle, and Mena, 2012).

d) Discriminant validity at the construct level

For examining the discriminant validity at the construct level, (Fornell and Larcker, 1981) criterion is used. The discriminant validity is established when the square root of the construct AVE exceeds the correlations between the construct and all other constructs (Ahmad, 2012; Ismail, Hamid, and Idris,

2012) The AVE value for each construct is calculated using PLS algorithm test, while the square root of the AVE value is calculated manually. Table 3 displays the constructs discriminant validity. The bolded diagonal values in the Table are the square roots of the AVE, while the non- bolded off-diagonal values are the intercorrelation values between the constructs.

Table 3: Inter-correlation matrix

	BI	EM	FC	PEOU	PU	SC
Behavioral Intention	0.88					
Emotionality	0.633	**0.843**				
Financial Concern	0.227	0.222	**0.738**			
Perceived Ease of Use	0.624	0.614	0.147	**0.806**		
Perceived Usefulness	0.58	0.668	0.106	0.709	**0.903**	
Sharia Compliance	0.571	0.623	0.052	0.698	0.686	**0.763**

***The diagonals are the square roots of the AVE of the latent variables and indicate the highest in any column row

e) Discriminant validity at the indicator level

Another method to evaluate the discriminant validity of the measurement model is at the indicator level. The discriminant validity is examined by the loading of each indicator relating to all construct correlations (Henseler et al., 2009). The results in the table showed that all indicators loaded higher on their constructs compared to the other constructs. This confirmed that the discriminant validity at the indicator level was established. Therefore, the results of the cross-loadings demonstrated that the second assessment of the measurement model discriminant validity was satisfactory. Accordingly, the measurement model established its discriminant validity.

Table 4: Indicator item cross-loading

	BI	EM	FC	PE	PU	SC
B1	**0.889**	0.565	0.224	0.523	0.474	0.504
B2	**0.905**	0.516	0.221	0.524	0.487	0.487
B3	**0.899**	0.542	0.210	0.500	0.473	0.434
B4	**0.903**	0.562	0.221	0.519	0.497	0.465
B5	**0.800**	0.586	0.129	0.653	0.6	0.598
EM1	0.573	**0.720**	0.025	0.66	0.695	0.688
EM2	0.518	**0.897**	0.226	0.48	0.536	0.492
EM3	0.488	**0.891**	0.258	0.432	0.493	0.442
EM4	0.524	**0.853**	0.267	0.444	0.473	0.417
FC1	0.045	0.042	**0.634**	0.063	0.02	0.07
FC2	0.014	0.155	**0.581**	0.091	0.063	0.028
FC3	0.207	0.176	**0.849**	0.126	0.047	0.011
FC4	0.243	0.207	**0.849**	0.127	0.143	0.093
PE1	0.445	0.425	0.121	**0.790**	0.53	0.494
PE2	0.513	0.496	0.111	**0.881**	0.577	0.596
PE3	0.571	0.501	0.054	**0.888**	0.586	0.63
PE4	0.556	0.604	0.17	**0.767**	0.632	0.618
PE5	0.399	0.427	0.149	**0.689**	0.523	0.44
PU1	0.484	0.577	0.141	0.639	**0.887**	0.59
PU3	0.534	0.616	0.054	0.634	**0.904**	0.655
PU2	0.550	0.615	0.096	0.649	**0.916**	0.612
SC1	0.391	0.441	0.000	0.447	0.511	**0.707**
SC2	0.400	0.474	0.056	0.487	0.528	**0.803**
SC3	0.410	0.482	0.065	0.504	0.531	**0.815**
TR1	0.462	0.491	0.006	0.544	0.524	**0.789**
TR2	0.513	0.521	0.011	0.531	0.526	**0.775**
TR3	0.379	0.506	0.104	0.523	0.538	**0.754**
IN1	0.511	0.491	0.059	0.615	0.51	**0.796**
IN2	0.366	0.321	0.075	0.502	0.429	**0.647**
IN3	0.461	0.515	0.004	0.627	0.603	**0.771**

In the conclusion of the measurement model, All the above results of the measurement model assessment substantiated that all the construct measures are reliable and valid. Consequently, based on these results, the measurement model was satisfactory for the next stage of analysis and evaluation, i.e. assessment of the structural model.

V. Structural Model Estimates

The structural model consists of the constructs, also known as latent variables, and the paths that connect them. Assessment of the structural model specifies the relationship between the latent variables (Henseler et al., 2009). The purpose of the structural model assessment is to evaluate its validity (Skaik and Othman, 2015) and path estimates (Henseler et al., 2009). and thus tests the proposed hypotheses (Ahmad, 2012) The assessment process is conducted using the following analyses: coefficient of determination, path coefficients, effect size, and predictive relevance.

After assessing the measurement model, the analysis proceeded to determine the explanatory power of the model and to test the research hypothesis. This involved the performance assessment of the structural model. The structural model consisted of the constructs, also known as latent variables, and the paths that connect them as shown in Figure 2. Assessment of the structural model specifies the relationship between the latent variables (Henseler et al., 2009). The purpose of the structural model assessment is to evaluate its validity (Ahmad, 2012) and path estimates (Henseler et al., 2009). and thus test the proposed hypotheses (Ismail et al., 2012). The assessment process is conducted using the following analyses: coefficient of determination, path coefficients, effect size, and predictive relevance.

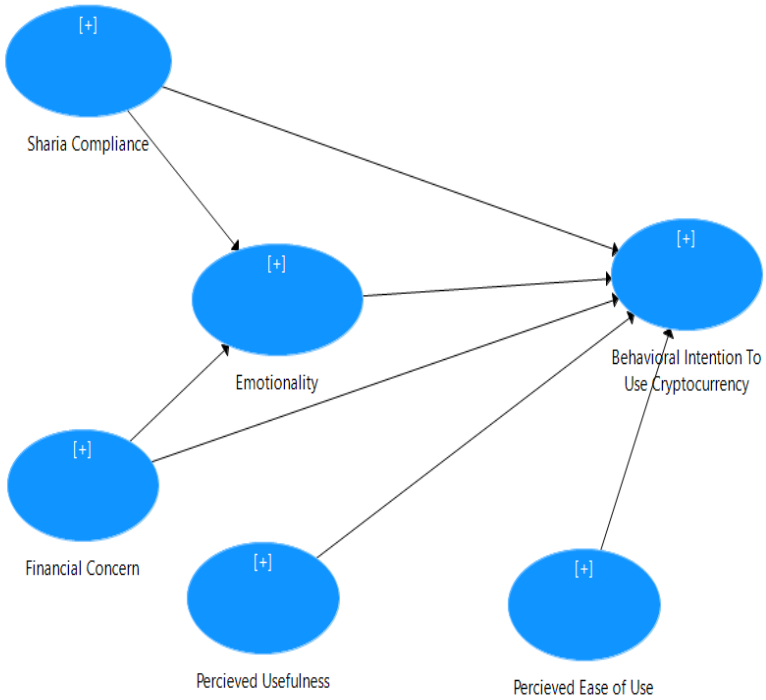

Fig. 2: Research structural model

a) Coefficient of determination

The coeficient of determination refers to the amount of variance in the dependent variables that are explained or predicted by the independent variable (Ahmad, 2012). Thus, it evaluates the regression function's goodness of fit against the empirically obtained manifest variables (Götz et al., 2010). The larger the coefficient of determination (R2) value is, the larger the percentage of variance explained (Götz et al., 2010) with R2 value usually varying between 0 and 1 (Hair et al., 2010). Using PLS algorithm test, the R2 values of the dependent variables are displayed in Table 5.

Table 5: R square values

Construct	R^2	Power
Behavioral Intention to Use Cryptocurrency	0.509	Large
Emotionality	0.424	Large

Based on the results above, Behavioral Intention to Use Cryptocurrency is 50.9% predicted by Emotionality. Meanwhile, Emotionality itself is 42.4% predicted by Shari'ah Compliance and Financial Concern. Finally, the results show that the R2 values for both Behavioral Intention to Use Cryptocurrency and Emotionality are large.

b) Path coefficients

Each path connecting two latent variables in the structural model represents a hypothesized relationship. Estimating the path coefficient explains the strength of the relationship between the latent variables and supports or refutes the hypothesis (Ahmad, 2012).

The recommended values for estimating the magnitude of the path coefficients are 0.02, 0.15, and 0.35 indicating small, medium, and large relationships respectively (Cohen, 1988). In PLS-SEM, the PLS algorithm test is conducted to evaluate the path coefficient sign and magnitude.

According to Hair Jr et al., (2017) , the significant t-statistic values for a two-tailed test are 1.65 (p-value 0.1), 1.96 (p-value 0.05), and 2.59 (p-value 0.01). Accordingly, the bootstrapping test using 5,000 resamples was performed. Table 5.6 shows the path coefficients and t-statistics.

