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Cloud Computing Public Policies (CCPP): The Role of Economic Freedom in IT Readiness to Implement CCPP

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CLOUD COMPUTING PUBLIC POLICIES (CCPP): THE ROLE OF ECONOMIC FREEDOM IN IT READINESS TO IMPLEMENT CCPP

1 INTRODUCTION

The environment has a critical role in development of business and innovation. Information Technologies (IT) are one kind of technologies that need a good business and innovation environment. Organizations can prepare a complete cycle of management to implement new technologies by contracting experienced IT managers (Armstron & Sambamurthy, 1996; Weill & Olson, 1989), CIOs (Armstron & Sambamurthy, 1996) or skilled IT team (Somers & Nelson, 2001).

However, even the organizations with higher levels of internal structuration suffer with external factors. Shin and Edington (2007) proposes a framework when statal changes in laws and normative interferes directly in IT projects. These uncertainties yet could be generated protectionists mechanism imposed by governmental agencies. Alreemy, Chang, Walters and Wills (2016) complement arguing that better regulatory environments promote superior positions in competition worldwide.

Shin and Edington (2007) reinforce this argumentation citing problems presents in IT environment, like the political instability between India and Pakistan, that interferes in projects of IT outsourcing. Spremić, Žmirak and Kraljević (2008) cite the example of Croatia, when some the government do not promote adaptation in public policies, resulting in too much barriers to implement IT solutions.

Majority of cloud computing public policies (CCPP) are sustained for IT public policies (ITPP), what means that there is a few specific policies to regard CC, and the ITPP umbrella covers CCPP (Jaeger, Lin, & Grimes, 2008). There are tinies, but controversial, initiatives. Atkinson (2014) comments that China government considers CC as a long-term strategic technology, included in State Informatization Development Strategy (2006-2020). However, China policies has prioritized the national companies domination (Atkinson, 2014) based on strong local standardization and certifications instead harmonization with international good practices (Business Software Alliance, 2018b). In contrast, Dias, Sano and Medeiros (2019) mentioned the South Korean national council for CCPP that includes multiples stakeholders of the society as members, like universities, private groups, governmental agencies, corporations, research institutes.

Now, we deepen the analytical approach, enlarge the number of years and englobe countries of all continents. Costa and Medeiros (2018) evaluate only CCPP of BRICS between 2012 and 2016, Rahman and Iqbal (2019) assess only Latin America countries in a cross section and Irion (2011) discuss only CCPP in English languages countries. These smithereens of literature showed us that there is lack of robust international overview. In such manner, we aim to analyze worldwide CCPP and its relations with economic freedom.

This paper is presented in five chapters. This first one introduces the context, thematic, objectives, relevance and advances in relation to other similar paper. Next chapter presents the theoretical background with definitions that based our research of CC and CCPP. The third relates the methodological procedures of data collected and analysis. The fourth describes the analysis and discussions of results. The last synthetizes the main findings, present the limitations and suggestion for future studies.

2 THEORETICAL BACKGROUND

We based our theoretical background from the seminal definitions of Cloud Computing (CC) to recent international agenda. We discuss that our proposition fills an empirical gap of literature, open a new research boundary and outline future studies.

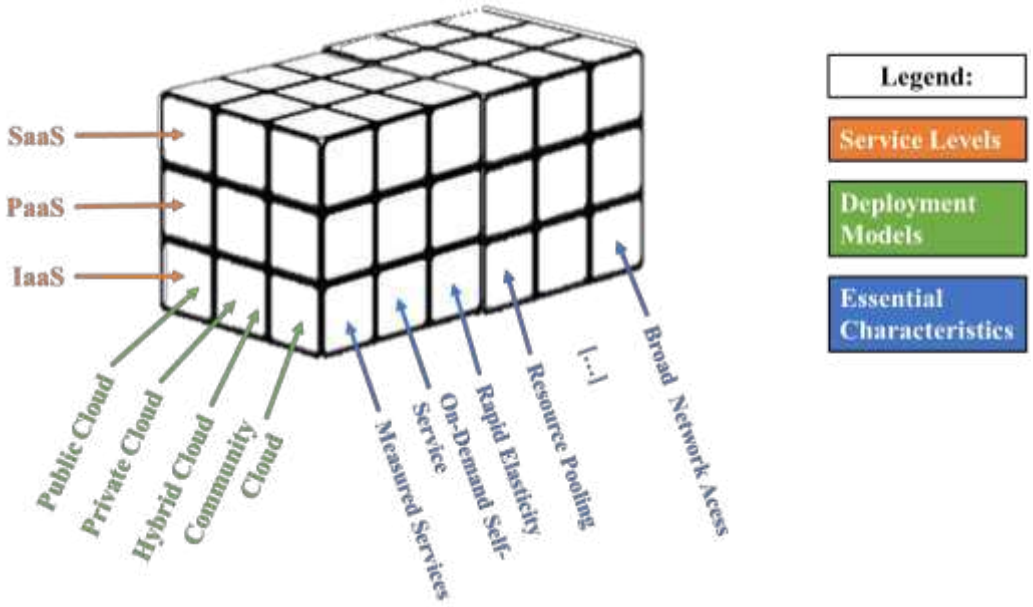
2.1 CLOUD COMPUTING (CC) AND RESEARCH AGENDA

