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EFFECT OF INFORMATION TECHNOLOGY CAPABILITIES ON E-SERVICES AMONG MALAYSIAN LOCAL AUTHORITIES

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Abstract

This study examines the effect of Information Technology capabilities (IT) on e-services in Malaysian Local Authorities (LAs). Using a questionnaire survey, this study assesses three elements of IT capability: infrastructure, skill and usage on the quality of e-services offered by LAs. This study uses the variables for IT capabilities introduced by Tippins and Sohi [2003] in assessing their influence on the quality of e-services among LAs. The results show that all three elements significantly affect the quality of the e-service. The results also show that the interaction between the IT infrastructure and IT skill significantly influences the quality of the LA e-services. The results support the findings in the private sector literature that discovered that IT capabilities were an effective performance mechanism in order to experience continuous performance improvement.

Keywords: Malaysia, local authorities, IT capabilities, quality and e-services

1. Introduction

One of the important elements in organisational success is service quality [Parasuranam et al., 1985; Cronin and Tyler, 1992; Wisniewski and Wisniewski, 2005]. Studies that have examined service quality have determined that such quality could be affected by several factors such as human or behavioural factors [Nishii et al., 2008], implementation of appropriate performance tools [Calisir, 2007] and organisational policy [Ashill et al., 2005; Drew and Healy, 2006]. Service quality may also depend on the information technology capabilities used in an organisation and the

success of such mechanisms in improving organisational performance depends highly on the individuals within that organisation [Tippins and Sohi, 2003].

Grover and Malhotra [1999] defined IT capabilities as a mechanism that is used in acquiring, processing and transmitting information so as to improve organisational performance. Studies conducted on the IT literature have suggested that the existence of efficient IT capabilities would allow for the greater transmission and processing of the information necessary for decision-making [Sanders and Premus, 2005]. The majority of the studies which have examined this issue supported such a suggestion as they found that advances in IT capabilities are positively linked to organisational performance [Powell and Dent-Micallef, 1997; Santhanam and Hartono, 2003; Bhatt and Grover, 2005]. The majority of these studies have focused on the link between IT capabilities and organisational performance in the context of the private sector. Further, these groups of studies mainly examined the effect of IT capabilities on financial performance. To date there are only a limited number of studies examining the effects of IT capabilities on non-financial performance such as quality of e-service.

In Malaysia, the government has acknowledged the importance of adopting IT capability in these LAs. *E-Pihak Berkuasa Tempatan* (e-PBT) was established to enhance the convenience, accessibility and quality of interaction of the local authorities with the public and business at large. The concept of E-PBT is to have an online application system on a website based on all Las in order to carry out their daily transactions. Among the services are e-assessment, e-compound, e-rental, e-licensing, e- complaints, e-submissions, e-business and e-community. The Local Government Director General in a press statement stated that 11 local authorities had established more than 5 application systems and that the new system aims to provide an easier channel for the public to interact with the council [The Star, 8 July 2003].

E-PBT is viewed as improving the flow of information and processes within the government by increasing the speed and quality of service delivery (MAMPU circular). The government has urged all local authorities to have their own web portal disclosing all the latest information and services offered online [Salleh and Hassan, 2004]. Such urgency has led 67% and 71% of the City and Municipal Councils respectively to have their websites externally linked to a website outside that of their organization [Salleh and Hassan, 2004]. Furthermore, the majority of the information disclosed in the website of the LAs is non-interactive such as mission, vision, objective, logo and motto [Said et al., 2003].

Of late, many LAs have started to realise that IT in an organisation is a necessity in enhancing their service quality. It assists organisations to monitor and track changing customer preferences, to respond more rapidly to customer needs, to improve service reliability, to reduce transaction errors, and to create better customized services. The Ministry of Housing and Local Government (MHLG) expects all LAs to employ more sophisticated application systems by 2010. However, a study examining the effect of adopting sophisticated application systems such as IT capabilities on improving the LA's' performance, particularly e-services has yet to be thoroughly explored.

The remainder of this paper is structured as follows. The next section provides a review of the relevant literature. Section 3 provides the hypotheses underpinning this study and section 4 provides an overview of LAs in Malaysia. Section 5 outlines the research design. The results are presented in section 6. A summary and conclusion are provided in the final section.

