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Organizational Resistance to Technology Diffusion: The Case of IPv6

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Abstract*—IP address is an essential protocol to identify every connected device to the Internet uniquely. IPv6 was developed as a long-term solution to overcome IPv4's shortcomings. However, IPv6 adoption is still very rare. Organizations tend to resistance to adopting and implementing IPv6 on their network. This study aims to develop and test a model of organizational resistance to IPv6, an Internet Protocol (IP) intended to replace IPv4, the widely used incumbent. This exploratory mixed-methods study analyzed interview data from Indonesian organizations, supplemented with insights from prior literature, to identify factors of organizational resistance to IPv6. A subsequent survey of Indonesian organizations was conducted to assess the relationship of each factor with IPv6 resistance. The survey data was then rigorously analyzed using PLS-SEM. While IPv6 is typically portrayed as an essential Internet infrastructure development, Indonesian organizations perceive it as unnecessary and threatening. A Structural Equation Model of IPv6 Resistance was developed and posits that although perceived threat, perceived lack of need, and environmental influences all influence organizational resistance to IPv6, switching costs and satisfaction with current technology have no impact. This study has practical implications for organizations that aim to promote IPv6 diffusion; promotion strategies should address the key factors identified in this study. While prior models of technology resistance have focused on individual-level resistance to technologies promoted from within the organization, this study focuses on organizational-level resistance to technology promoted by sources external to the organization and hence makes a new theoretical contribution.

***Keywords*— IPv6; technology diffusion; technology resistance; Internet Protocol; mixed methods.**

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I. INTRODUCTION

The Internet is a complex technological system based on a multitude of protocols and standards, some of which are recent innovations while others are of far greater age. One of the most important protocols, and practically part of the ancient bedrock upon which the Internet sits, is Internet Protocol version 4 (IPv4). IPv4 was developed in the 1970s at a time when the Internet bore little similarity to the network as we know it today; that it has survived far longer than any of the Internet's pioneers would have expected is a testament to the effectiveness of its design. Nevertheless, the huge and unanticipated expansion of the Internet that occurred in the early 1990s revealed a weakness in IPv4: the protocol only supports a maximum of 4.3 billion IP addresses, and since every device connected to the network requires a unique address, this number was effectively a theoretical upper limit on the number of devices that could be connected to the Internet. Such numbers were inconceivable in the 1970s but by the 1990s it became clear that they would become insufficient to meet increasing demand and accommodate modern-day internet requirements [1].

Therefore, a new standard known as IPv6 was introduced to replace IPv4. IPv6 equips various features to accommodate the required technology for the Internet today and in the future. However, the adoption of IPv6 was very rare [2], [3]. Today, two decades after the release of the IPv6 standard, its adoption remains negligible, as Dell [2] notes IPv4 with NAT is still how the vast majority of Internet devices are provided connectivity–despite complete exhaustion of the IPv4 address space commencing in 2011.

A 2014 measure of peak IPv6 traffic was that it constituted approximately only 0.25% of peak IPv4 traffic, while more recent reports of the proportion of IPv6 traffic range from less than 1% to 4% [3]. The Internet measurement problem is "sufficiently complicated" that the Association for Computer Machinery (ACM) has dedicated an annual conference to the topic since 2001. The published figures vary by magnitude due to ambiguity about what is actually being measured [4]. IPv6 traffic also varies from region to region, and the majority originates in the US [5], while Google's IPv6 statistics show that in most parts of the world, it remains almost non-existent [6]. The lack of IPv6 diffusion is perhaps even more surprising given that the fundamental reason for the development of IPv6 was the limited address space available in IPv4 [7], and indeed, IPv6 advocates expected that its much larger address space would be the "key factor" that drove its success [5].

One possible explanation for this lack of demand for IPv6 is the uneven distribution of IPv4 address space [2]. A disproportionate share of IPv4 address space went to countries in which the Internet diffused relatively early, and consequently, the United States and Australia have relatively large address space allocations. In contrast, the Internet did not take off in Indonesia until later, and the number of addresses per user is much lower, as presented in TABLE I

TABLE I
ALLOCATION AND POPULATION BY COUNTRY

Country	Addresses allocated (000s)	Internet users (000s)	Population (000s)	Address per user	Address per capita
United States	1,594,205	276,600	321,367	5.76	4.96
Australia	49,182	20,200	22,751	2.43	2.16
Indonesia	19,083	42,400	255,994	0.45	0.07

For this reason, one might expect Indonesian interest in IPv6 to be higher than Australia and the United States. Moreover, the Indonesian government is targeting to become the largest digital economy in Southeast Asia [8], impacting the increasing need for the Internet. However, among Indonesian organizations, the same pattern is replicated: awareness of IPv6 is high, but the level of readiness remains extremely low. Very few Indonesian organizations have taken steps to prepare for IPv6 adoption, and there is widespread intent to continue relying on IPv4.