CC refers to a set of configurable computational resources present on the internet (Mell & Grance, 2011) that "are computing services delivered over the internet, on demand, from a remote location" (Wyld, 2009). The [North American] National Institute of Standards and Technology (NIST) Report (Mell & Grance, 2011) proposes a classification involving characteristics, models and services. According to Pinheiro Junior (2017), this classification is widely used in worldwide studies. For NIST Report, CC is characterized by fast elasticity and service on demand, measurement of service, ability to support various applications through a platform or infrastructure and ubiquitous network.

The models or types of CC, however, can be: public, private, community and hybrid. The public cloud is characterized by payment for the service, depending on its use, usually where companies offer different services. The private cloud is an infrastructure specific to the organization, but that can be managed by third parties. The community cloud is created for specific groups of organizations with common interests. Finally, the hybrid cloud, which is the combination of one or more models (Mell & Grance, 2011). Right Scale (2016) there is a great demand for the use of the hybrid cloud, for the sharing of types.

Finally, the classification also deals with CC services. These can be software (SaaS), platform (PaaS) or infrastructure as a service (IaaS). SaaS corresponds to applications offered as a service, which can be accessed by various devices through APIs. In PaaS the capacity is made available by the provider to the developer of applications that will run on cloud. And, the IaaS is related to the provision of processing, storage or network capacity (Mell & Grance, 2011; Veras, 2012).

Figure 1: CC Framework.



Source: Based on NIST Report (Mell & Grance, 2011), adapted from Craig-Wood (2010).

In an Systematic Literature Review (SLR), Pinheiro Junior (2017) finds that major of Brazilian published articles are about individual aspects of usage and adoption and Vieira and Meirelles (2015) conduces a SLR to better understand which factors influences CC firms usage, however, it is not a Brazilian uniqueness. In one of the CC first empirical research, Wyld (2009) made a survey with IT managers, like Diniz, Costa and Medeiros (2017). Yang and Tate (2012) describe similar results to Pinheiro Junior (2017), with larger number of adoption questions.

2.2 CLOUD COMPUTING PUBLIC POLICIES (CCPP)

Jaeger, Lin and Grimes (2008) were the first to think in Cloud Computing Public Policies (CCPP). Irion (2011) comments that initial discussions are above the risk of appliance this new technology. Since Rogers (1983) Theory of Diffusion of Innovation to modern models of usage and acceptance of technologies the risk is an enemy to CC advance, as mentioned by the author (p. 82): “innovations perceived as most economically rewarding and least risky were adopted more rapidly”. This sentence directs politicians, government and CCPP decisions. Jaeger, Lin and Grimes (2008) reinforce that this phenomenon causes a gap between market practices. Marston, Li, Bandyopadhyay, Zhang and Ghalsasi (2011) cites an example when the reglementary agency retroact the new normative to punish a company. Instabilities like this could generate damage to the market.

In two SRL, the authors finds that securities aspects are related with CC implement. Yang and Tate (2012) relates that process of restrictions and authentications, audits and creation of mechanisms of protections are discussed. Backe and Lindén (2015) treat about, almost exclusively, CC security aspects. These two systematic reviews showed us that there is too much research developed in solutions to solve technical problems than public policies (PP), emphasizing the Jaeger, Lin and Grimes (2008) mentioned gap. Leading us to conclude that the free market could provide a faster solution than PP.