2. Literature Review

Research on service quality started in the 1980s in USA due to the decline of the economic importance of the manufacturing sector and the growth of the service sector [Deming, 1986]. Service quality became a key focus in enhancing private sector competitiveness [Parasuranam et al., 1985] and meeting the expectations of customers [Parasuranam et al., 1985; Cronin and Taylor, 1992; Wisniewski and Wisniewski, 2005]. The development of the internet has led to the development of e-services in both the private and public sectors. E-service is defined as the conduct of business with the assistance of telecommunications, and of telecommunication-based tools [Ahmad et al., 2006]. The development of e-service has led an interest in research with regards to the quality of e-services.

Within the information literature, there are studies that have examined the link between IT capabilities and organisational performance [Floyd and Woolridge, 1990; Powell and Dent-Micallef, 1997]. These studies used IT capability variables such as IT infrastructure, IT experience, IT skills and IT management commitment. The results of these studies are mixed. A group of studies found that the IT capabilities improved the organisational performance [Bharadwaj, 2000; Tippins and Sohi, 2003; Wade and Hullan, 2004; Ray et al., 2004]. Another group of studies found that IT capability does not necessarily improve the organisational performance [Venkatraman and Zaheer, 1990; Strassaman, 1996]. These mixed findings could be attributed to the different methodologies used such as the use of historical accounting measures and the use of a single measure of IT capability such as IT investment [Bharadwaj et al., 1999].

Studies on IT capabilities and organisational performance have often used financial performance as the indicator variable. However, as noted by Brynjolfsson [1993], research should also look beyond the conventional productivity such as financial performance since the inclusion of non-financial information such as service quality could provide further understanding in relation to IT development. Recent studies have focused on examining the effect of IT capability on product quality (such as [Sanders and Premus, 2005]), customer service [Ray et al., 2004] and service quality (such as [Zhu et al., 2003; Rosacker and Olson, 2008; Ali and Green, 2009]). These studies have been generally conducted within the private sector.

Many studies have argued that the importance of IT capabilities on organisational performance should also extend to the public sector in order to innovatively and simultaneously address the challenges they face [Burt and Taylor, 2000]. However, within the public sector literature, research on the link between IT capabilities and organisational performance is limited. Although there are studies that have examined such linkages, these are often in the form of a theoretical or conceptual nature (such as [Sambamurthy et al., 2003]). These studies proposed that IT human resources and technology assets are important determinants in relation to organisational performance [Ross et al., 1996]. There are, however, other elements of IT capabilities such as IT infrastructure, IT skill and IT usage [Tippins and Sohi, 2003] which have yet to be thoroughly examined within the public sector literature.

In Malaysia, there are a few limited studies that have examined the links between these IT capabilities. These studies are often descriptive in nature. For example: Ahmad et al. [2006] examined the readiness of Malaysian LAs in relation to the implementation of E-PBT. They found that the majority of city councils and 55.9% (19 out of 34) of the municipal councils provide online application systems or transaction services. Apart from these descriptive findings, their study did not

examine the effect of such implementations on the organisational performance such as the service quality. The lack of empirical investigation provides a gap in the literature. Therefore, this study aims to examine the effect of three elements of IT capability: IT infrastructure, IT skill and IT usage on the quality of e-service in Malaysian LAs.

3. Malaysian Local Authorities

The Malaysian LAs are divided into three components. One hundred and forty four of the LAs are City Councils, 34 are Municipal Councils and 101are District Councils. The mayors have been given the responsibility to lead the City councils. Municipalities and districts are led by the presidents. The Malaysian LAs have the power to perform several duties including the power to collect taxes, to create laws and rules and to grant licenses and permits for any trade in their areas. They are also responsible for public health and sanitation and management, environmental protection and building controls, social and economic development and the general maintenance functions of the urban infrastructure within their jurisdiction. The LAs, being the government's lowest tier, have a high responsibility to provide the maximum interaction with the public.

The emergence of the internet has provided further opportunities for the public sector to reach the public [Ahmad et al., 2006]. The Malaysian government has taken this opportunity by means of implementing E-government during 2000. E-government is the delivery of information and services online through the internet or other digital means [Ahmad et al., 2006].