Therefore, it is very important to understand why Indonesian organizations resist IPv6 rather than encouraging its adoption, despite experiencing a more acute scarcity of IPv4 address space than many other countries. This study aims to enrich the literature on IPv6 in Indonesia. The research objective for this paper is thus to understand why Indonesian organizations continue to resist IPv6 rather than encouraging its adoption, despite experiencing a more acute scarcity of IPv4 address space than many other countries. This commences with a review of relevant literature on technology resistance. Bhattacherjee et al. [9] argue that resistance to introducing technology is a common phenomenon. Technology resistance is not the mirror image or binary opposite of adoption [10], [11], and the factors associated with resistance are not necessarily mere inversions of various factors in technology acceptance models.

Lapointe and Rivard [12] reviewed the earlier literature and identified only four theoretical explanations of technology resistance, all of which have the context of individual acts of resistance by end-users and none directly applicable in the context of resistance at an organizational level. Based on these four models, the authors then synthesized their multilevel model of resistance to IT implementation, focusing on group-level resistance against a technology being promoted by an organization to individual organizational end-users; this model conceptualizes group-level as group-level aggregated individual acts of resistance. However, such a model is difficult to apply when the unit of analysis is the organization itself and when the focus of resistance is a technology being promoted by sources in the external environment. Indeed, there are no known models of organizational-level resistance that have been developed for such scenarios.

Organizational level adoption is widely explained with reference to the TOE framework [13], [14], which categorizes factors of organizational adoption as Technological, Organizational or Environmental. Theoretical models based on the TOE framework are often adapted to suit the context. The relative importance of different factors varies from industry to industry [15], and similarly, factors will likely vary in importance from one technology to another. For example, Makridis and Han [16] underline the significant workplace management rule regarding the technological change to AI and automation. Hajiheydari et al. [17] found that technology-related factors positively contribute to resistance toward using IoMT (Internet of Medical Things).

As noted above, resistance and adoption are not binary opposites, so resistance cannot necessarily be explained by adoption theory. Nevertheless, in the absence of any approaches specifically intended to explain organizational-level resistance, perhaps the TOE framework can be similarly adapted in the same way as the studies. More recently, Choi et al. [15] adopted TOE in their study to investigate organizational resistance to technology. They concluded that various technological, organizational, and environmental dimensions contributed to the resistance to the blockchain. The approach of the current study is thus to apply the TOE framework to organizational technology resistance and, more specifically, the resistance by Indonesian organizations to IPv6. This was investigated using a mixed-method approach, in which a qualitative theory-building phase was followed by quantitative theory testing.

II. MATERIALS AND METHOD

A. Theory and hypothesis development

The unit of analysis in the present study is organizations that use the Internet in their business operations. Very few studies have addressed organizational-level resistance; a notable exception is Sugandini et al. [18], who concluded that although they experienced difficult times during the Pandemic Covid 19, most businesses resist using social media as part of their marketing strategy. Another study by Suzuki and Williams [19] found that organizational resistance to EDI was correlated with uncertainty about future requirements, low perceived benefits, and high diffusion of proprietary formats. The last of these is likely to be irrelevant to Internet Protocol, an open standard with only two versions (4 and 6). Further, although EDI has notable network externalities, Metcalf's Law [20] would suggest they will not be in the same league as the externalities of Internet Protocol, which underpins a vastly larger network. More recently, organizational resistance to innovation is likely to stem from a range of psychological, economic, technological, political, strategic, and organizational cultures [15], and called for empirical research to investigate further the sources of organizational resistance.

