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E-READINESS OF THE SERVICE ENTERPRISES IN CHINA

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Abstract

This paper presents an evaluation indicators system of e-readiness for the service enterprise, which is based on the model of e-business value creation process. This indicators system encompasses four levels corresponding to four dimensions of e-business value creation process. These four levels are: strategy, resources, capability, and performance that are causally related from e-business value creation process perspective. Based on a survey of 124 Chinese service enterprises, the evaluation indicators system is used to assess the effectiveness of e-readiness and to prove the rationality of the indicators system. Study results reveal that the indicators system can evaluate e-readiness of the service enterprise dynamically according to the value creation process. These findings are helpful for managers to diagnose and forecast problems, and subsequently implement e-business effectively and efficiently.

Keywords: *Electronic business, service enterprises, e-readiness, evaluation indicators system, e-business value creation process*

1 INTRODUCTION

Modern service industry has already been the new focus of world economic development and international competition. Vargo and Lusch(2004) pointed out that, at present, the market is in the "typical transition period" and service enterprise is a basic part of the economic transformation. Modern service industry of adopted e-business will be the most innovative and dynamic industry in economic development. However, eighty percent of IT investments of enterprises which have already implemented e-business did not get the satisfactory results(Huang,2004). Therefore, it is essential to answer this question, "what are the conditions our enterprises should have in order to implement e-business successfully?" The evaluation of e-readiness is the key to helping our enterprises to transform ad hoc approach to e-business into a disciplined and scientific take on e-business development. But there is little ground work in the study regarding the evaluation of e-readiness of enterprise at the present time.

This paper is based on the model of e-business value creation process (Zhao and Zhu,2006), and the Characteristics of e-readiness of service enterprises where develop the evaluation indictors system of e-readiness for service enterprises. This evaluation indictors system has four levels: strategy, resource, capability, and process performance. These four levels corresponding to four dimensions of e-business value creation process, which are causally related. Therefore it can evaluate the e-readiness factors and causal relationships caused by the value creation process. This is different from former studies which did not consider the causal relationships. These findings are helpful for our managers to diagnose and forecast the problems, and subsequently implement e-business effectively and efficiently.

The balance of the paper is organized as follows. In section 2, we first review the e-readiness literature. The model for the evaluation of e-readiness is presented in section 3. The evaluation indicators system of e-readiness is presented in section 4, and we discuss the details of research methodology, data

collection, and dada analysis in section 5. We substantiate the reliability of this evaluation indicator system of e-readiness. At the last section, conclusions and limitations are presented.

2 LITERATURE REVIEW OF E-READINESS

The concept of e-readiness was first proposed by the Asia-Pacific Economic Cooperation Organization and the Cisco Systems. They represented regional e-readiness and enterprise e-readiness respectively (Zhao,2005). The object of evaluation of e-readiness has transferred from national, regional level to industrial and enterprises' level. The definition of e-readiness is that enterprises or organizations optimize all the related aspects in order to implement e-business strategy and plan successfully (Hartman&Sifonis&Kador ,2000). The core of e-readiness is to find what conditions enterprises should have in order to implement e-business successfully.

In the domain of e-readiness, researchers are concerned about information technology (IT), the mode of management, the condition of IT infrastructure, customer satisfaction, and external factors(Zhao,2005).Zhu(2003) verified the relationship between the causal factors and e-business value by comparing the e-business of developed countries and developing countries, and discovered that integration of technologies is the most critical factor to create e-business values, but optimal e-business value is derived from the usage of inside resources of the organization. Maruca and Raymond Burke et al. (1999)studied retail companies and discovered that the critical success factor for e-business is a close connection between companies and clients; corporate culture is another factor that needs to be considered when developing e-business. Wang and Cheung(2004) studied the e-business adoption process of travel corporations in Taiwan, and discovered that outside competition, innovation location, funding support and information resources are the major success factors of e-business in tourist industry. Jiang Ximing and Huang Jingwei(2006)proposed an e-business evaluation model for enterprises to implement and ways to improve e-business system. They also discovered that the goal of Chinese software companies to implement e-business is to increase product recognition, to decrease marketing cost, and to increase customer satisfaction. Stephen M. Mutulaa and Pieter van Brakelb (2006) developed an integrated tool for evaluating e-readiness. Based on three dimensions, Huang Jinghua et al. (2004) proposed the framework of e-business evaluation. In order to expand the scope of using an indicators system, increasingly more researchers(Mutulaa and Brakelb,2006) intended to integrate the existing indicators systems to develop a new framework of e-readiness. However, it is unreasonable to believe these indicators can assure a better evaluation result (Minges,2005).