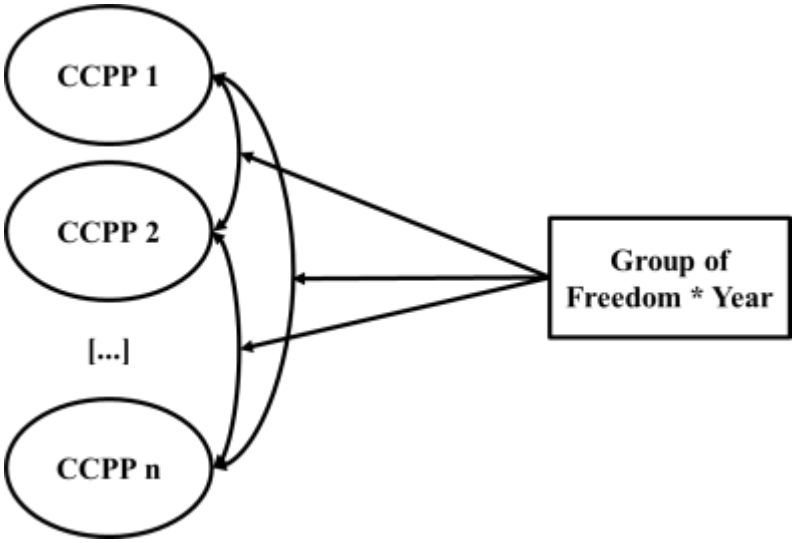
Costa and Medeiros (2018) analyzed BRICS situation of CCPP between 2012 and 2016. They found that Brazil is the country with faster growth of improvements in public policies. The main aspects that support Brazilian evaluation are related to security, prevention of cybercrimes and guarantee intellectual property. In other hand, this country also promotes large investments in infrastructure. In this period, Brazil also exceed China in readiness to implement CCPP, Russia and India advanced no later than half of Brazilian growth and South Africa grew little less than Brazil.

Meanwhile, CCPP in Japan, Australia, Germany, United States and France practices are much more developed (good evaluated) than BRICS or MERCOSUR. Even with the growth, emergent countries need to improve your public policies in aspects like promotion of free market – non protectionists laws, support to international standardization and rules harmonization (Costa & Medeiros, 2018). Based on that discussion, we propose the following hypothesis:

H1 = The level of economic freedom, practiced by a country, is positively related with its readiness for IT and Cloud Computing Public Policies implementation.

To support this hypothesis, we pretend to relate economic freedom and readiness for implement a public policy. With the propose to complement the analysis and discussions, we sperate the countries in different groups of economic freedom, instead only correlate the both indicators to test hypothesis. This analysis consists in a more accurate and detailed degree to better comprehend in a multivariate manner.

Figure 2: Complementary (detailed) research model.



Source: Authors (2020).

In our perspective, this complementary model presents all pairwise correlations (represented by double arrowed linkages) between categories of CCPP evaluation in each *group of freedom*

(that represents degrees) for each *year available* (from 2012 to 2018). CCPP can be evaluate in other *n* dimensions, like data privacy, security, cybercrime, intellectual property rights, support to market standardization, promotion of free market, information and communication infrastructure. These results can introduce new insights to the literature, creating bases for more peculiarities to be analyzed in a future research agenda. As we identified in the surveyed literature, there is a lack of research in country level analysis of CCPP.

3 METHODOLOGICAL PROCEDURES

This research aim is to describe the relationship between the characteristics of readiness to implement a Cloud Computing Public Policy (CCPP) and economic freedom. To execute the paper objective, we collected data from two different reports, merge and treat the datasets, analyze and describe results to test and support the research question.

To the construction of the statistical model, we collected data from Business Software Alliance – BSA Reports of Global Cloud Scorecard (Business Software Alliance, 2011, 2013b, 2013a, 2016, 2018b). We analyze all yearly publicized reports (2012, 2013, 2016 and 2018). For the theoretical background and discussion of results, we use both Global Cloud Scorecard and individual Country Reports to understand qualitatively the changes of CCPP over time. To analyze economic freedom, we used the research developed for The Heritage Foundation, the Index of Economic Freedom. We match the same countries that were studied in both indicators to made our analysis.

We categorize the CCPP in seven groups based on BSA Cloud Computing Reports: data privacy (DP), security (SEC), cybercrime (CY), intellectual property rights (IPR), support to market standardization (STD), promotion of free market (FREE), information and communication infrastructure (ITI). Each of these seven variables compose a total standardized score (ranging from 0% to 100%) what means ideal environment of IT readiness to implement a CCPP.

We analyze the data in Stata 15® using *mvcluster* package to separate the countries with higher levels of economic freedom from those with lower levels. We test different clusters algorithms to find what better fits with data: two partitional/non-hierarchical (Kmeans and Kmedians) and four hierarchical (Ward, Centroid, Single and Complete Linkages) clustering (Judson, 1998) both based on two tips of calculation of distances: Euclidean and Canberra (Gower, 1971).