Due to the paucity of prior empirical work upon which to base hypotheses, this study adopts a mixed-methods approach in which a qualitative phase was conducted first to develop hypotheses, followed by a quantitative stage in which this hypothesis testing was conducted. In the first phase, semi-structured interviews were conducted with key individuals from 17 organizations who had responsibility for their organization's network policy or day-to-day network operations; these participants were well-placed to comment on their organization's stance towards IPv6. Participants are summarized in Table II.

TABLE II
QUALITATIVE PHASE INFORMANTS

Name	Industry	Employees	Interviewee (s) role
OG1	Holding company (Agriculture, property, telco)	> 1,000	Network Manager, Project Manager
OG2	Manufacturing	15,000	Infrastructure Manager, IT Planning Manager, Network Engineer
OG3	Banking	18,000	Infrastructure Development Manager
OG4	Food services	7,000	IT Infrastructure and Service Manager
OG5	Wholesale trader	10.490	CIO, Infrastructure Manager
OG6	Energy	6,000	CIO
OG7	Agriculture	12,000	CIO, Infrastructure Manager
OG8	Information Media	900	IT Manager
OG9	Mining	6800	CIO, IS Manager, Infrastructure Engineer
OG10	Gas and oil	400	Network Infrastructure Manager
OG11	Pharmacy	6,000	CIO
OG12	Gas Transportation	660	CIO, Network Manager, Network Engineer
OG13	Public Education	3,980	CIO, Network Engineer, Application Developer
OG14	Cement industry	6,800	CIO, Infrastructure Manager, Application Manager, Network Engineer
OG15	Government	7,686	Head of IT department
OG16	Private Education	7000	Head of IT Department, Network Engineer
OG17	Construction, Property	800	CIO, Network Manager, Application Manager, Network Engineer

The interview or group discussion data were analyzed using Domain Analysis [21]. This technique is a systematic and rigorous approach to the analysis of qualitative data and reveals a number of categories, or "domains" in the data, as well as relationships between those domains. The technique is widely used and has been used in social science [22], qualitative studies [23], and health education [24]. The domain analysis process yielded five domains relating to organizations' resistance to IPv6 and a number of hypothesized relationships between these domains. These are discussed below.

The first domain, *IPv6 resistance (RC)*, groups participants' comments about resisting or rejecting IPv6. The emergence of this domain was not surprising due to the fact that IPv6 remains extremely rare, and due to the focus of the research on IPv6 resistance. This domain provided the basis for the dependent variable.

The second domain, *perceived lack of need (LN)*, is characterized by participants' beliefs advantages purported by IPv6 are irrelevant to their organizations. Many participants reported that their organization had no need for increased IP address space. Participants generally felt that any problems with IPv4 were still too far into the future to worry about now and that their organization did not really need other advanced features of IPv6. Therefore, we propose *H1: Greater perceived lack of need is associated with an increased likelihood that organizations will resist the innovation.*

The third domain, *satisfaction with the current system (SS)*, refers to comments indicating they were satisfied with the current technology, IPv4. Participants frequently referred to IPv4 and NAT as being sufficient for the organization's needs and often described the current technology as reliable, convenient, and familiar. There was some concern that these benefits would be lost in a transition to IPv6. Hence, we propose *H2: Satisfaction with the current system is positively associated with a perceived lack of need*. Also, we propose *H3: Greater satisfaction with the current system is associated with an increased likelihood that organizations will resist innovation*.

The fourth domain, *perceived threat (PT)*, summarizes comments from participants about doubts or worries associated with IPv6. These included concerns about the scale of the effort required for the organization to implement IPv6 and worries about potential incompatibilities with existing applications and other technology in place within the organization. Some participants expressed concern that implementing IPv6 could contribute to increased downtime and about using a technology with which they have little or no experience. For these reasons, we propose *H4: Greater perceived threat is associated with an increased likelihood that organizations will resist innovation.*

The fifth domain, *switching cost (SC)*, groups comments from participants that referred to the cost of implementing IPv6. These comments were mixed in their tone and can be divided into two camps: those that felt switching costs would be a problem and those who felt they would not. In the case of the former, there were concerns about a lack of a business case for IPv6, but some participants felt that the cost was potentially not that great as network devices were likely to support IPv6 already. As the qualitative stage cannot indicate how widespread each of these perspectives might be, the hypothesis is proposed to test whether switching cost is relevant to IPv6 resistance. It is *H5: Greater concerns about switching costs are associated with organizations' increased resistance to innovation.*

The final domain covers environmental influence (RP), and groups comments from participants that referred to influences external to the organization, including government bodies, Internet regulators, and industry regulators. Hence, we propose *H6: Lack of environmental influence is positively associated with an increased likelihood that organizations will resist the innovation*.