Table 6: Path coefficients and t-statistics

Independent Variable	Dependent Variable	Path Coefficient	T-value	Path magnitude
Emotionality	Behavioral Intention	0.307	4.677	Large
Financial Concern	Behavioral Intention	0.11	1.812	Medium
Financial Concern	Emotionality	0.19	3.152	Medium
Perceived Ease of Use	Behavioral Intention	0.274	3.643	Medium
Perceived Usefulness	Behavioral Intention	0.081	1.081	Small
Shari'ah Compliance	Behavioral Intention	0.126	2.022	Medium
Shari'ah Compliance	Emotionality	0.612	16.329	Large

All path coefficient estimates ranged from 0.081 to 0.612 establishing small, medium and large relationships between the hypothesized constructs. Moreover, the t-statistics values ranged from 1.081 to 16.329 demonstrating significant levels. According to Kock (2015), a path coefficient value below the recommended minimum value indicates it is too weak to be considered relevant from a practical point of view, which may occur with large sample sizes.

Based on the above tests involved in assessing the structural model of the research, the results demonstrated that the structural model was adequate and valid. Therefore, as indicated by researchers and experts in PLS (Chin, 2010; Götz et al., 2010; Urbach and Ahlemann, 2010; Hair et al., 2017), once the quality of the model was confirmed, the next stage was to test the hypothesized relationships among the model constructs.

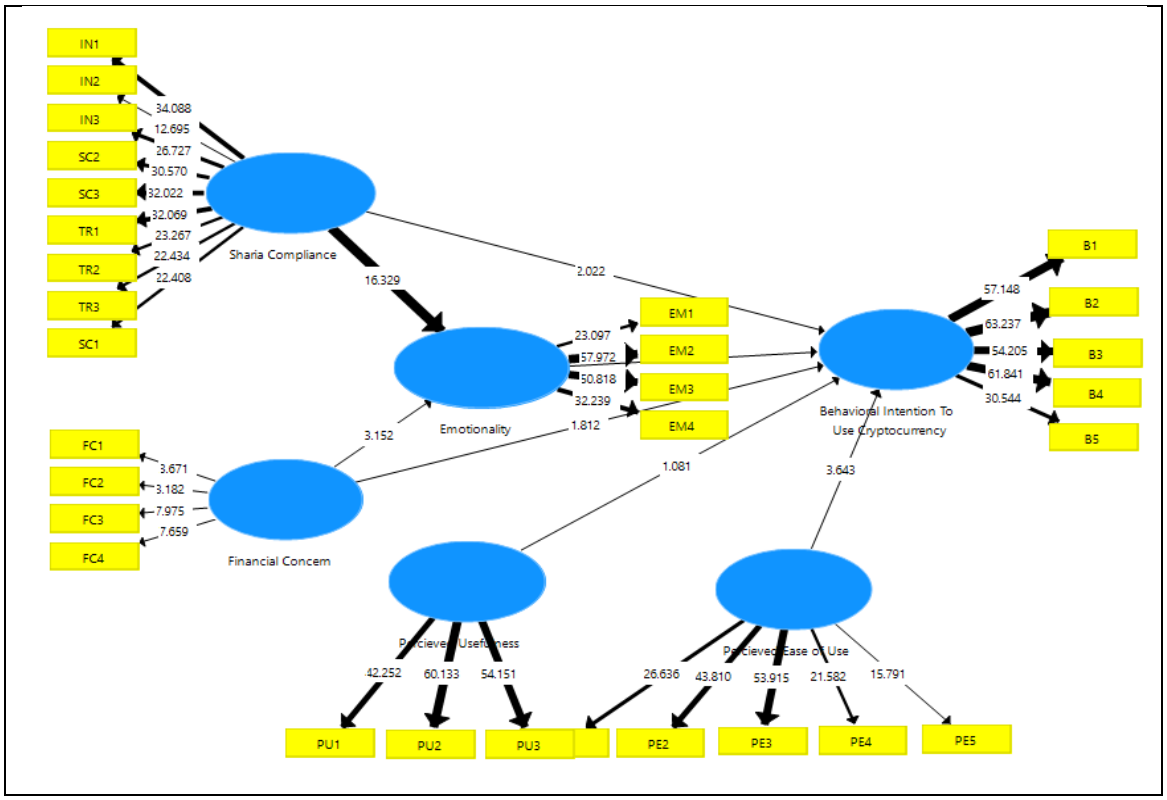

Fig. 3: Hypothesis testing: Bootstrapping direct effect result

VI. Hypotheses Testing

The research hypotheses are tested using the results obtained from the path coefficient assessment in the structural model. To test the hypotheses, both path estimates and t-statistics with their p-values are used to support the hypothesis. Path coefficients provide us with an overview of results including standard errors, bootstrap mean values, t-values and p-values through bootstrapping. Path coefficient values of 0.02, 0.15, and 0.35 indicate small, medium, and large relationships respectively (Cohen, 1988). Meanwhile, significant t-values for a two-tailed test are 1.65, l.96, and 2.59 at p-values 0.1, 0.05, and 0.01 respectively (Hair et al., 2017).

Table 8: Hypotheses testing with path coefficients, t-statistics, and significance levels

No.	Hypothesis	Std beta	T Statistic	P Values	Result
H1	Shari'ah Compliance -> Behavioral Intention to Use Cryptocurrency	0.126	2.022	0.043	Supported
H1a	Shari'ah Compliance -> Emotionality	0.612	16.329	0.000	Supported
H2	Financial Concern -> Behavioral Intention to Use Cryptocurrency	0.11	1.812	0.07	Unsupported
H2b	Financial Concern -> Emotionality	0.19	3.152	0.002	Supported
H3	Perceived Usefulness -> Behavioral Intention to Use Cryptocurrency	0.081	1.081	0.28	Unsupported
H4	Perceived Ease of Use -> Behavioral Intention to Use Cryptocurrency	0.274	3.643	0.000	Supported
H5	Financial Concern -> Emotionality -> Behavioral Intention to Use Cryptocurrency	0.058	2.75	0.006	Supported
H6	Shari'ah Compliance -> Emotionality -> Behavioral Intention to Use Cryptocurrency	0.187	4.463	0.000	Supported
H7	Emotionality -> Behavioral Intention to Use Cryptocurrency	0.307	4.677	0.000	Supported

Based on the analysis, it shows that Behavioral Intention to Use Cryptocurrency from the Islamic perspective is influenced directly by Shari'ah Compliance (β= 0.126, t-value= 2.022, p-value = 0.043), Perceived Ease of Use (β= 0.274, t-value= 3.643, p-value < 0.001), Emotionality (β= 0.307, t-value= 4.677, p-value < 0.01). Therefore, H1, H2b and H4 are accepted.

On the other hand, Perceived Usefulness (β= 0.081, t-value = 1.081, p-value = 0.28) and Financial Concern (β= 0.11, t-value= 1.812, p-value = 0.07) presented non-significant positive effect on BI. Therefore, H3 and H2 are not accepted.

As evident from the analysis, Emotionality is influenced directly by Financial concern (β= 0.19, t-value= 3.152 at P level < 0.002) and Shari'ah Compliance (β= 0.612, t-value= 16.329, p-value < 0.001). Therefore, H2b and H1a are accepted.

Meanwhile, Behavioral Intention is influenced indirectly by Financial Concern (β = 0.058, t-value= 2.75, p-value = 0.006) and Shari'ah Compliance (β = 0.187, t-value= 4.463, p-value = 0.043). Therefore, H5 and H6 are supported

VII. Assessment of Mediating Relationship

A variable is considered a mediator if the influence of the independent variable on the dependent variable decreases when the mediator is introduced simultaneously with the independent variable as a predictor of the dependent variable (Baron and Kenny, 1986). In this research, the model is characterized by its complexity for containing one mediator, Emotionality. In each case, some independent variables affect the mediating variable, which in turn affects the dependent variable. This leads to forming a chain of relations among the independent, mediating and dependent variables (Baron and Kenny, 1986).

Mediation assessment provides accurate information whether a mediating variable mediates the relation between two other variables. Mediation variable mediates the relation between two other variables (MacKinnon and Fairchild, 2009).

a) Mediator emotionality

According to Henseler et al., (2009), measuring the direct and indirect relationships between independent and dependent latent variable is another important evaluation of a structural model. In this study, the assessment started by assessing the influence of Shari'ah Compliance and Financial Concern on Behavioral Intention to Use Cryptocurrency from the Islamic Perspective. The results showed that Shari'ah Compliance positively influenced Behavioral Intention to Use Cryptocurrency from the Islamic Perspective. On the other hand, Financial Concern had an indirect and positive influence on BI. To test the mediating effect of Emotionality, it was included in the relationship between the independent variables and Behavioral Intention to

Use Cryptocurrency from the Islamic Perspective. The result showed that Emotionality positively influenced Behavioral Intention and was influenced by Shari'ah Compliance, yet not by Financial Concern.

Moreover, the results showed that the addition of the mediating variable Emotionality has increased the coefficient values of Sharia Compliance, Financial Concern on Behavioral Intention. Table 14 shows the results indicating that while Emotionality partially mediated between Financial Concern and Shari'ah Compliance on Behavioral Intention to Use Cryptocurrency from the Islamic Perspective.