With all results of cluster analysis, we choose the algorithm that proportionate greater levels of homogeneity: groups with different averages and less internal variance as possible. We applied the package *anova* to conduct this analyze and present F statistics to base the choice. We also applied the *oneway* package, that present Bartlett's test for equal variances, possibilities to correct different variances and multiple-comparison tests (Searle, Casella, & McCulloch, 1992).

In non-normal conditions, we replace Bartlett's to robust Levene's test in *robvar* package, when there are no condition to apply traditional Analysis of Variance (Brown & Forsythe, 1974; Carroll & Schneider, 1985; Conover, Johnson, & Johnson, 1981; Gastwirth & Miao, 2009; Markowski & Markowski, 1990) we made non-parametric rank based Kruskal-Wallis H test (*kwallis* package) or robust Regression (*regress* package with correction to heteroscedasticity) to test difference between the groups (Kruskal & Wallis, 1952, 1953; White, 1980).

After, we use *sem* package (Acock, 2013) to test the moderation of economic freedom cluster classification between the correlations of seven groups of variables (DP, SEC, CY, IPR, SMS,

FREE and ITI) that measure IT readiness to CCPP. In this way, we can find what group have higher levels of IT readiness and the mean difference between them. We also use packages of basics descriptive statistics to describe the profile of researched countries and characterize the sample of hypothesis.

4 ANALYSIS AND DISCUSSIONS OF RESULTS

Initial results – based on descriptive statistics – shows that highest levels of economic freedom are from Oceania continent, we also observe that this continent have the higher levels of readiness to implement CCPP (BSACCPP). Since infrastructure of information and communication (ITI) until guarantees to data privacy (DP). This is only the first result able to support the study hypothesis.

On the other hand, we can observe the African results. This continent, at same time, have the minor economic freedom and readiness to implement CCPP. But, differently from Oceania, which reach the higher score in all variables, Africa have not the lower score in all indicators that compose BSACCPP, owning the second place in combating cybercrime (CY) and support to market standardization (STD). Likewise, in general lines, this result contributes to support the hypothesis.

Notwithstanding, we highlight that could have some different levels and heterogeneity in the same continent, like America or Asia. Some parts of America have higher levels of economic freedom, as United States and Canada, contrasting with Brazil and Argentina, with rigid economic. The same can be observed with opposing Japanese or South Korean economy with Chinese or Vietnamese.

Table 1: Descriptive statistics.

	America		**Europe**		**Oceania**		**Africa**		**Asia**	
Variable	**Mean**	**CV (%)**	**Mean**	**CV (%)**	**Mean**	**CV (%)**	**Mean**	**CV (%)**	**Mean**	**CV (%)**
Freedom	64,8	18,8	65,4	10,9	81,7	1,6	62,4	0,9	65,1	17,3
ITI	15,1	29,0	17,4	17,2	19,9	12,8	10,7	13,3	15,0	35,4
FREE	6,9	58,4	7,5	34,5	7,6	15,2	2,9	73,7	5,3	53,8
STD	8,1	37,9	9,6	15,5	10,6	11,8	10,2	8,3	8,7	14,7
IPR	11,5	31,8	14,1	25,7	15,7	24,2	11,9	33,2	12,0	35,8
CY	8,5	25,8	9,0	19,2	10,2	9,0	10,1	5,9	7,5	27,2
SEC	6,1	32,4	7,1	28,1	7,4	30,7	3,5	10,9	4,9	52,1
DP	7,0	34,9	6,9	29,0	8,6	15,2	5,8	60,2	5,9	38,7
BSACCPP	63,2	22,8	71,6	15,7	80,0	0,8	55,1	9,4	59,2	26,6

Source: Authors (2020).

We observed two main results of cluster analysis: partitional methods indicates 3 clusters (k = 3) and hierarchical methods indicates 4 clusters (k = 4). Comparing the F statistics of hierarchical methods is possible to assume that single – nearest-neighborhood – linkage obtain

the worst performance. Seeking for the same in partitional methods, Kmeans performs discreetly better than Kmedians, with carefully greater relevance to Euclidean distance.

Finally, we choose Kmeans with Euclidean distance clustering method driven by his parsimonious, which combine better separation of groups average with the formation of fewer number of groups. An expected result of cluster analysis separation was the creation of two groups, distinguishing countries with higher level of economic freedom from those with lower levels. Meanwhile, the results do not support this expected fit, and we observed a creation of an intermediated group.