There are two problems in the indicators system of e-readiness of former research. First, because these studies lacked theoretical model, their measurement criterion were vague, the categories not well-defined and the compatibility was questionable. Second, there was no causal relationship among indicators. Those indicators systems are incapable of evaluating e-readiness from an integrated way.

In view of the problems listed above, this paper constructs the evaluation indicators system of e-readiness for service industry based on the e-business value creation process model(Zhao and Zhu,2006). We then use an empirical method with a survey of 124 service enterprises in China to ascertain the dynamic evaluation according to the value creation process, and scientific assessment capabilities of the evaluation indicators system.

3 THE MODEL OF EVALUATION OF E-READINESS

We proposed the model of e-business value creation process in another paper (Zhao and Zhu,2006). It shows the causal relationship of the process through the four dimensions of strategy planning, IT-related resources, e-business capabilities and e-business value. These four dimensions consist of seven variables: strategy includes leadership, organizations readiness, environment and IT knowledge; the IT-related resources includes information system, IT human resources and e-readiness of value chain partners; the e-business capabilities includes information sharing capability and collaborative process capability; the e-business value is measured by e-business process performance.

Our model of e-business value creation process is different from the traditional model. It takes the process as its driver and the two capabilities (information sharing capability and collaborative process capability) as its core. Through the dynamic transformation process of strategies planned resources, the resources produced capacities, and the capabilities create e-business values, it reveals the dynamic causal relationships between the important indicators of e-business value creation objectively. So our indicators system based on e-business value creation process has the assessment properties of dynamic tracking value creation and status evaluation. These help managers evaluate, forecast, and make decisions effectively.

4 THE EVALUATION INDICATORS SYSTEM OF E-READINESS

4.1 The evaluation indicators system of e-readiness

The framework of evaluation indicators system of e-readiness (as shown in figure 1) consists of four layers: strategy construction layer, resources analysis layer, capabilities assessment layer and performance measurement layer.

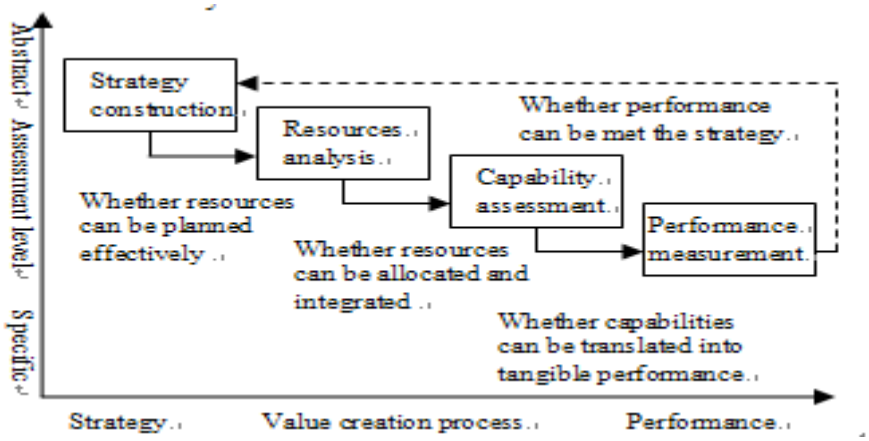

Figure 1. The framework of evaluation indicators system of e-readiness

4.1.1 Strategy construction layer

The e-business strategy is defined here as strategic orientation and planning to direct utilization and integration of organizational resources for e-business performance. The indicators are shown in table 1. The researchers have recognized the importance of e-business strategy plan early. Porter (2001)argues that enterprises should focus on positioning the implementation of e-business strategy effectively to activate internal resources that are rare and valuable. Piccoli (2005) indicates that the strategic initiatives based on IT is a behaviour system, which fosters the creation and application of economic value.