Table 9: Result of the mediating effect of emotionality

IV	DV	B and T-Values Without Mediator	B and T-Values with Mediator	Mediating Effect
Financial Concern ->	BI	β0.11 / t: 1.812	β0.058/ t: 2.75***	Full
Sharia Compliance ->	BI	β0.126 / t: 2.022**	β0.187 / t: 4.463***	partial

b) Total effect

In addition to measuring the mediating effect of the mediators, Hair Jr et al., (2017) recommend another criterion to be considered when addressing the mediators' effect. The sum of direct and indirect effects is referred to as the total effect. The interpretation of total effects is particularly useful in studies aimed at exploring the differential impact of several driver constructs on a criterion construct via one or more mediating variables.

Table 10 shows the total effects of the structural inner model path relationships as generated by SmartPLS using the PLS algorithm test.

Table 10: Total effects of the structural inner model

Path	Value	Effect Size
Emotionality -> Behavioral Intention	0.307	Large
Financial Concern -> Behavioral Intention	0.11	Small
Financial Concern -> Emotionality	0.19	Medium
Perceived Ease of Use -> Behavioral Intention	0.274	Large
Perceived Usefulness -> Behavioral Intention	0.081	Small
Shari'ah Compliance -> Behavioral Intention	0.126	Medium
Shari'ah Compliance -> Emotionality	0.612	Large

VIII. Principle finding and Discussion

The research was designed using a quantitative research approach through employing an online survey, a web-based questionnaire was developed based on the research objectives and questions. Follow up reminders were sent to ensure attaining the required sample size. The sample was collected from 307 and from the population those who targeted are with some knowledge of cryptocurrency.

The data were analyzed by using the partial least square structural equation modelling technique. The analysis process involved an assessment of the measurement model to evaluate the reliability and validity of the items used, assessment of the structural model to evaluate its validity, the path coefficient estimates, and test the research hypotheses and assessment of the mediating factors. The results of the research provided empirical support for the conceptualized research model, with 7 hypotheses out of 9 being supported.

The results revealed that Behavioral Intention to use cryptocurrency from the Islamic perspective was positively associated with Shari'ah Compliance, Financial Concern, Perceived Ease of Use, and Emotionality, which collectively explained 50.9% of the Behavioral Intention to use cryptocurrency from the Islamic perspective. Meanwhile, the results found that Financial Concern and Perceived Usefulness did not have a significant positive impact on Behavioral Intention but have been an indirect effect on BI through Emotionality. Overall, the model was able to explain 50.9% of the variance in Behavioral Intention to use cryptocurrency from the Islamic perspective

In this study, Shari'ah Compliance has been found to positively influence Behavioral Intention to use cryptocurrency from the Islamic perspective ($\beta = 0.126$, t-value= 2.022, p-value = 0.043) and Emotionality ($\beta = 0.612$, t-value = 16.329, p-value < 0.001). This result indicates that for one unit increase in Shari'ah compliance and Emotionality, BI will increase by 0.126 and 0.612 respectively. This result is consistent with previous studies (Abdullah and Wahab, 2015; Lu et al., 2016; Ribadu and Wan Ab. Rahman, 2017). For example, Abdullah and Wahab (2015) stated that religious obligation was the strongest predictor of the intention to use Islamic personal financing.

In this study, Sharia Compliance refers to denotes obedience to Shariah law. Any cryptocurrency system is required to operate in conformity with the principles of the Islamic law of contract and must be devoid of fundamentally prohibited elements as a prerequisite.

Sharia Compliance has become one of the most important factors to make users adopt cryptocurrency in their daily life operations. A lot of thought on this issue. As previously found from the literature from researchers and scholars that, cryptocurrency and bitcoin are not permissible meaning it is prohibited in Islamic law while Other scholars look it as permissible.

Cryptocurrency is a digital payment currency and peer-to-peer (P2P) technology to create and

manage monetary transactions as without to central authority as reported by (Nakamoto, 2008). This indicates that cryptocurrency such as bitcoin is just replacement of the normal fiat money. However, most of the people look cryptocurrency as a new form of money that raises a lot of thought on it. Some people wondering that has no value, not an asset, commodity and it's not like other currencies such as dollars and ringgit. This indicates that Gold and Silver are the basis of money in Islam; when they are not available, it is accepted to use banknotes or even a stamped skin' as said by Imam Malik in Mudawwana he said that "if a skin people consider it as currency and they accepted it, it could be accepted as currency even a skin" The difference between Cryptocurrency and the banknotes is that; Cryptocurrency is not from the government but rather it is from hidden individuals so, it has no insurance or guarantee when particular risk happened.

From the sharia point of view, uncertainty issues Such as, volatility, obscurity, ambiguity, the status of cryptocurrencies (commodity, financial asset, Currency) and not regulated by the government which surround the Cryptocurrency have let some peoples to doubt or not involve on the cryptocurrency transactions. The Uncertainty factors (Gharar) behind the cryptocurrency is one of the major factors that if its resolve, then will influence people to intend to use cryptocurrency. Also, from the Islamic Rules of Jurisprudence and Fundamentalism, One out of the five main rules "Harm must be eliminated". Because the value of cryptocurrency can be speculative, it is unclear what a person is buying and what the result of the entire bitcoin venture is going to be. No authorities to blame if attackers get access to your Wallet or lose your wallet private key. Therefore, these kinds of issues can be considered as uncertainty "gharar" and from shariah, harm must be removed according to rules of sharia. This specified that from the Shariah point of view the major purpose of cryptocurrency its uncertainty and also there is "addarar" harm This indicate the issues of uncertainty is very important when it comes to the sharia. Scholars need to look carefully before making it permissible or impermissible for after resolving and removing uncertain factors, then more people will engage and use cryptocurrency.

From the finding of this Paper, Financial Concern (β = 0.19, t-value= 3.152, p-value = 0.002) presented a positive influence on Emotionality. This indicates that as financial concern increases by one unit, Emotionality will increase by 0.19. This result is consistent with the previous studies (Abramova and Böhme, 2016; Ryu, 2018). For instance, Ryu (2018) stated that financial risk had a positive impact on perceived risk meaning that losses in cryptocurrency transactions were common due to its price volatility and security issues. Therefore, increased security in such financial transactions would positively influence behavioural intention to use cryptocurrency. On the other hand, Financial Concern did not present a significant direct influence on behavioral intention to use cryptocurrency from the Islamic perspective (β = 0.11, t-value = 1.812, p-value = 0.07).

Within this study, Perceived Ease of Use was proved to have a significant positive influence on Behavioral Intention to use cryptocurrency from the Islamic perspective (β= 0.274, t-value= 3.643, p-value < 0.001). This indicates that as perceived ease of use increases by one unit, BI will increase by 0.274. This finding is aligned with previous studies (Abramova and Böhme, 2016; Durodolu, 2016; Shahzad, Guoyi, Jian, and Shahbaz, 2018; Shiau and Chau, 2016). According to the analysis, there is a lack of user-friendliness when using Cryptocurrencies. From the viewpoint of sending or receiving cryptocurrencies is still cumbersome and holding cryptocurrencies is lead to many risks such as volatility and attacked. Users need to be able to have more confidence in the availability of their funds. Therefore, they need to undertake additional measures to protect their computers and mobile devices To boost their influence on cryptocurrency.

On the other hand, Perceived Usefulness presented a non-significant positive effect on BI (β= 0.081, t-value= 1.081, p-value = 0.28). This finding becomes different with (Han and Moon, 2011) These indicate that the participants are more concern with other highly associated variables compared to Usefulness.

From the goal of this study is to examine whether shariah compliance and financial concern can indirectly influence behavioral intention to use cryptocurrency from an Islamic perspective. From the results reported that Emotionality mediates the relationships between Sharia Compliance and Financial concern. More specifically, Emotionality fully mediated with financial concern while sharia compliance has been partially mediated. The finding reveal that Behavioural intention is influenced indirectly through emotionality by Financial Concern (β0.058, t-value= 2.75 at P level < 0.006) and Sharia Compliance (β0.187, t-value= 4.463 at P level < 0.043). this result is consistent with the studies of Ryu, (2018) that investigated the mediation between financial concern and legal concern, were legal risk had a highly negative effect on the Fintech continuance intention.

From this study Emotionality (β = 0.307, t-value= 4.677, p-value < 0.001) was identified to have a significant positive influence on Behavioral Intention to use cryptocurrency from the Islamic perspective. This indicates that as emotionality increases by one unit, BI will increase by 0.307. This result is consistent with the studies of Lu, Fan and Zhou (2016). In that study, they found the perception of others having a positive impact on trust in online sellers.