Table 2: Chosen of clusters number.

Method / k		Distance	2012	2013	2014	2015	2016	2017
F | Kmeans	k = 2	Euclidean	35,0	39,1	40,0	47,8	52,4	50,3
	k = 3	Euclidean	**67,6**	**61,7**	**51,1**	**53,9**	**56,0**	74,6
	k = 4	Euclidean	62,3	59,1	42,8	41,6	45,7	**96,9**
	k = 2	Canberra	35,0	39,4	40,0	47,8	52,4	51,2
	k = 3	Canberra	**69,3**	52,8	**46,2**	**53,6**	**51,8**	74,6
	k = 4	Canberra	62,3	**59,1**	41,5	41,6	40,4	**96,0**
F | Kmedians	k = 2	Euclidean	35,0	39,1	40,0	47,8	**52,4**	50,3
	k = 3	Euclidean	**69,3**	**57,9**	**48,1**	**53,6**	51,8	66,0
	k = 4	Euclidean	44,8	51,1	36,6	41,6	40,4	**91,0**
	k = 2	Canberra	35,0	39,5	**39,0**	47,8	**52,4**	50,3
	k = 3	Canberra	**69,3**	**55,3**	24,2	**49,2**	51,8	66,0
	k = 4	Canberra	40,5	51,1	36,6	36,9	40,4	**91,0**
F | Ward	k = 2	Euclidean	42,7	39,1	38,0	**47,8**	**52,4**	47,5
	k = 3	Euclidean	49,1	57,9	43,1	38,1	51,8	74,6
	k = 4	Euclidean	**85,3**	**79,5**	**56,7**	55,2	53,4	**87,7**
	k = 2	Canberra	35,0	31,6	34,5	**47,8**	**52,4**	47,5
	k = 3	Canberra	49,1	57,9	**43,1**	38,1	51,8	74,6
	k = 4	Canberra	**85,3**	**79,5**	38,5	55,2	53,4	**87,7**
F | Centroid	k = 2	Euclidean	18,7	5,9	16,2	6,0	5,4	6,5
	k = 3	Euclidean	59,5	26,8	**48,5**	6,3	6,3	30,3
	k = 4	Euclidean	**85,3**	**60,6**	38,6	**27,8**	**38,5**	**97,4**
	k = 2	Canberra	35,0	31,6	4,6	4,8	5,2	6,5
	k = 3	Canberra	**59,5**	**50,9**	6,3	6,3	38,2	24,3
	k = 4	Canberra	51,2	36,8	**21,0**	**34,5**	**38,5**	**97,4**
F | Single	k = 2	Euclidean	5,7	5,9	6,2	6,0	5,4	6,5
	k = 3	Euclidean	28,6	5,3	6,3	6,3	6,3	**24,3**
	k = 4	Euclidean	**40,7**	**8,3**	**9,0**	**21,3**	**38,5**	16,6
	k = 2	Canberra	15,3	3,6	4,6	4,8	5,2	6,5

	k = 3	Canberra	19,4	5,3	6,3	6,3	6,3	15,6
	k = 4	Canberra	**21,9**	**9,8**	**9,0**	**21,3**	**17,1**	**16,6**
F | Complete	k = 2	Euclidean	35,0	31,6	16,2	31,5	42,0	47,5
	k = 3	Euclidean	59,5	50,9	30,1	**55,0**	56,0	74,6
	k = 4	Euclidean	**85,3**	**79,5**	**57,7**	54,4	**58,1**	**97,4**
	k = 2	Canberra	42,7	39,1	32,0	32,6	27,9	47,5
	k = 3	Canberra	43,7	47,5	**48,5**	**41,8**	**56,0**	**60,6**
	k = 4	Canberra	**67,4**	**57,0**	38,6	33,0	46,6	55,3

Source: Authors (2020).

Succeeding the classification of countries in clusters, we must describe the characteristics of each group. The first one has greater means of readiness to implement CCPP. The pooled mean is nearest to the levels of 2013 and, longitudinally, is possible to observe the growth of this group. Notwithstanding, the growth rate is decreasing. The two other groups hold growth rates from 2012 to 2016, decreasing in 2018 evaluation.

As statistical result, we can view in Table 3 that Kruskal-Wallis H test, Analysis of Variance (Anova) and Robust Regression demonstrates that and all techniques converges to the same conclusion: at least one group have a different mean, or central tendency. As detailed in Anova and H post-hoc tests and regression analysis, all means differs significantly from each other in all years and pooled analysis.