The theoretical model based on the above discussion is presented in Figure 1.

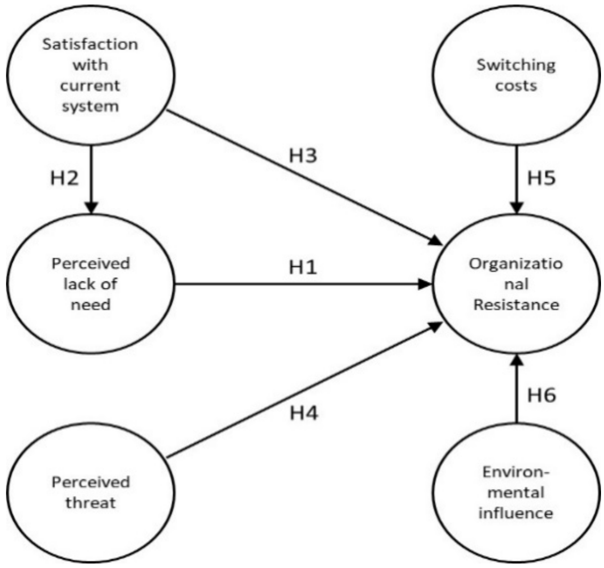

Fig. 1 Resistance to ipv6 model

B. Measurement Items

The theoretical model developed in the qualitative phase was tested using statistical techniques. To maximize instrument validity, and as Oldland & Hutchinson [25] suggested, the survey instrument items were adapted from prior literature. The instrument items were arranged in random order and used a seven-point Likert scale. To further strengthen the instrument's content validity, it was pre-tested by four individuals with knowledge and familiarity with IPv6. Minor revisions were made based on feedback from the pre-test, and the instrument was then translated into Indonesian.

A pilot test was then conducted using five respondents withdrawn from the sample frame of the main study. Following the pilot, brief interviews with each respondent were conducted to assess the instrument's feasibility from the respondents' perspective. No issues were raised; hence, no further changes to the instrument were required. The instrument was administered as an online survey using the survey engine provided by Qualtrics.com. Both English and Indonesian versions were available to participants; Qualtrics' software allows participants to change between languages seamlessly.

C. Data Collection

A convenience sample was obtained from companies listed on the Indonesian Stock Exchange and Indonesian educational institutions and government agencies. Additionally, relevant individuals identified via the social media site LinkedIn were invited to participate as representatives of their organization. A total of 516 invitations were sent, and 80 responses were received. This was supplemented with 50 paper-based surveys delivered directly to respondents' organizations, from which 23 responses were received. These approaches yielded 103 responses from 563 recipients (18.2% response rate).

The researchers contacted 10 non-respondents to identify reasons for non-response. Reasons included a policy against completing surveys (two non-respondents), time constraints (three non-respondents), no longer being a member of the organization (two non-respondents), the survey being irrelevant to their current position (one non-respondent) or having no interest in the topic (two non-respondents). These reasons are similar to other studies [26] and do not suggest non-response bias was likely.

D. Data Preparation

Data screening, as suggested by Cleff [27], is performed to ensure the data is useful and valid. The first analysis suggested that 14 responses had some missing data. However, further analysis suggested that two of these were considered valid due to missing less than 5% of data [28], and thus there were 91 valid responses. Secondly, the assessment of the unengaged response indicated that there was not the same value for every single question. Thirdly, the data were subsequently checked for normality. The results for some measures fell outside the desired range of ±1, indicating that the data were not necessarily normal and reinforcing the decision to use PLS-SEM to conduct the analysis [29]. Finally, sample size adequacy was tested using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMOMSA) and Bartlett's Test of Sphericity (BToS). The KMOMSA score was 0.792 and the BToS was 0.000, indicating that the sample size was sufficiently large [30].

Harman's single-factor test revealed that a single factor accounted for only 24.435% of the variance of the model, suggesting that Common Method Variance (CMV) was not a problem in the data. Additionally, as Harman's test has attracted some criticism [31], the marker variable IT Sophistication was included in the survey; this variable was chosen for its plausibility to survey participants and its theoretical dissimilarity with other variables in the model. This variable was not highly correlated with any of the other factors, indicating that the likelihood of CMV in the data was low, as presented in TABLE III.