From the goal of this study is to examine whether shari'ah compliance and financial concern can indirectly influence behavioral intention to use cryptocurrency from an Islamic perspective. The outcome reveals that Emotionality fully mediated with financial concern while sharia compliance has been partially mediated this lead Emotionality to have a positive influence on behavioral intention to use cryptocurrency from the Islamic perspective. These indicate that there is a big role of Fatwa centres Such as Muftis, Majma'al Fiqh to come out with good solutions according to the Islamic principles that will fit cryptocurrency and eliminate all harm related to it. A lot of fatwas are based on assumptions, not strong bases. Even though, their fatwas will play a strong influence on users to adopt cryptocurrency because their opinions will influence users to make a transaction with cryptocurrency. A lot of Fatwa based on assumption No strong bases that addressed the issue of cryptocurrencies. Similarly goes to the financial expert their role through emotionality to give a clear advertisement for people to show them which is the exactly good cryptocurrency to make them aware of how to deal with such currencies. The more they simplified the rules and remove this all uncertainties related to cryptocurrency the more will influence people behavior to adopt cryptocurrency from the Islamic perspective. Therefore, Good opinions of sharia expert and Financial expert will strongly influence user's behavior intentions to adopt cryptocurrency.

This study gains some support from three main theories, Technology Acceptance Model (TAM), Theory of Reason Action (TRA), and de-individuation Theory. Financial Concern is one of the major construct used in this study, which was adopted from Ryu (2018) The result of that study which examined the relationship between financial concern and Fintech continuous intention Indicated that Financial Risk positively associated with Perceived Risk. this is not consistent with the outcome of this study.

Perceive Ease of use, is one of the major construct used in this study, which was adopted from Abramova and Böhme, (2016). The result of that study which examined the relationship between Perceived Ease of use and with user engagement in bitcoin. Specified that perceived ease of PEU factor influences user engagement in bitcoin transactions positively. Hence, this is consistent with the outcome of this study.

Perceived Usefulness, is one of the major construct used in this study, which was adopted from Han and Moon (2011). The result of that study which examined the relationship between Perceived usefulness and with continuous intention to use Internet Protocol Television (IPTV). Specified that perceived ease of PEU factor influences user engagement in bitcoin transactions positively. Hence, this is not consistent with the outcome of this study.

Emotionality is one of the major construct used in this study, which was adopted from De-individuation theory by Prentice-Dunn and Rogers, (1983). He theorized that, through his studies on the impact of a "crowd," a loss of personal responsibility in crowds leads to an inclination to behave primitively and hedonistically by the entire group. This resulting mentality, The idea of a "group mind" is comparable to the shared autism theory, which holds that individuals within a group may develop shared beliefs that have no basis in reality.

IX. Conclusion

This study evaluates the issues concerning cryptocurrency-typed (Bitcoin) implementation from an Islamic perspective. A hypothesis has been formulated and evaluated by quantitative research methodology. Smart PLS is used to investigate the determinants that influence the continuous knowledge-sharing intention of the members within business online communities. This tool is utilized in this study as an analytical tool. Hence hypothesis testing was carried out. The findings reveal that Behavioral Intention to Use Cryptocurrency from the Islamic perspective is influenced by many factors namely: Shari'ah Compliance, Perceived Ease of Use, Emotionality, Perceived Usefulness, and Financial Concern. However, Emotionality towards Islamic belief is influenced directly by Financial concern and Shari'ah Compliance in the implantation of cryptocurrency. Furthermore, Behavioral Intention is influenced by Financial Concern. This study has contributed to understanding the Islamic issues behind the implementation of cryptocurrency. The impact of this study will resolve some claims that cryptocurrency and Bitcoin are harams based on the fact that the issuer of Bitcoin is unknown and has neither an official government nor a central authority behind it.

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Girassol: A Mobile App to Measure Levels of Nomophobia in Adolescents and Young People

By Karlla Danielly de Souza, Mônica Ximenes C. da Cunha & Eike Duarte Santiago

Abstract- This article presents an application to measure levels of technological dependence in adolescents and young people. The first phase of this research consisted of a Systematic Literature Review (SLR) to collect data on the detection and risks of excessive and harmful use of digital technologies. The data collected in SLR became the base for interviews with 05 psychologists and a survey with 566 individuals between 12 and 21 years of age. Based on field research and the "Internet Addiction Test" (IAT), which was adapted for this public, the Girassol application was developed. The first validation with 05 health/education professionals and 07 adolescents/young people was 83.3% positive, and the second validation had a positive evaluation of 98.49%.

Keywords: technological dependence; mental health; mobile applications; teenagers; young.

GJCST-G Classification: D.2.m

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Karlla Danielly de Souza [α], Mônica Ximenes C. da Cunha [σ] & Eike Duarte Santiago [ρ]

Abstract- This article presents an application to measure levels of technological dependence in adolescents and young people. The first phase of this research consisted of a Systematic Literature Review (SLR) to collect data on the detection and risks of excessive and harmful use of digital technologies. The data collected in SLR became the base for interviews with 05 psychologists and a survey with 566 individuals between 12 and 21 years of age. Based on field research and the "Internet Addiction Test" (IAT), which was adapted for this public, the Girassol application was developed. The first validation with 05 health/education professionals and 07 adolescents/young people was 83.3% positive, and the second validation had a positive evaluation of 98.49%.

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I. Introduction

A research [4] presented Brazil as the fourth country with the largest number of internet users. The daily use of the internet causes family conflicts resulting from the lack of dialogue, in addition to leading to superficial relationships, learning difficulties and anxiety disorders [6]. In recent years, virtual relationships are not only present as a means of communication, but also as an alternative in the demands of work and as entertainment during leisure time. It is demonstrated that technological dependence is easily perceived among adolescents, who maintain frequent contact through messaging on social networks sent by cell phones or computers. Additionally, the advances in technology have made traditional toys obsolete, and hindered the development of synesthetic experiences [5].

Digital technologies are increasingly affecting society, culture and the interaction between individuals, both positively and negatively [2]. Although feelings of anxiety, dependence and loneliness have not been confirmed in social media users, adolescents are sensitive to social influence [3]. This influence can also occur in virtual social networks, even indirectly, as the opinion of others is also manifested through comments on posts, and conversations in online chat rooms. Among the impacts and risks to mental health are: anxiety, depression, nomophobia, bullying and cyber bullying.

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Therefore, this research concerns the new needs of adolescents in a virtual environment, the emotional problems sometimes caused by its use, and possible mental disorders caused or accentuated by games and online chats that influence adolescents and young people in carrying out risky activities. The objective was to carry out a SLR and, based on the results, propose an application (app) to assist in the identification of psychological problems caused by the overuse of technology. The empirical basis for the artifact was a field research to survey the impacts of digital technologies on the mental health of adolescents and young people.

II. Research Methodology

The research was exploratory in nature, with a mixed approach, considering that the data obtained is qualitative and quantitative.

Initially, a SLR was carried out where the keywords for the research were defined, and thus the strings were formulated. Ten databases were selected for the SLR, which were Google Scholar, Scielo, Bireme / VHL, Pub Med, Science Direct, Repository of the Federal University of Uberlândia, Repository of the University of Porto, Repository of the University of Lisbon, Repository of the University of Brasília and Pepsic. Inclusion and exclusion criteria were defined. The entire SLR followed a review protocol that is available at: https://drive.google.com/open?id=151lz FY 84RlEGphnMHf4Y6djSEZs1oACa. The review aimed to answer the question "What are the impacts of the overuse of digital technologies on the mental health of adolescents and young people?", And to answer this question, three other research questions were elaborated:

- What are the risks of the excessive use of social networks in the lives of adolescents?
- How to detect mental health problems through postings and behaviors?
- What are the scales for detecting depression?

Then, interviews were conducted with five psychologists chosen by a referral who work in a support center, a social project, educational institutions (public and private) and a private clinic.

The third stage consisted of a survey, the sample of which consisted of 566 adolescents and young people, aged 12 to 21 years old, who study in 03

different public educational institutions (Municipal, State and Federal).

The data collection instruments used in the second and third stages of the research were, respectively, a questionnaire for psychologists (QP), composed of 12 open questions, and a questionnaire for adolescents (QA), with 25 closed questions. Both questionnaires were based on the results of the SLR. The free will of each individual was respected, and those who were not interested in providing data for the research were free to stop participating during the interview or survey.

The selection of psychologists was made using the snowballing technique. In the survey with students, a link to the online questionnaire (in schools where there were computers in the classrooms) were distributed, in addition to printed questionnaires when necessary.

The responses of the psychologists were examined using the content analysis technique, and the responses of adolescents and young people using basic statistics.

Due to the scarcity of related works, only six applications were selected: Depression Self-Assessment (AD), Break Free (BF), Hygia (H), Menthal (M); Nomophobia (N), and Phone Addict Free (PAF). The only one of these found through academic literature was the prototype Hygia, which is a concept for a proposed system to monitor the individuals' depression levels. The others were found through more extensive research on Google and Play Store (app store for smartphones with the Android system). In the Play Store, it was possible to find several test apps with different themes, but the "depression self-assessment" was selected, where so far it has been the closest to the initial proposal of Girassol, the app presented in this work.