Under the New Public Management (NPM), the Ministry of Local Government and Housing is targeting all LAs to offer e-government services [Abdul Khalid, 2008]. NMP refers to the adoption of private sector practices into the public sector. The aim is to develop a common platform and approach to e-government in order to increase the economies of scale and to reduce the burden of smaller LAs. Maniam et al. [2006] reported that ten city councils and 36 municipalities have made some progress in e-government services that are available to the public via the medium of the internet. However, the implementation of e-government has not received a great response due to fundamental problems of access, security and privacy [Hazman et al., 2006]. Such responses have caused an increased pressure among the public in increasing the service quality of the Malaysian LAs.

4. Framework and Hypotheses

4.1. Framework

Figure 1 illustrates the framework that underpins this study. The framework shows that IT capabilities may influence the e-service quality of LAs. Three elements of IT capabilities are examined in this study. The three elements of IT capability are IT infrastructure, IT skill and IT usage.

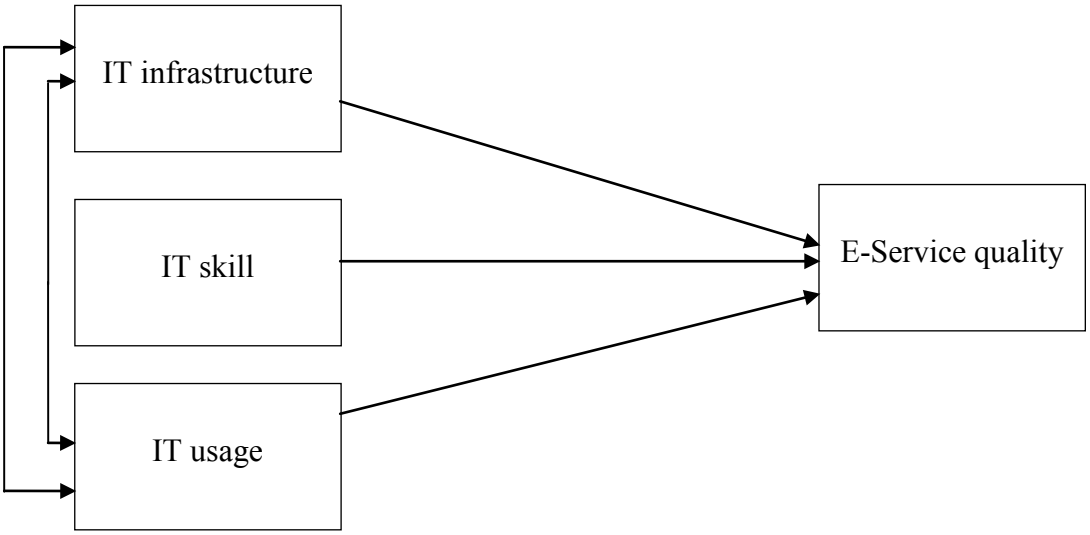

Figure 1. Framework of this study.

Studies in the private sector literature have shown that IT capabilities may play a vital role in providing high service quality [Zhu et al., 2002; Rosacker and Olson, 2008; Ali and Green, 2009]. Examining the service quality within an organisation could be used as an organisational performance as perceived by their customers. Similarly, examining service quality within the public sector could be used to examine the performance of the LAs. The emergence of the internet provides further pressure on the LAs in providing high e-service quality. Therefore, this study uses e-service quality as the dependent variable.

Many studies have examined the link between IT infrastructure and organisational performance. These studies have examined IT infrastructure because the belief is that computer-based hardware could assist in the acquisition, processing, storage, dissemination and use of information [Tippins and Sohi, 2003]. Since one aspect of organisational performance includes the quality of service quality, IT infrastructure is the first independent variable.

IT skill is the second independent variable in this study. IT skill refers to the extent an organisation possesses a body of knowledge about the objects (such as IT infrastructure) [Tippins and Sohi, 2003]. Studies examining the link between IT skill and organisational performance have found that the possession of IT skills among individuals in an organisation enhances the organisational performance. These studies show that by having IT skills, the information could be effectively managed [Zahra and Covin, 1993; Kearns and Lederer, 2003; Tippins and Sohi, 2003] and was able to provide the basis for gaining competitive advantage [Powell and Dent-Micallef, 1997; Santhanam and Hartono, 2003].