TABLE III
CORRELATIONS BETWEEN THE MARKER VARIABLES AND OTHER FACTORS

	SC	LN	PT	RP	SS	RC
Marker	0.046	0.147	-0.126	0.139	-0.109	-0.143

E. Data Analysis

Because of very low levels of IPv6 adoption, it was likely that many variables, including the dependent variable, could be skewed. For this reason, Partial Least Squares Structural Equation Modelling (PLS-SEM) was an appropriate choice to use [29], [32]. It is also noted that non-normal data can result in inflated R-squared values if Covariance-based SEM (CB-SEM) is used [33], further supporting the choice of PLS-SEM. The software package SmartPLS [34] was used to conduct the analysis and to test the proposed theoretical relationships. The full model is presented in Figure 2. The analysis process followed [29] by conducting measurement validity model and structural model validity which are discussed in the following section.

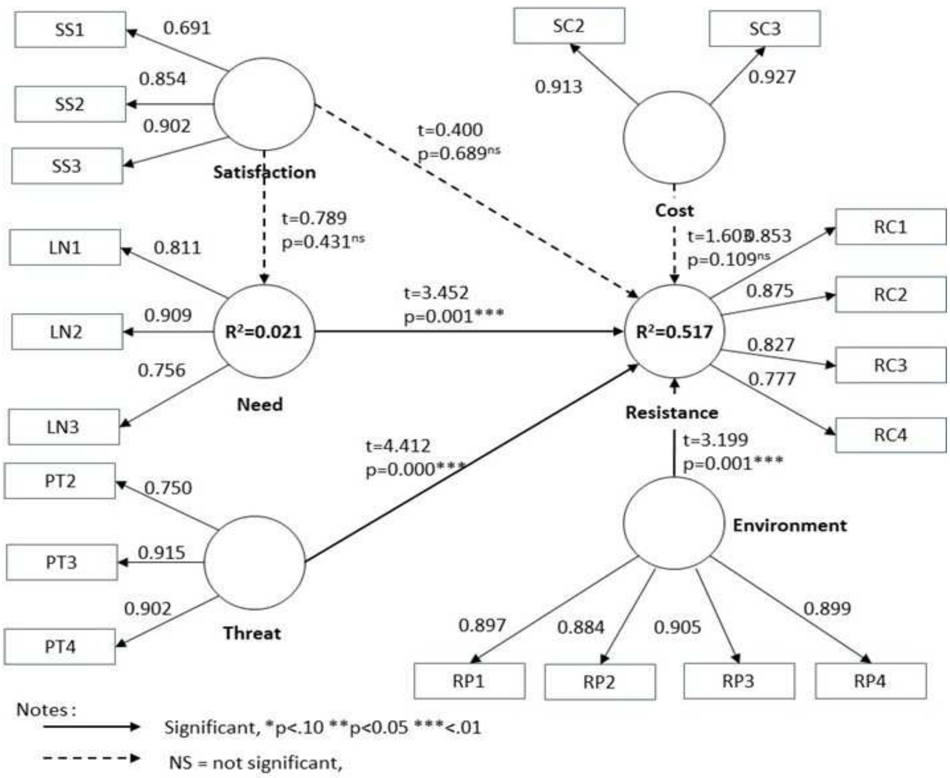

Fig. 2 Structural model analysis result

III. Result and Discussion

A. Measurement Model Analysis

Measurement model analysis was performed to ensure data validity and reliability. The measurement model validity involves (1) indicator reliability, (2) internal consistency reliability, and (3) construct validity. Firstly, the indicator reliability was conducted by assessing the pattern matrix as presented in TABLE IV.