The apps classified as related were compared in seven (07) aspects:

- Monitoring tool - whether the app monitors or detects;
- Alert/notification feature - states or denies the existence of alerts;
- Test Application - whether the app uses any type of test to comply with its functionality;
- Indication of dependency/depression level - whether the application presents data on the individual's level of dependency or depression, in view of the monitoring or test applied;
- Test validity and reliability - for applications that use tests, whether the applied test has any approval for it to be used;
- Web application - whether the application is available in a version for online access; and
- Mobile application - whether it is an application for mobile devices, such as tablets and smart phones, for example.

After making the comparison between Girassol and the six similar apps, it was noticeable that all of them are mobile applications, only the Hígia prototype fits as both mobile and web applications. Of the seven applications, five are monitoring tools, one does not have this functionality, and Girassol can be classified as a partial monitoring tool, as it classifies dependency through tests and not by observing posts and activities performed on the smartphone or any other device. It was also notable that only two of the applications (Self-assessment of depression, and Girassol) offer tests validated by qualified professionals, making them reliable applications. Chart 1 presents the comparison between the applications. The left column shows the aspects analyzed, and the top row shows the applications represented by their initials. The letters Y, N and P respectively mean: yes, no and partially.

Aspects x App	AD	BF	G	H	M	N	PAF
Monitoring tool	N	Y	P	Y	Y	Y	Y
Alert/notificationfeature	N	Y	N	Y	N	Y	N
Test Application	Y	N	Y	N	N	N	N
Indication of dependency/depression level	Y	Y	Y	N	P	P	P
Test validityandreliability	Y	N	Y	N	N	N	N
Web application	N	N	N	Y	N	N	N
Mobile application	Y	Y	Y	Y	Y	Y	Y

Chart 1: Application comparison

The Girassol app was developed based on the findings from the three initial phases of the research, along with the authorization and support from the Delete Institute represented by director Anna LS King, for the use of the "Internet Addiction Test" (IAT), and a questionnaire prepared by psychologist Kymberlly Young. Its main objective is to assess the levels of nomophobia of adolescents and young people.

The research design illustrated in Figure 1 presents the steps of the methodological procedure, from SLR to application development.

Figure 1: Research Design

III. Results and Discussions

In this section, the results of each stage of the research carried out are presented and discussed. The literature review was carried out between the years 2016 and 2017, where 37 papers were selected; the interviews with psychologists and the survey with teenagers took place in the second half of 2018.

a) Systematic Literature Review (SLR)

After reading the 37 papers selected in the SLR, cyberbullying and depression (or its signs and symptoms, such as psychological distress, anguish and suicidal thoughts) are highlighted as the main risks of the excessive use of social networks, as it can be seen in the word cloud shown in Figure 2, resulting from question 1 in the survey.

Figure 2: Word cloud - risks of overuse of technology

The main signs mentioned in response to question 2 were the sudden changes in mood and behavior, coupled with the need to stay connected, using profiles that are always up to date, seeking more and more followers. Chart 2 displays the results found in the SLR for the 2nd search question.

Detection	Numberofcitations
Spend more time online, higher predisposition to attack and reduced academic performance.	1
Loss of ability to concentrate.	2
Long online evening sessions; lie to family and friends about the number of hours spent connected.	2
Negative social interactions; post negative content; use of emoticons in a written conversation to report their real emotional state.	2
Depressive symptoms when you have nothing to post.	2
Show riskybehaviors.	2
Interacts only via the web; may start to develop schizophrenia by living in isolation.	2
High emotional problems, uses the internet to regulate mood, gain social support and release emotions.	4
Cannot disconnect from social networks or go offline; the time dedicated to the tool increases and the level of control over it decreases.	4
Anxiety for likes and comments; make posts without thinking first; impatience when they run out of Internet access; has abstinence and its effects; anguish and discomfort when use is not possible.	4
Compulsive internet use; need to be connected 24 hours a day; being obsessed and compelled to constantly check the phone; quickly seek to connect to the Internet anywhere.	4
Greater difficulty in overcoming challenges; being aggressive and socially dominant.	4
Have few or no real friends; see safer and less threatening online communication; hide in the anonymity of cyberspace.	5
Describe specific methods of suicide within the context of other topics.	9
Performnarcissisticpostings.	9
Oversharing[1], stressed posts and preview trigger[2] posts.	9
Being vulnerable as to the opinion of others; dependent on likes - feel the need to "cure" one's profile.	9
Complaintofsituationalproblems.	9

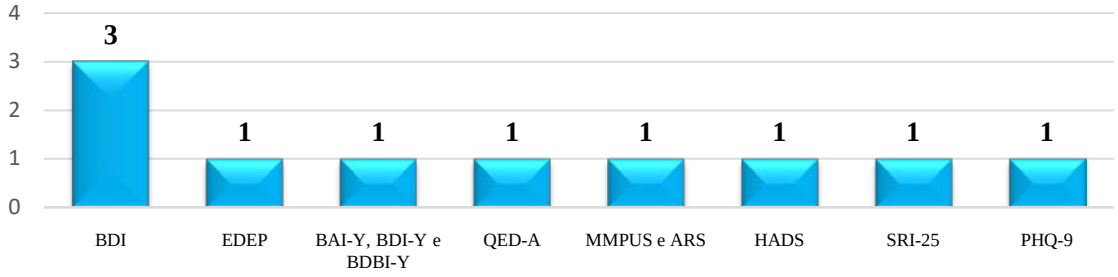
Chart 2: Detection of risks and problems for mental health

[1]Excessivesharing
[2]Addingcontacts

Among the works selected in the literature review to answer this question, two of them [6] [1] pointed out eight signs to help identify dependence on the Internet/Digital Technology: excessive concern with the internet, need to increase the connected time (online), the presence of irritability and/or depression, exhibiting repeated efforts to decrease the time of internet use, when internet use is reduced, presents emotional lability, remain more connected than scheduled, work and social relationships at risk from overuse, and lying to others about time spent online.

The Beck Depression Inventory (BDI) emerged as the most cited to detect depression, related to question 3. Graph 1 shows the scales found during SLR surveys.

The results and references for the Systematic Literature Review protocol are available in the link presented in section 2 of this article.



Graph 1: Scales for detecting depression

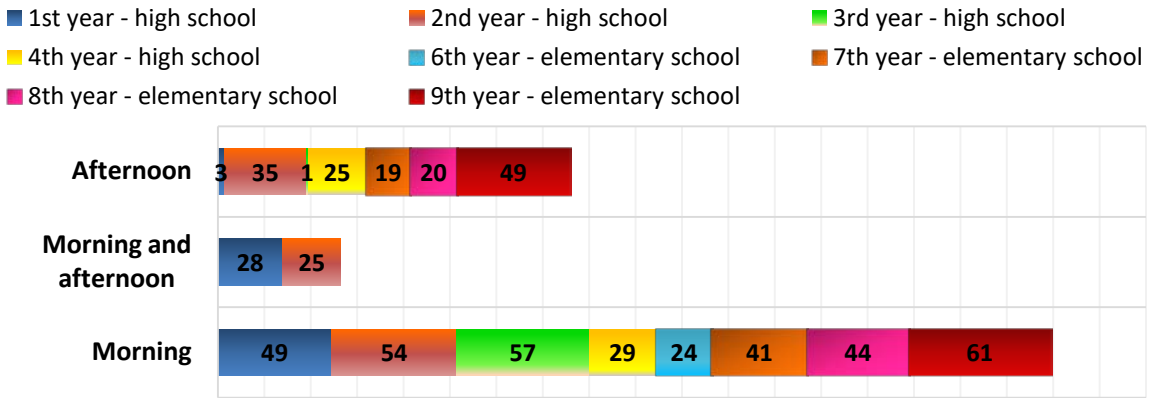
b) Interviews with psychologists

The interview with psychologists aimed to analyze the results of the SLR and its veracity, identifying how close the contents found in the SLR are to the current reality. And after the interviews, it was possible to recognize the relationship between the behavior of young people on the virtual network and the relationship with the real world, helping in the development and adaptation of questions for the survey and for the test.

Relevant results obtained in the interviews signaled the fact that the majority of psychologists interviewed have received adolescents/young people with problems arising from the excessive use of digital technologies. The drop in school performance was mentioned as one of the main problems. Social isolation is one of the behaviors presented that signal the risk of depression in adolescents. Bullying/cyberbullying cases were mentioned as unpleasant experiences lived by adolescents/young people. The complete questionnaire and the psychologists' answers to this research are available through the link: https://drive.google.com/open?id=12y9qCebxQsClejGuWw2WzMSskbzUYqzg.

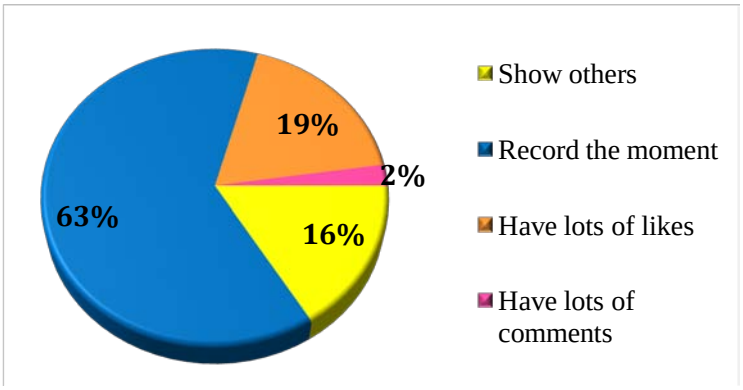
c) Survey with Adolescents and Young people

This research had 359 part-time students (morning), 152 part-time students (afternoon), and 53 full-time students (morning and afternoon) participants. Graph 2 shows the number of students participating, per shift, in each grade.