Mitcham and Mackey [1983] viewed IT usage as the activities performed in achieving a particular objective. It refers to the extent that an organisation utilises its IT infrastructure in managing both the market and customer information [Tippins and Sohi, 2003]. Studies have examined the link between IT usage and organisational performance. Most of these studies show that the level of IT usage does indeed improve organisational performance. Therefore, IT usage is the third dependent variable.

4.2. Hypotheses

The development of the framework in this study has thus led to the development of six hypotheses. Many studies have examined IT infrastructure and its linkages to organisational performance. These studies have found that an organisation with

sophisticated IT infrastructure would eventually lead to high organisational performance [Bharadwaj, 1999; Ray et al., 2004]. Arguably, this study suggests that IT infrastructure could also influence e-service quality in the Malaysian LAs. However, there is a group of studies that have found no significant evidence that IT infrastructure could influence organisational performance [Sager, 1988; Zaheer and Venkatraman, 1990]. Therefore, the following null hypothesis is developed:

H1: There is no significant effect of IT infrastructure on e-service quality among Malaysian local authorities.

Tippins and Sohi [2003] identified IT skill as "a set of principles and techniques useful to bring about change towards desired ends". A number of studies have examined the link between IT skill and organisation performance. These studies have found that a higher proportion of IT skill would result in a higher performance for an organisation [Ray et al., 2004]. Given that IT skill is related to the experience, context, interpretation and reflection of IT, therefore, a high level of IT skill would improve the organisational performance. The second hypothesis is developed.

H2: There is no significant effect of IT skill on e-service quality among Malaysian local authorities.

Studies that have examined the link between IT usage on organisational performance have been extensively examined. These studies suggested that an effective IT usage would lead to better information sharing and, as a consequence, would thus provide support and enhance the work quality which eventually leads to better organisational performance [Bharati, 1999]. This study examines the effect of IT usage on one component of organisational performance, namely e-service quality. Therefore, the following hypothesis is developed.

H3: There is no significant effect of IT usage on e-service quality among Malaysian local authorities.

The Resource Complementary theory has argued that the effect of IT infrastructure alone could not influence performance unless there are other complementary attributes such as the IT skill to use the IT infrastructure. Similarly, studies have argued that organisational performance could only be enhanced provided that the level of IT usage of the IT infrastructure is high. There are studies that have examined the relationships between IT infrastructure, IT skill and IT usage on organisational performance (such as [Powell and Dent-Micallef, 1976; Bhatt and Grover, 2005; Ravinchandran and Lertwongsatien, 2005]). The results of these studies support the proposition that an organisation's ability to use IT infrastructure is dependent on IT skills and usage. However, the focus of these studies was on the private sector. This study examines the effect of these interactions on organisational performance within the setting of the public sector. Therefore, the following null hypotheses are developed:

H4: There is no significant interaction between IT infrastructure and IT skill on e-service quality among Malaysian local authorities.

H5: There is no significant interaction between IT infrastructure and IT usage on e-service quality among Malaysian local authorities.

H6: There is no significant interaction between IT skill and IT usage on e-service quality among Malaysian local authorities.

5. Research Design

This study focuses on the effect of IT capability on e-service quality in Malaysian LAs. Specifically, this study examines whether:

1. IT infrastructure influences the e-service quality.
2. IT skill influences the e-service quality.
3. IT usage influences the e-service quality.
4. Interaction between IT infrastructure, IT skill and IT usage influences the e-service quality.
5.

This study examines these issues by means of a questionnaire survey.

5.1. Sample

This study uses representatives from the Malaysian LAs as the study sample. The representatives consist of top and middle management in the local authorities. These subjects are expected to be knowledgeable in relation to the operation and management of their organisation.

Two hundred and eighty eight questionnaires were distributed to two representatives for each of the LAs. The two representatives in each organisation are from the Mayor/ President office and the IT expert from the IT department. Each representative was given an envelope consisting of a questionnaire and a self-addressed envelope. Out of the 288 questionnaires distributed, 135 questionnaires were completed and returned, resulting in a response rate of 47%.