TABLE IV
PATTERN MATRIX

Indicator	Constructs					
	LN	PT	RC	RP	SC	SS
LN1	**0.758**	0.261	0.337	0.079	0.101	0.044
LN2	**0.880**	0.488	0.502	-0.001	0.085	0.150
LN3	**0.660**	0.186	0.309	-0.042	0.060	0.136
LN4	**0.709**	**0.656**	0.505	0.058	0.456	0.049
PT1	0.268	**0.605**	0.306	-0.002	**0.490**	0.053
PT2	0.486	**0.786**	0.463	0.029	0.487	0.235
PT3	0.470	**0.873**	0.544	0.156	0.239	0.074
PT4	0.534	**0.870**	0.527	0.056	0.212	0.080
RC1	0.396	0.469	**0.854**	0.479	0.396	0.113
RC2	0.531	**0.607**	**0.878**	0.301	0.357	0.020
RC3	0.501	0.440	**0.824**	0.165	0.156	0.068
RC4	0.469	0.447	**0.775**	0.142	0.263	0.219
RP1	0.027	0.007	0.242	**0.897**	0.187	0.034
RP2	-0.017	0.041	0.271	**0.884**	0.159	-0.070
RP3	0.074	0.108	0.317	**0.905**	0.195	0.034
RP4	0.025	0.124	0.360	**0.899**	0.283	0.039
SC1	0.176	0.148	0.144	0.170	**0.586**	0.299
SC2	0.243	0.360	0.326	0.181	**0.903**	0.250
SC3	0.206	0.431	0.354	0.231	**0.906**	0.362
SS1	-0.021	0.061	-0.022	0.027	0.303	**0.706**
SS2	0.092	0.091	0.098	-0.032	0.305	**0.866**
SS3	0.113	0.149	0.088	0.055	0.332	**0.893**
SS4	-0.026	0.026	0.045	0.016	0.310	**0.571**

Two indicators (LN4 and PT1) had unacceptable cross-loading and were dropped from subsequent analysis. Two further indicators (SC1 and SS4) were also dropped due to loadings being below 0.7. The rest of the indicators were considered sufficiently satisfactory, above 0.7, which justified proceeding to the next analysis process. The second process was evaluating internal consistency by calculating the composite reliability (CR) and Cronbach's Alpha (CA) for all constructs (TABLE V). The result was satisfactory and above-recommended thresholds, and all constructs showed high levels of internal consistency reliability.

TABLE V
SUMMARY FOR REFLECTIVE OUTER MODELS

Construct	Indicator	Factor loading	Indicator Reliability	CR (>0.7)	CA	AVE (>0.5)
Need (LN)	LN1	0.811	0.658	0.867	0.772	0.685
	LN2	0.909	0.826			
	LN3	0.756	0.571			
Threat (PT)	PT2	0.750	0.562	0.893	0.818	0.737
	PT3	0.915	0.836			
	PT4	0.902	0.813			
Resistance (RC)	RC1	0.853	0.728	0.901	0.854	0.695
	RC2	0.875	0.765			
	RC3	0.827	0.685			
	RC4	0.777	0.603			
Environment (RP)	RP1	0.897	0.804	0.942	0.919	0.803
	RP2	0.884	0.782			
	RP3	0.905	0.818			
	RP4	0.899	0.808			
Switching Costs (SC)	SC2	0.913	0.834	0.917	0.820	0.847
	SC3	0.927	0.860			
Satisfaction (SS)	SS1	0.691	0.477	0.860	0.839	0.674
	SS2	0.854	0.729			
	SS3	0.902	0.814			

B. Structural Model Analysis

The measurement model analysis results indicated that all validity and reliability assessment properties are in an acceptable range. The second analysis is to determine the explanatory power of the model as well as to test research hypotheses. The R^2 of 0.517 is satisfactory. Results from hypothesis testing are provided in TABLE VI. H1, H4 and H6 were all supported; however, H2, H3 and H5 were not.

TABLE VI
SIGNIFICANCE TESTING OF THE STRUCTURAL MODEL PATH COEFFICIENT

Hypothesis	Path Coefficient	t Value	p Value	Inference
H1. LN → RC	0.299	3.452	0.001	Supported
H2. SS → LN	0.145	0.789	0.431	Not Supported
H3. SS → RC	-0.033	0.400	0.689	Not Supported
H4. PT → RC	0.392	4.412	0.000	Supported
H5. SC → RC	0.148	1.603	0.109	Not Supported
H6. RP → RC	0.264	3.199	0.001	Supported

C. Discussion

The findings in figure 2 suggest that organizational resistance to a technology promoted by sources external to the organization is similar to technology resistance by individuals. The results above suggest that resistance to IPv6 is associated with a perceived lack of need for the technology. Participant OG05 expressed it thus:

"We know the advantage, but well ... we haven't needed it. For our organization, we've heard about the issues. However, it may be later on ... It is still just like a dream. We are wasting our time to learn about it."