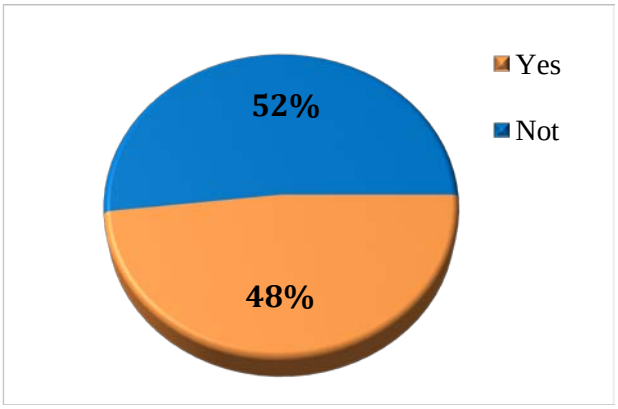


Graph 2: Number of student respondents per grade and shift

Among the results obtained in the survey with adolescents and young people, 21% indicated that when posting a photo, the most important thing is to achieve many likes and comments, as shown in Graph 3. The achieve this, 273 (48%) of the participants allow strangers to have unrestricted access to their profiles on the networks, according to Graph 4.

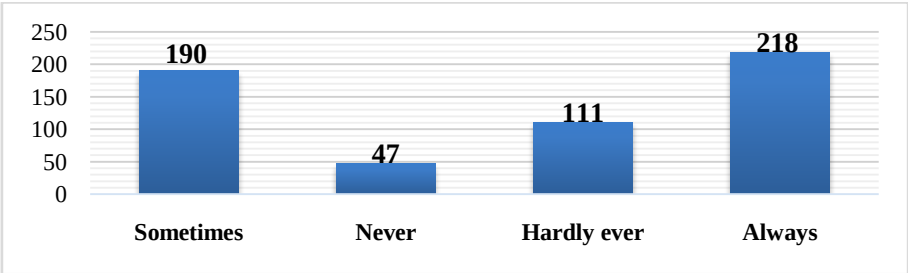


Graph 3: What is more important when posting a photo?

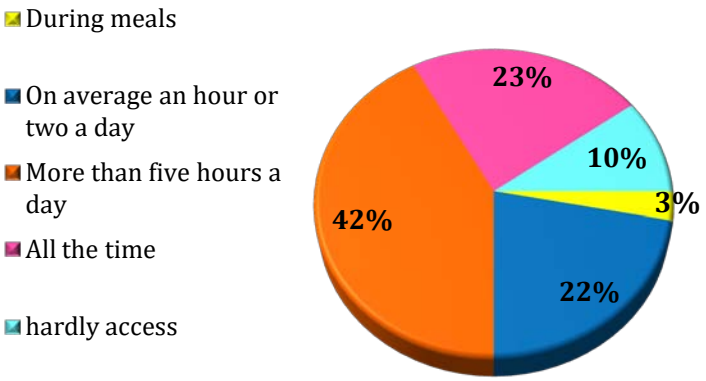


Graph 4: Allow strangers to access posts?

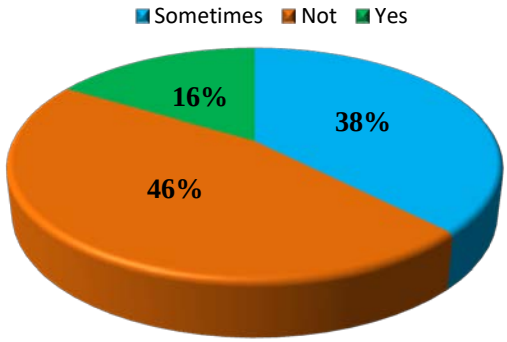
Another relevant fact was that only 8.3% never received complaints due to the time connected, as shown in Graph 5, although 42% stated that they spend five hours or more accessing social networks daily and 23% confirmed that they spend all the time on the internet, according to Graph 6.



Graph 5: Complaints about connected time

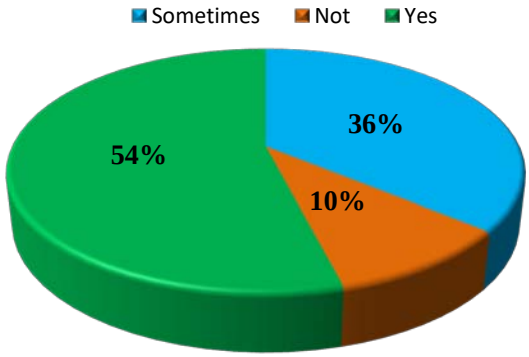


Graph 6: Frequency of social media use

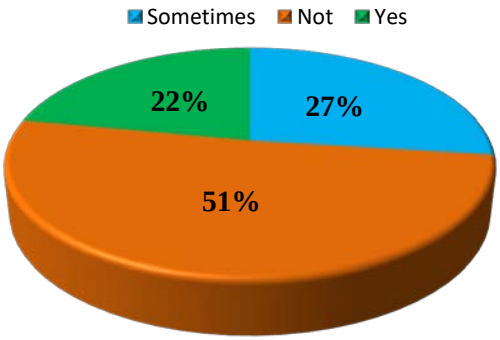


Graph 7: Feeling of loneliness when offline

The worrying factor is that, of 566 adolescents and young people, 93 (16%) expressed feelings of loneliness when there is no internet access, according to Graph 7, and only 10% denied that they spend more time than planned on social networks, according to Graph 8. 22% confessed frequent delays in their appointments due to the connected time, according to Graph 9.



Graph 8: Internet usage longer than scheduled



Graph 9: Delays caused by use of social networks

All results obtained in the survey (online and printed) are available through access to the following links: https://drive.google.com/open?id=1W_m_7MVZIYCB-oLVHo8E8kNRhRrpfy46 and https://drive.google.com/open?id=1ObB9NQcBUAvpTmec_-Z2jg-lwdK6oA_S.

d) Application Girassol (Sunflower)

Girassol was developed with the intention of detecting the exact moment to intervene and treat problems caused by the overuse of the internet and other technology derivatives. It consists of an application with 18 questions adapted from the "Internet Addiction Test" (IAT), with the due written authorization from Delete Institute. The app aims to assist parents, educators and health professionals in detecting a possible technological dependence, which is often disguised as a leisure activity, hobby and means of communication with other people.

The IAT is the first validated and reliable measure in this matter. The changes made to the questionnaire were linked to the results of the SLR and the interviews with the psychologists, with the

collaboration of the psychologist, doctor in mental health and director of the Delete Institute.

Figure 3 shows the flow of all planning and contact with the Institute for adapting the dependency test.

The test identifies the level of dependency, which varies between "normal user" and "dependent user". Each question has a score from 0 to 5, which generates a final score, which fits into some level of internet dependency. In the total score, values up to 18 mean that the individual has no dependence, 19 to 33 is an average user, 34 to 63 is a risk user, and above 64 points strongly suggest that the individual should seek professional help. Figure 4 presents some screens planned for the application prototype, while Figure 5 presents the screens already implemented and updated for the Girassol application, which is available for download in the play store, through the link: https://play.google.com/store/apps/details?id=com.santiago.girassol.