Based on observation that all means are different, we can detect a pattern of variation between the groups. In all years, for both indicators (Economic Freedom Index or BSACCPP), Group 1 is the first one with more economic freedom and readiness to implement CCPP, followed by Group 2 and Group 3, with tiniest levels. With these results is possible to assume that are strong evidences to support the hypothesis studied, to the confirmation that the countries with highest levels of economic freedom are yet those of higher readiness to implement ITPP, especially in our study, the CCPP.

As a complementary result, we can see that Group 1 maintained similar variability (lower than 10% of coefficient of variation) in economic freedom and BSACCPP. While the variability is, approximately, 3 times larger in Group 3 and almost 5 times largest in Group 2 on BSACCPP index of CCPP readiness. We cannot increase the number of clusters as a result of the sample size analyzed for BSA and because we choose a cleaner approach to interpret the dataset, with lowest number of clusters as possible. If BSA analyzed the same countries of Economic Freedom Index we could identify some non-observed heterogeneities in Groups 2 and 3, that are creating major degrees of variation.

Table 3: Test of hypothesis.

						p-value		
Year	**Descriptive Statistics**	**Group 1**	**Group 2**	**Group 3**	**Total**	**Kruskall Wallis**	**Analysis of Variance**	**White Robust Regression**
	Mean	78,52	66,77	48,54	64,88	0,001	0,001	0,001

Pooled BSACCPP	CV (%)	4,14	19,10	13,21	22,68			
2012	Mean	76,00	64,36	47,03	62,70	0,002	0,001	0,001
	CV (%)	4,56	21,64	15,24	23,77			
2013	Mean	78,01	65,77	50,40	64,86	0,002	0,001	0,001
	CV (%)	2,17	20,55	13,34	21,84			
2016	Mean	79,89	69,28	51,43	67,17	0,001	0,001	0,001
	CV (%)	2,90	17,70	10,49	20,76			
2018	Mean	80,17	67,67	45,29	64,79	0,001	0,001	0,001
	CV (%)	4,71	18,83	12,18	25,20			
Pooled Freedom	Mean	77,82	65,68	53,73	65,73	0,001	0,001	0,001
	CV (%)	7,00	5,70	7,93	15,58			
2012	Mean	77,40	64,87	52,84	65,02	0,001	0,001	0,001
	CV (%)	8,34	5,54	6,71	16,20			
2013	Mean	77,70	65,24	52,93	65,28	0,001	0,001	0,001
	CV (%)	7,85	5,02	7,34	16,15			
2016	Mean	77,72	65,89	53,21	65,64	0,001	0,001	0,001
	CV (%)	6,69	6,63	9,63	16,18			
2018	Mean	78,44	66,71	55,93	66,99	0,001	0,001	0,001
	CV (%)	6,61	5,97	8,02	14,60			

Source: Authors (2020).

This characterization is further import to better understand the groups profiles in following moderate analyses. As general result is possible to interpret that, practically, all correlation coefficients are positive in second group. Albeit, this means that the same countries are above the average in both variables correlated, at same moment and in all years investigated, while the other countries are always below.

Information and Communication Infrastructure (ITI) and Intellectual Property Rights (IPR)

There are negative correlations between IT infrastructure and safety related aspects for Group 1 in almost all years. This could be the phenomenon mentioned by Jaeger, Lin and Grimes (2008), when there is a lack among the market practices and statal reaction to regulament. The positive correlation in Groups 2 and 3 represents that there are some parity on levels of infrastructure – slower than most freedom countries – and the creation of regulation that could lead to guarantee safety. This can create the market rebalancing, directing investiments to developing countries, as related by Marston et al. (2011, p. 183), market vanguard can handle with judicial instabilities and the regulamentary could strongly impacts the usage of CC, and "developing countries can possibly have an advantage here". Most of Group 2 and 3 contries are in develop and Group 1 countries are developed economies.

Similar discussion can be realized in the insertion of intellectual property rights in discussion. One of first discussion of CCPP is about how much a country PP could guarantee safety for

IPR (Jaeger et al., 2008). Kushida, Murray and Zysman (2011) concludes that the market shape is composed by a combination of policies decisions and market dynamics, and the solution could converge to democratic South Korean solutions, for example. Dias, Sano and Medeiros (2019) comments that they created councils with multiple stakeholders to decide the CCPP.