The significance of perceived lack of need is consistent with previous observations that mounting a business case for IPv6 is difficult [2], [35], [36]. Indeed, there are currently no major IPv6-only applications, and it is difficult to quantify the potential benefits of adopting them [37]. However, this does not mean that organizations cannot see the "big picture" need for IPv6. Rather, it is simply that within the context of their own organizations, there is no need for the technology. In the words of OG06:

"We see this issue as a corporation a bit differently. If we talk about it on a macro level, the problem of IP address is obvious. We have to anticipate in terms of providing policy and so on. We currently deploy NAT for our network. We can implement our own policy according to the need of our company. So, we fully control our network. Will our company adopt IPv6? I don't think so."

However, IPv6 resistance is driven not only by the view that the technology is unnecessary; a perception that it presents particular threats is also associated with IPv6 resistance. Results from the qualitative phase of this study suggest that perceived threats could stem from concern about the level of IPv6 expertise within the organization, being daunted by the amount of work required to implement IPv6, the risk of disruption to other IT operations and concerns about compatibility with other systems, and concerns about security – particularly in environments which (rightly or wrongly) rely on NAT for security.

The third factor implicated in IPv6 resistance is environmental influence. This could be construed as active discouragement from environmental sources, but the majority of comments in the qualitative phase referred to the absence of active encouragement or facilitation from government and other regulatory sources. In the words of one participant (OG05):

"Especially our government, they don't care about this. They are sleeping. We have to wake them up. What do you want to say? That is the fact, our government is sleeping. If it's late means they are aware. They're sleeping. So, you have to wake them up. It's like fire. It's been a fire, but they haven't woken up yet."

However, if IPv6 was mandated, several participants suggested that Indonesian organizations' resistance to IPv6 could be overcome. One respondent (OG07) even advocated for this:

"Why don't they give some pressure? I have a little bit funny idea then. This should be pushed by the [regulator] because they provide the services. Let's say, they just need to say, in 2013, I don't want to allocate IPv4 addresses for you anymore. So, everyone should use IPv6. That's the first thing. The second is, starting in 2015, everyone should migrate to IPv6. So, IPv4 will be faced off in the year 2018. Just like the policy of currency changing."

Some participants were sensitive to network effects, for example, OG05 ("*It doesn't mean we're not aware but IPv6 is not booming*"). Perceived lack of need could potentially be reduced if a government mandate led to widespread adoption. However, this study cannot conclude whether such views are widespread. Nevertheless, the prospect that organizations could be willing to adopt IPv6 if compelled to do so warrants further investigation, particularly given that governments and other regulators have so far been reluctant to mandate IPv6 adoption.

While a perceived lack of need, perceived threats, and lack of environmental influence are all implicated in resistance to IPv6, there was no evidence that satisfaction with IPv4 increased resistance to IPv6, nor was there evidence that satisfaction with IPv4 lessened any perceived need for IPv6.

This is contrary to prior research that found that satisfaction was a significant organizational factor in technology adoption. It has been noted above that adoption and resistance are not mirror opposites, so it may be that satisfaction is not important in the context of technology resistance.

Finally, there was no evidence that cost concerns increased resistance to IPv6. A similar result also reveals by Livadariu, et al. [36] where there is no cost-wise for deploying IPv6. This could be explained by the belief that if IPv6 were to become necessary it would not require replacing network equipment – which would be likely to support IPv6 already. However, this could also reflect an underestimation of the cost of IPv6 implementation, which could include considerable expenses other than equipment upgrades.

IV. CONCLUSION

This research contributes to the theoretical literature by providing a model of organizational resistance to IPv6, which to the authors' knowledge is the only model of technology resistance at an organizational level as opposed to an individual end-user level. Future work will investigate whether the model, perhaps in an adapted form, can be applied in other technological contexts.

These findings also have practical implications for organizations whose mission is to promote the diffusion of IPv6. If one accepts that IPv6 is essential to the Internet's continuing development, more work is required on demonstrating a business case for end-user organizations for resistance to IPv6 to be overcome. Similarly, more work to counter perceptions that IPv6 is a threat is required. Finally, further investigation is urgently needed to test whether governments and regulators could play a more significant role in addressing the resistance to IPv6.

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