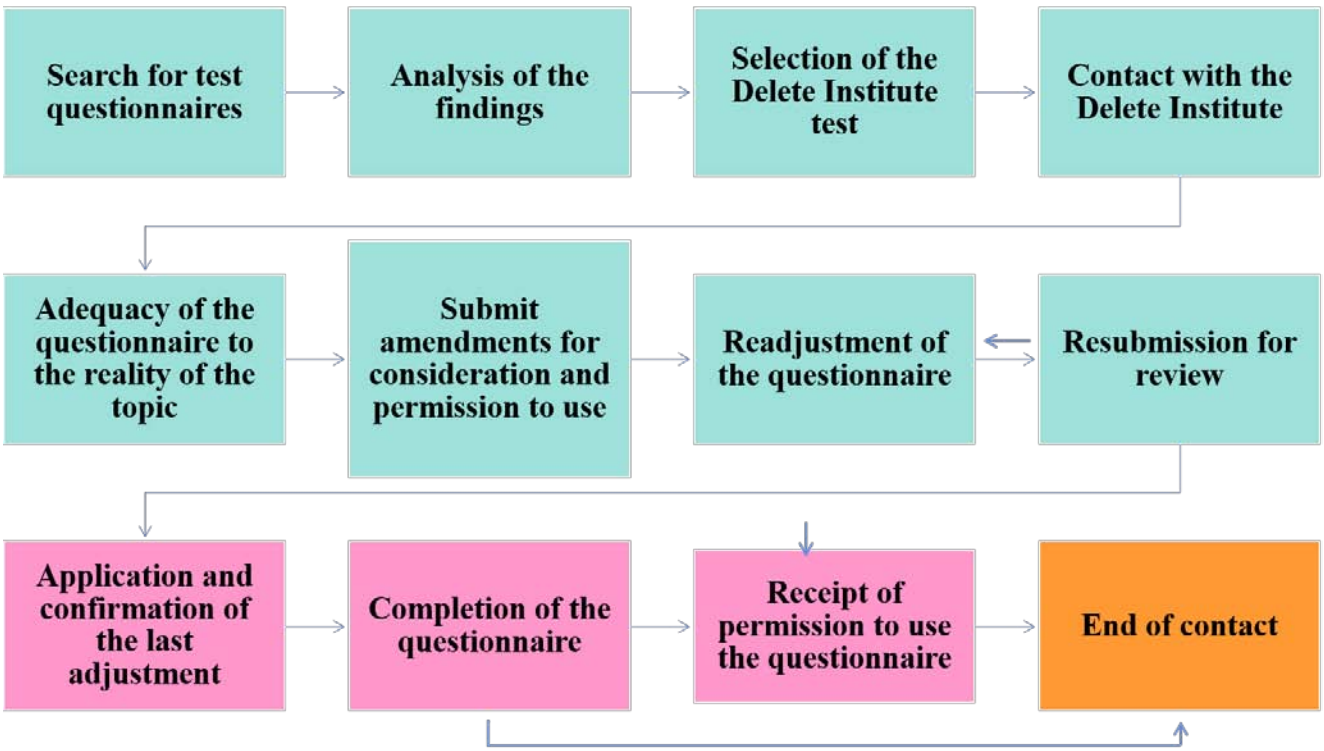


Figure 3: Flow of adaptation of the questionnaire

Figure 4: Screens planned for the prototype

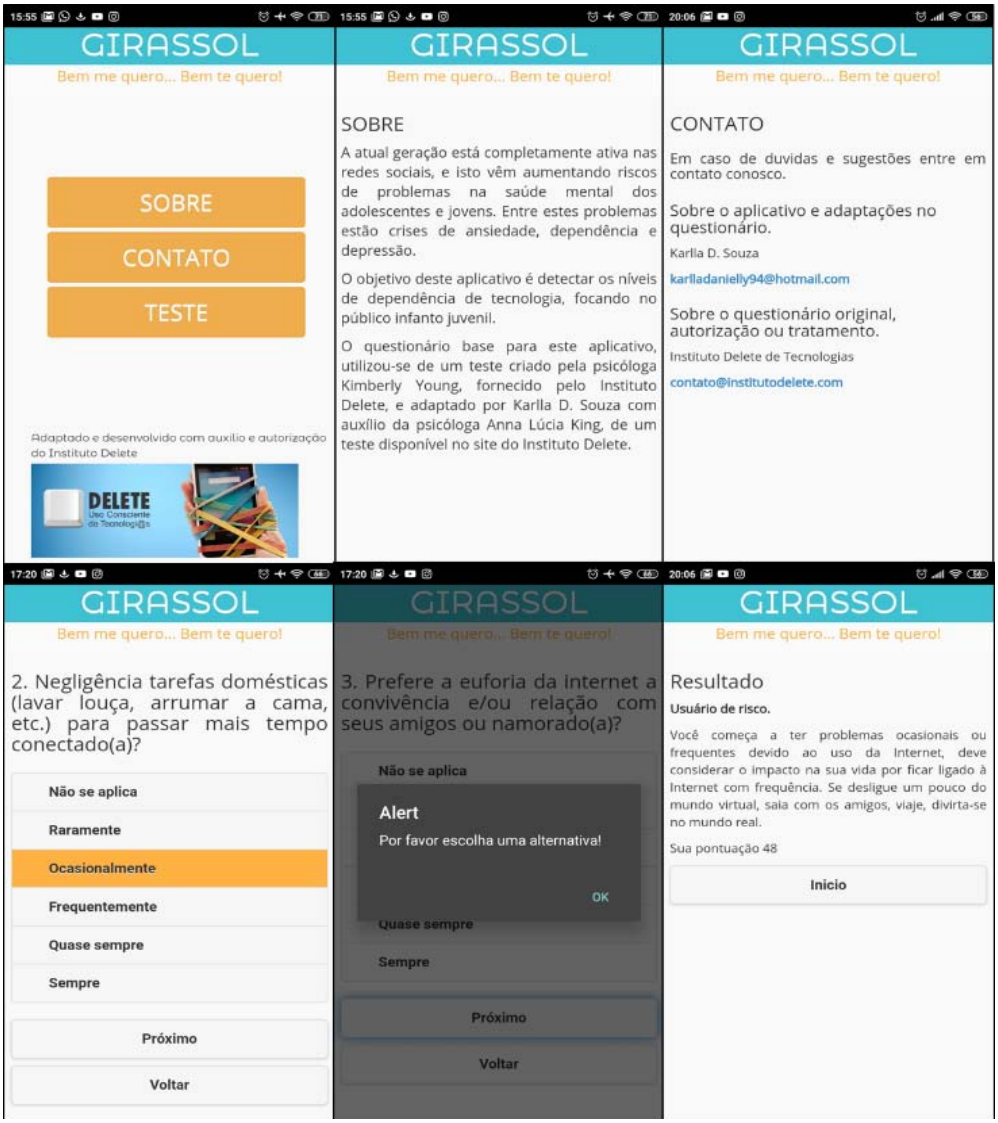


Figure 5: Girassol Application Screens

When opening the application, the user is directed to the home page of the app which features 3 buttons - about, contact and test -, below the buttons, there is a banner redirecting to the Delete Institute website, which provided support for the adaptation of the questionnaire. On the "About" screen, there is information about the app, such as the problem that encouraged its development, purpose and adaptation of the IAT questionnaire. In the contact screen there are 02 e-mails for contact, one to seek information about the work developed, and the other to contact for questions about the original test, authorization, and treatment of technological dependence. On the test screen, the questions and six answer options are presented, where the respondent must mark the one that most represents his or her practice or behavior. When selecting an answer, the individual must click on "next".It is possible to return to the menu or previous question by pressing "back". If the respondent tries to advance to the next question without answering the current one, the app displays a message asking for the answer. At the end of the test, the result screen displays the respondent's score. It contains the type of user, a short explanatory phrase, and the score obtained on the test.

The architecture follows the MVC model (model-view-controller), divided into a view layer, which presents the screens to the user, and two controllers; one responsible for collecting the views and the other responsible for the test (this captures the responses and generates the results). The model layer was not necessary in the implementation because the test is already loaded into the code. Figure 6 illustrates the app Girassol architecture.

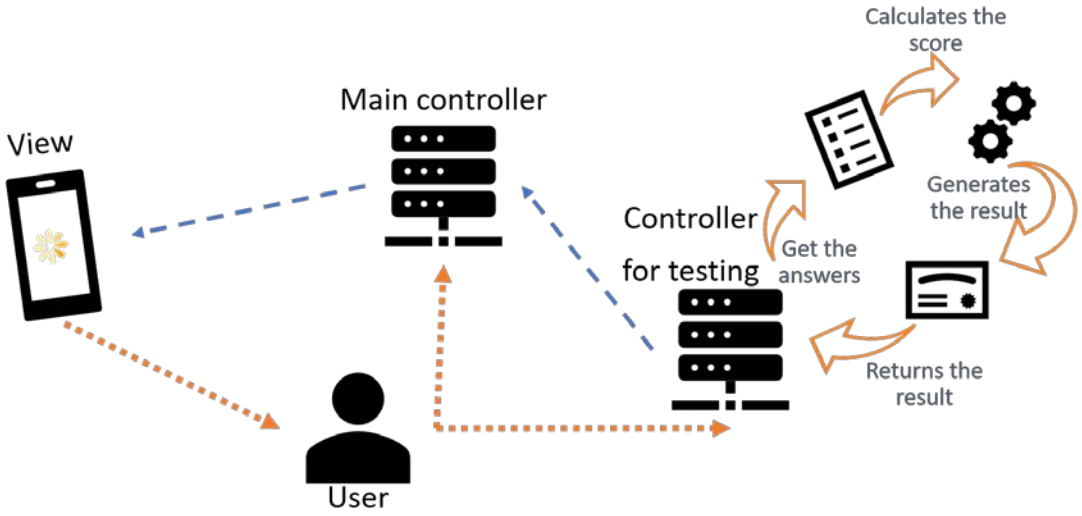


Figure 6: Girassol Application architecture

The questionnaire was stored in a json - light format for data exchange -, which is loaded in the application when the user selects the test option. In addition, the app has only an internal database, so no data is stored.

i. *Validation*

Two validations were carried out for the Girassol application. The first took place in January 2019, and the second took place in December of the same year.

a. *First Validation*

The first validation saw the collaboration of two professionals in the field of education and three in psychology. This assessment was signed 100% positive by the experts. Everyone said that it would be an appropriate tool to use in schools and one of them indicated its use in offices, serving as a way to perform a screening and identify possible patients.