Support to Market Standardization (STD), Promotion of Free Market (FREE)

The relationship of these two variables is almost always positive, except in 2018 for Group 3. This means that promotion of free CC market consists to variate at same time the support to market standardization. The countries with highest levels of promotion of free market are also the same with highest levels of international market standardization. This behavior crosses the groups of economic freedom and can be detected from Group 3 to Group 1. Although, these two variables are differently related with other analyzed in statistical model, we will focus on discussion of its relations with the three aspects of safety: data privacy, security and prevention of cybercrime.

Excepting the correlation within market standardization and data privacy, all coefficients linked to safety are positive related to market standardization for Group 1. We can identify a different pattern in Group 3, when the relations whose predominate are negative. This result represents that, among the countries with greater economic freedom and promote harmonization with international rules, there are highest levels of safety perception. While, the countries with less economic freedom, even ensuring aspects of safety or market harmonization/standardization individually, do not reaches both simultaneously.

Data Privacy (DP), Security (SEC), Cybercrime (CY)

These three aspects are responsible for measure how safety is a country to implement CCPP. Business Software Alliance (2018a) comment that there is a component of reliability, trustworthiness and assurance to be regarded, because exist a tenue limit that separates a good and needed regulation from those who causes instabilities. Due to ubiquitous characteristics of CC, interchangeability of policies among the countries could generate lacks of IT development. For this reason, there is some mechanisms with international recognition, like General and Personal Data Protection Regulations (GDPRs), APEC Cross Border Privacy schemes (CBPRs) and applications of The Budapest Convention on Cybercrime principles, as main examples.

When comparing with similar countries (Group 3), Vietnamese, Brazilian and Chinese economies are two examples of longitudinal worst evaluations in at least two of three aspects of safety. The examples of Group 2 are South Africa, Thailand and Turkey and, for Group 1, are South Korea and Singapore. Therefore, we found at least one Asiatic country in each level of economic freedom which holds constant non-safety characteristics.

Table 4: Detailed analysis of study hypothesis, complementary model.

	Group 1					**Group 2**					**Group 3**				
Corr.	**Pooled**	**2012**	**2013**	**2016**	**2018**	**Pooled**	**2012**	**2013**	**2016**	**2018**	**Pooled**	**2012**	**2013**	**2016**	**2018**

iti, free	-0,82	-0,98	-0,45	-0,15	-0,51	0,70	0,88	0,90	0,87	0,70	-0,08	-0,03	0,17	0,16	-0,36
iti, std	-0,50	-0,20	-0,62	-0,74	-0,79	-0,02	0,14	0,11	0,30	0,16	-0,62	-0,78	-0,69	-0,70	-0,48
iti, ipr	0,78	0,99	0,71	0,36	0,84	0,62	0,65	0,73	0,74	0,75	0,41	-0,02	0,38	0,29	0,54
iti, cy	-0,15	0,31	0,07	-0,18	-0,35	0,22	0,31	0,42	0,47	0,52	-0,12	-0,11	0,15	0,17	-0,24
iti, sec	-0,42	-0,16	-0,42	-0,09	-0,20	0,65	0,91	0,89	0,80	0,82	0,12	0,55	0,46	0,46	-0,10
iti, dp	-0,40	-0,28	0,00	-0,63	-0,59	0,36	0,71	0,73	0,22	0,35	0,17	0,68	0,22	-0,82	0,03
free, std	0,26	0,09	0,15	0,62	0,65	0,45	0,27	0,35	0,45	0,55	0,20	0,46	0,27	-0,03	0,22
free, ipr	-0,61	-0,99	-0,70	-0,87	-0,45	0,21	0,75	0,72	0,69	0,71	0,32	0,44	0,76	0,29	-0,21
free, cy	0,14	-0,24	0,20	0,54	0,57	0,58	0,54	0,50	0,47	0,75	0,35	0,77	0,29	0,74	0,76
free, sec	0,17	0,06	-0,26	0,03	0,36	0,77	0,84	0,87	0,88	0,55	0,50	0,46	0,68	0,81	0,53
free, dp	0,14	0,14	-0,23	-0,14	0,36	0,60	0,62	0,69	0,39	0,73	-0,01	0,15	-0,19	-0,17	0,09
std, ipr	-0,65	-0,11	-0,70	-0,65	-0,50	-0,29	0,28	0,51	0,58	0,55	-0,02	0,23	0,36	0,36	-0,97
std, cy	0,46	0,08	0,09	0,62	0,26	0,67	0,14	0,35	0,31	0,80	0,10	0,47	-0,44	-0,45	0,27
std, sec	0,70	0,34	0,56	0,33	0,55	0,34	0,27	0,27	0,43	-0,10	-0,25	-0,26	-0,25	-0,52	-0,29
std, dp	0,62	0,74	-0,01	0,03	0,50	0,60	0,16	0,17	0,44	0,73	-0,01	-0,49	-0,03	0,38	0,23
ipr, cy	-0,38	0,30	0,11	-0,21	-0,10	-0,11	0,62	0,40	0,45	0,79	-0,35	0,40	-0,09	-0,22	-0,29
ipr, sec	-0,71	-0,17	-0,38	-0,33	0,23	0,15	0,83	0,85	0,87	0,59	-0,16	-0,24	0,49	-0,09	0,21
ipr, dp	-0,60	-0,21	0,12	-0,16	-0,82	0,01	0,46	0,61	0,44	0,53	0,20	-0,41	0,26	-0,37	-0,18
cy, sec	0,37	-0,23	-0,19	-0,15	0,58	0,54	0,46	0,59	0,59	0,23	0,55	0,54	0,70	0,85	0,38
cy, dp	0,01	-0,59	-0,65	-0,46	-0,23	0,64	0,21	0,36	0,76	0,79	0,04	0,26	0,23	0,10	0,14
sec, dp	0,50	0,55	-0,34	-0,27	-0,12	0,60	0,79	0,79	0,56	0,25	-0,35	0,85	0,12	-0,39	-0,69