Table 1: Variable constructs: Adapted from Tippins and Sohi [2003]

IT Capability	**E-Services** **E-PBT (The Star, 2003)**
IT infrastructure	
1. Organisation's staff linked to the computer network 2. IT infrastructure linked to each department electronically 3. IT infrastructure that linked the organisation to other external business partners 4. A significant amount of funds allocated for IT infrastructure annually.	• e-assessment • e-compound • e-rental • e-licensing • e-complaints • e-submissions • e-payment • e-community
IT skill	
1. Human resources possessing a high degree of IT expertise 2. Consistent updating with regards to new IT knowledge 3. Supportive environment in trying out new IT innovations 4. Consistently finding ways to enhance IT skills 5. Considerable IT training opportunities for staff	
IT usage	
1. Enhance responsiveness to customer service requests 2. Increase response speeds in relation to business opportunities 3. Re-engineer business processes 4. Manage customer information 5. Acquire, store and process information about customers	

The questionnaire is divided into 3 sections. Section A consists of questions relating to IT capabilities. In this section, the respondents are requested to respond to three parts. The first part asks questions relating to IT infrastructure which include the organisation's staff who are linked to the computer network, IT infrastructure linked to each department electronically, IT infrastructure that linked the organisation to other external business partners and a significant amount of funds allocated for IT infrastructure annually. The respondents are asked to indicate the level of agreement using a 7-point scale from 1 (very low) to 7 (very high).

The second part of the questionnaire requests the respondents to answer questions relating to IT skills which includes whether their human resources possess a sufficiently high degree of IT expertise, are consistent in their updating with regards to new IT knowledge, have a supportive environment for trying out new IT innovations, consistently find ways to enhance IT skills and also have considerable IT

training opportunities for staff. The respondents are asked to provide their responses using a 7-point scale from 1 (very low) to 7 (very high).

The third part of the questionnaire requests the respondents to answer questions relating to IT usage which includes enhancing responsiveness to customer service requests, increasing response speeds in relation to business opportunities, re-engineering business processes, managing customer information and acquiring, storing and processing information about customers. The respondents are asked to provide their responses using a 7-point scale from 1 (very low) to 7 (very high).

Section B consists of questions relating to the opinions of the respondents in relation to the e-service quality of the local authorities. The respondents are requested to respond to questions concerning the service quality with regards to 8 types of services, namely, e-assessment, e-compound/ payment, e-rental, e-licensing, e-complaints, e-submissions, e-business and e-community. The Ministry of Housing and Local Government in Malaysia have identified these services and have expected these services to be provided since 2005. The respondents are requested to provide their responses using a 7-point scale from 1 (highly unsatisfied) to 7 (highly satisfied).

Section C requests information relating to the demographic profiles of the respondents including their gender, level of management, years of experience working in their current organisations and the number of employees in their organisations. These questions are asked in categorical form.

5.2. Research Constructs

To assess the level of the IT capabilities, the respondents are asked to rate the IT capability level using a 7-point scale of 1 (very low) to 7 (very high). The mean scores of the IT infrastructure (4 variables), IT skill (5 variables) and IT usage (5 variables) for each elements of IT capability are used as an indicator for each of the IT capabilities. The respondents were approached to complete the questionnaire in December 2007.

This study uses subjective self-rating performance measures that have been criticized in the accounting literature [Thornton, 1968]. However, recent literature has suggested that self-rating performance measures are more accurate than objective upper management ratings [Perera et al., 1997; Caruana et al., 2002; Bhatt and Grover, 2005; Viswesvaran et al, 2005]. Self-rating measures involve a method in which the respondents provide an indication of the performance of their particular organisation.

E-service quality is assessed by means of browsing the availability of the eight types of e-services offered in the websites of the chosen LAs. The e-services examined are**:** e-assessment, e-compound/ payment, e-rental, e-licensing, e-complaints, e-submissions, e-business and e-community. Those LAs that provide only one e-service are given a point of '1' and those providing any two e-services are given a point of '2'. The process of browsing the availability of e-services was performed in December 2009.

As suggested in the IT literature, the impact of IT on service quality performance is not immediate [Bharadwaj, 2000]. As such, this study relies on a two year gap: December 2007 to December 2009, in measuring the benefits of the IT capability on e-service quality.

6. Results

Table 2 provides the demographic statistics for the f subjects who participated in this study. Panel A provides information in relation to the respondents' level of seniority. The majority of the respondents are heads of departments (68.9%) and 31.1% of the respondents are from the senior management group.