For the validation by the specialists, three affirmative sentences were produced:

1. The application is able to detect cases of technological dependence.
2. The application can measure an individual's internet addiction levels.
3. The application is appropriate for teenagers / young people.
4. In addition, a question about where the app could be used:
5. Would you indicate the use of the app in: schools, offices, both or none?

The answers are found in Chart 3.

	About the utility of the app			
User	1	2	3	4
educ01	Yes	Yes	Yes	Schools
educ02	Yes	Yes	Yes	Schools
psy01	Yes	Yes	Yes	Both
psy02	Yes	Yes	Yes	Schools
psy03	Yes	Yes	Yes	Schools

Chart 3: Evaluation of the app from the experts' point of view

User psy01 agrees that the app is able to detect cases of addiction because, through punctuation, the teenager sees what he does not want to hear, since he usually does not care when people around him say that he is spending a lot of time on his cell phone; it can serve as a "reality check".

The first validation also counted with the collaboration of seven individuals, aged between 15 and 21, with the individual score ranging from 5 to 67 points. All adolescents and young people approved the benefits brought by the application, highlighting its ease of use and the usefulness of the proposal, as well as contributing with suggestions.

The questionnaire for the adolescents and young people consisted of six phrases to be answered with 'Yes' or 'No'. The phrases elaborated were:

1. All fields on the screens are clear and easy to understand;
2. The interface provides all functions for the operation of the application;

3. The interface is simple, pleasant and clear;
4. Considering my real actions and the data that the prototype collected, it can be said that they are coherent and in this why the presented result could help in some way;
5. I would make the result generated in the application available for a more complete evaluation with psychologists or psychiatrists;
6. I consider it important to make these results available to a psychologist / psychiatrist who helps the young public, facilitating the recognition of crises or treatments of technological dependencies.

User 02 indicated that he would not make his result available for analysis with psychologists or any other mental health professional. User 06, on the other hand, only mentioned the lack of a 'back' button to return to the main menu, since every time it was necessary to close the application to go to any other screen, making the app tiring and stressful to use. Analyzing the questions, it was possible to notice that the app obtained a 71.4% positive evaluation by the monitored users.

The responses of the monitored users' evaluation are shown in Chart 4, where in the first column the users are identified by numbers, and the first full line presents the numbers referring to the evaluation phrases. Chart cells highlighted show negative responses.

	Usability Questions			Usefulness Questions		
User	1	2	3	4	5	6
01	Yes	Yes	Yes	Yes	Yes	Yes
02	Yes	Yes	Yes	Yes	No	Yes
03	Yes	Yes	Yes	Yes	Yes	Yes
04	Yes	Yes	Yes	Yes	Yes	Yes
05	Yes	Yes	Yes	Yes	Yes	Yes
06	Yes	No	Yes	Yes	Yes	Yes
07	Yes	Yes	Yes	Yes	Yes	Yes

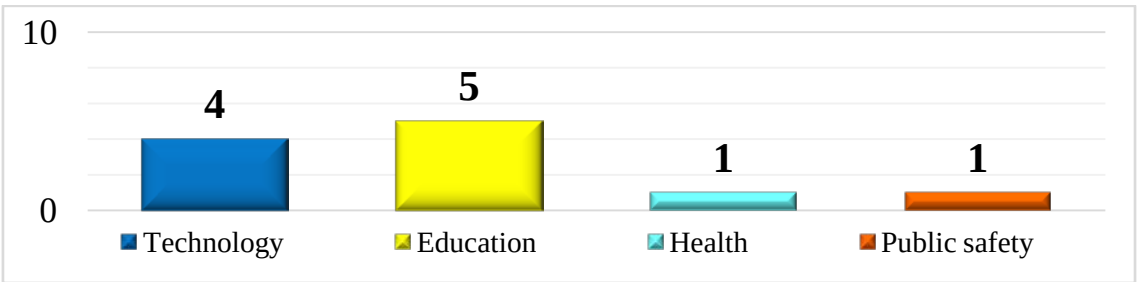
Chart 4: Evaluation of the app from the point of view of adolescents and young people

b. *Second Validation*

The second validation of the application was done through online Google forms. The questions were the same as in the first validation, but the software was updated.

Eight young adults aged between 18 and 25, and 11 professionals in the areas of mental health, education, technology and public safety participated in this validation.

Graph 10 presents the respondents' areas of activity, through which it is possible to see that most specialists work in the areas of education and technology. It is worth mentioning that in the first validation, only psychologists and educators evaluated the application. The specialists in the second validation provide a new perspective to this research, especially for future works.



Graph 10: Expertise area

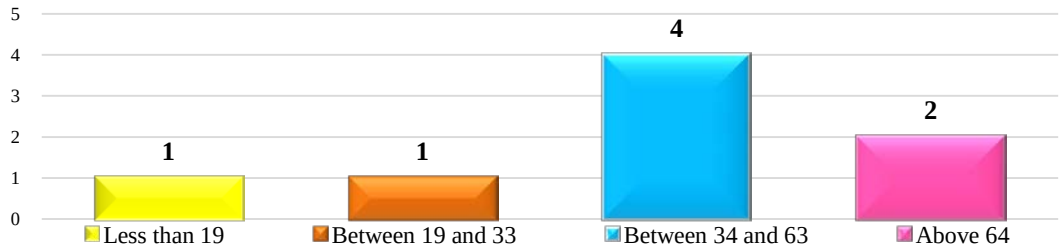
Chart 5 displays the second expert assessment of the application's usefulness. In this evaluation, the application achieved a 96.97% positive evaluation. The only negative assessment was in the matter of detecting a case of technological dependence.

	About the utility of the app			
User	1	2	3	4
Specialist01	Yes	Yes	Yes	Schools
Specialist02	Yes	Yes	Yes	Both
Specialist03	Yes	Yes	Yes	Both
Specialist04	Yes	Yes	Yes	Schools
Specialist05	Yes	Yes	Yes	Both
Specialist06	Yes	Yes	Yes	Both
Specialist07	Yes	Yes	Yes	Schools
Specialist08	Yes	Yes	Yes	Schools
Specialist09	Yes	Yes	Yes	Both
Specialist10	Yes	Yes	Yes	Both
Specialist11	No	Yes	Yes	Both

Chart 5: Second app review from the experts' point of view

Some of the comments made by the experts in the second validation are: "Innovative Work. It will contribute a lot to the education of young people. Congratulations.", "I am consciously leaving dependency and returning to the habit of reading, which was lost due to the time spent on social networks". "A great application for measuring the hazard index in the use of technologies by children and adolescents" and "Working more with usability."

Half of the young adult respondents were between 20 and 22 years old. As it can be seen in Graph 11, they had a final score between 34 and 63, which indicates that it may be necessary to mitigate the use of technologies, for they strongly suggest a form of dependency. Two of the eight respondents had scores above 64, which indicates the need for them to seek professional help to identify the cause of the technological dependence, and seek to treat it.



Graph 11: Test score count

After the changes suggested in the first evaluation, the application was again presented to young people, and they were asked about its ease of use and its usefulness. In the second evaluation, the app obtained a 100% evaluation by the young respondents, as it can be seen in Chart 6.

	Abouteaseof use			About the utility of the app		
User	1	2	3	4	5	6
01	Yes	Yes	Yes	Yes	Yes	Yes
02	Yes	Yes	Yes	Yes	Yes	Yes
03	Yes	Yes	Yes	Yes	Yes	Yes
04	Yes	Yes	Yes	Yes	Yes	Yes
05	Yes	Yes	Yes	Yes	Yes	Yes
06	Yes	Yes	Yes	Yes	Yes	Yes
07	Yes	Yes	Yes	Yes	Yes	Yes
08	Yes	Yes	Yes	Yes	Yes	Yes

Chart 6: Second evaluation of the app from the point of view of adolescents and young adults

Two of the respondents mentioned that they liked the application, and especially the idea of alerting and offering the opportunity to identify when to deal with the problem of technological dependence.

IV. Final Considerations

The results of this research empirically proved the signs and problems arising from the overuse of digital technologies and brought as main contribution the Girassol application, which helps to identify the right moment to intervene in order to reduce the negative impacts of digital technologies on the mental health of adolescents and young people.

The app was evaluated twice. Between these evaluations there were several updates, among them: new function suggested in the first validation, on-screen data update, complementary information at the end of the questionnaire, presenting phrases for a better understanding after identify the dependency level, where professional help is indicated in case of risk.

This work is important to draw the attention of parents and educators to the way in which adolescents and young people are using technology and to help identify the moment when it is necessary to intervene to reduce the negative impacts on their mental health.

For future work, we intend to continue with the updates and follow the suggestions made by experts and improve the usability of the app.

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We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

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3. Ensure corresponding author's email address and postal address are accurate and reachable.
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Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

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The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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Tips for writing a good quality Computer Science Research Paper

Techniques for writing a good quality computer science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of computer science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10.Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
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- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

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Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

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This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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