Source: Authors (2020).

Summarily, the main discussions are around the three safety aspects: data privacy, prevention to cybercrime and security. Kushida, Murray and Zysman (2011) mentioned that these aspects are the most volatile worldwide, and the relation among economic freedom and readiness to implement CCPP are still incipient, like we discuss in almost all literature reviews researches (Pinheiro Junior, 2017).

5 CONCLUSIONS

In a wide vision of this empirical research paper, we propose a hypothetical study based on discrete evidences presented in literature. These small tracks lead us to synthetize similar publications, that treat mainly of IT public policies, and reasoning our hypothesis for analogy, whereas CCPP are also under the ITPP umbrella, as mentioned by Jaeger (2008).

With our research, we founded that the countries with higher levels of economic freedom are the better evaluated as ready to implement CCPP. We based our findings on merging the surveys published by Business Software Alliance and The Heritage Foundation. We conclude that excessive intervention of governmental agencies and statal and judicial instabilities promotes retardment in technological development and isolation of the international market, especially in cloud computing environment – analyzed in present paper.

Based on that conclusion, we reinforce the Jaeger (2008) suggestion. So, education is always a first step to avoid bad usage. Topics like ethics in data treatment needs to exhaustively discussed in technical courses formation, undergraduate and graduate programs. With new possibilities brought by technologies, the society must to discuss new practices to guarantee individual freedom and privacy, market spontaneous movements and natural growth based on voluntary exchanges.

Direct interventions in public policies causes distortions that difficult the growth of CC market. In such manner, we recommend that policymakers stay heeded in creation of legal mechanisms in new technologies usage. Like related in Dias, Sano and Medeiros (2019), South Korea has developed higher levels in readiness to use CC based on to promote dialogue between the stakeholders in a democratic environment. And this environment of freedom is what collaborates with technology development. Based on that conclusion, we suggest the replication of present study with other emergent technologies, like internet of thing/everything (IoT and IoE), big data and analytics, artificial intelligence, etc. We hope to find similar empirical results in the relationship observed between IT readiness and economic freedom.

As general limitation, we are treating macro variables and there are some chances that exist other variables that explain or are related with readiness to implement an CCPP. However, the CC literature are predominant published in proceedings or (chapter of) books and part of it treat (or even ITPP) with the level of managers (CEO, CIO, leaders), user (usage behavior, acceptance) or workers (IT teams or technicians, students, programmers). Consequently, there are some levels of lack to study countries as unity levels.

As suggestion, other studies could analyze the hypothesis specifications tested in present study, something similar of Costa and Medeiros (2018), that studied, comparatively, the CCPP of BRICS countries. To present evidences (or counterfactuals), future studies could cross (more) qualitative information to analyze the relationship of economic freedom and readiness to CCPP implement.

As specific limitation, the dataset used is based on BSA Reports that studies 28 countries longitudinally. The final consequent is to present well-defined correlations coefficients (with sometimes ranging until 0,5) without statistical significance. These reports present the best proxy as possible to evaluate CCPP systematically.

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