Panel B provides the types of LAs participating in this study. Sixty percent of the respondents are from the district councils, 24% are from the municipal councils and the remaining 10% comes from the city councils. This is expected since the majority of the LAs in Malaysia represent the city councils (101 out of 144).

Table 2: Descriptive statistics

Panel A: Respondents' position level

Position level	Frequency	Percent
Mayor/ President	42	31.1
Head of Department	93	68.9
Total	135	100

Panel B: Type of LA

Local Authorities	Frequency	Percent
City Council (Large)	14	10.4
Municipal Council (Medium)	33	24.4
District Council (Small)	88	65.2
Total	135	100

Table 3 provides the results in relation to testing the hypotheses in this study. Panel A, Table 3 presents the mean score of all elements of IT capabilities and e-service quality. The results show that the service quality mean score for IT usage is the highest (4.7605) as compared to the service quality mean score for IT infrastructure (4.7130) and IT skill (4.7353). The results provide some indication that the respondents agree that the main important determinant in relation to the quality of e-services among the LAs is the IT usage.

Panel B, Table 3, shows the results regarding whether the IT capability has significantly influenced the quality of e-services among the LAs in Malaysia. Specifically, the results show that the level of IT infrastructure, IT skill and IT usage influence the quality of the e-services significantly (p= 0.001; p=0.006; p=0.004 respectively). The results indicate that the quality of e-services is dependent on the IT infrastructure, whether the staff in the organisation is highly IT skilled as well as the level of IT usage within an organisation. The results in this study reject hypotheses 1 to 3 that state that there are no significant effects of the IT capabilities on the e-service quality of the LAs.

Panel B, Table 3 also provides the results which show the interaction between the IT capability elements. The results show a significant effect of IT skill and IT usage on e-services quality (p=0.003). The results indicate that high IT skill and IT usage would influence the quality of e-services provided to the customer. The results also show that there is a marginally significant effect on the interaction between IT infrastructure and IT skill (p=0.085). Such results provide an indication that a high level of IT skill would enhance the effectiveness of the IT infrastructure and this would eventually lead to a high quality in relation to e-services. The results in panel B, Table 3 however, show no significant effect on the interaction between IT

infrastructure and IT skill (p=0.439). The results in this study thus reject hypotheses 4 and 6 but support hypothesis 5.

Table 3: IT capability and e-service quality
Panel A**:** Descriptive statistics

	Mean	Standard deviation	N
IT infrastructure	4.7130	1.30924	135
IT skill	4.7353	1.30849	135
IT usage	4.7605	1.47655	135

Panel B: Univariate analysis of Variance

Dependent variable: e-service quality	df	Mean square	p-value.
Intercept	124	1122.577	0.000
IT infrastructure	15	2.833	0.001
IT skill	23	1.815	0.006
IT usage	10	2.323	0.004
IT infrastructure x IT skill	2	1.167	0.085
IT infrastructure x IT usage	3	0.361	0.439
IT skill x IT usage	10	4.018	0.003
Corrected total	134		

7. Summary and Conclusion

This study examines the effect of IT capabilities on the e-service quality of Malaysian LAs. Using a questionnaire survey distributed to the mayors, presidents and heads of IT departments, the results show that IT capabilities, namely, IT infrastructure, IT skill, IT usage and the interactions between these three elements may influence the e-service quality. The results in this study support previous studies in the organisational performance literature that show that there is a significant influence of IT infrastructure (such as [Bharadwaj, 2000]), IT skill (such as [Ray et al., 2004]) and IT usage (such as [Bharati, 1999]) on organisational performance.

A key finding in this study is that IT capability plays an important role in influencing the quality of e-service among LAs. The evidence in this study points to the fact that until the realisation by the LAs of the benefits of IT capability that their e-service quality would not be improved.

This study has some limitations. Firstly, the respondents from the Malaysian LAs were asked to respond on behalf of the public. Although this technique has been applied by other studies, there may be an element of bias in the responses.

This study examines the IT capability and its association with e-service quality within the environment of local authorities. Future research could examine other levels within the public sector such as state and federal organisations.

Overall, the findings of this study provide some useful insights into the effect of IT capability on e-service quality among LAs. Such results provide some understanding on the impact and importance of IT capability within the public sector.

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