4.1.2 Resources analysis layer

Based on Resource-Based View (RBV), we divide these resources related to the implementation of e-business strategies of the organization into two kinds: IT-related resources and resources of knowledge sharing. Information system resources, IT human resources and partner e-readiness resources are called IT related resource; knowledge sharing contains the design of new product (service) of the enterprise, knowledge management of business process, customers' requirement analysis, and the knowledge about service tracking. In previous studies, we note that these resources influence the implementation of e-business. Melville et al. (2004) considered that these resources which create IT values mainly included IT resources (technology and human resources) and complementary organization resources. Both Barua (2004) and Zhuang (2003) proved that IT resources, human resources and business resources (including business process and partner e-readiness) are the main

sources that create e-business value. At the same time, knowledge is considered a critical resource in service enterprises (Criscuolo&Salter& Sheehan,2007). The indicators are as shown in table 1.

4.1.3 Capabilities assessment layer

According to the model of e-business value creation process(Zhao and Zhu,2006), we classify capabilities into two kinds. They are information sharing capabilities and collaborative capabilities. Information sharing capabilities are used here to refer to the ability that a firm uses e-business technology to share business information with partners (e.g., suppliers and customers) for its transaction and coordination activities Collaborative process capabilities refer to the ability that a firm uses e-business technology to accomplish business processes electronically with partners (e.g., suppliers and customers). RBV believes that process is the direct way to exploit enterprise's resources. It is through process that enterprises implement various e-business processes (e.g. customer service) to achieve their strategic goal(Barua,2004). In our study, we emphasize cross-organizational cooperation relationships and collaborative process capabilities. They include process reengineering according to collaborative demand, on-line service, satisfying customer's requirement, and tracking customer's information for personalized products and services.

4.1.4 Performance measurement layer

E-business performance indicators can be used to measure and forecast the performance results regarding the status of current e-readiness, and to analyze and verify the relationships and influence of the e-readiness indicators with the enterprise performance. Hence, we classify e-business performance into strategic performance, financial performance, and the e-business process performance. Strategic performance is used to measure competitive advantage; financial performance is used to measure the financial indicators in a firm's performance; e-business process performance is used to measure the efficiency of the customer relationship management process and to improve on the quality of implementing e-business process.

Object layer(O)	Criteria layer (A)	Evaluation layer (B)	Indicators layer (P)		
			Indicators code	Indicators	Main references
Strategy construction	Strategic initiative	Strategic support	R1	4	Grandon,2004 Molla,2005 Zhu et al.,2007
		Strategic planning	R2	3	
		Organizational Preparations	R3	2	
Resource analysis	IS resources	IS integration in organizations	R4	2	Barua,2004 Tan,2007
		IS integration among organizations	R5	3	
	HR resources	IT skills and training	R6	3	Bharadwaj,2000 Zhao,2008
		Willingness of participating e-business	R7	2	
	KN sharing	Customer-oriented knowledge	R8	3	Tanriverdi, H.,2005 Malhotra, A. ,2005
		Enterprise-oriented knowledge	R9	2	
	Readiness of value chain partners	Readiness of partners	R10	3	Barua,2004 Mishra,2007
		Readiness of customers	R11	4	
Capabilities assessment	information sharing capabilities	Sharing capabilities partner-oriented	R12	3	Barua,2004 Zhao et al. ,2006
		Sharing capabilities customer-oriented	R13	6	
	Collaborative	Collaborative capabilities	R14	2	Barua,2004

	process capabilities	partner-oriented			Zhao et al. ,2006
		Collaborative capabilities customer-oriented	R15	5	
Performance measurement	Process performance	E-business process performance	R16	6	Mishra ,2007 Zhuang,2003 Ray ,2005
	Financial performance	Enterprise financial performance	R17	9	
	Strategic performance	Competitive performance	R18	3	

Table1. Indicators system for evaluating e-readiness in service industry

4.2 Determining the weights of indicators

Determining the weights of indicators in indicators system is the main prerequisite to achieving scientific and effective results. We use improved AHP method to analyze the weights. We selected data from 20 enterprises that implemented e-business with a success track record as sample for analyzing the weights.

According to our analysis, we calculated the weights of indicators system in table 2. (Because of space constraints, we only listed the results of indicators of the strategic layer).

Object layer(O)	Criteria layer(A)	Indicator layer(P)	A-P layer weights $\{w_i'\}$
Strategic layer	A1 Strategic support	A11 Strategic orientation	0.2397
		A12 Top managers responsibilities	0.2464
		A13 Top managers cognition	0.2675
		A14 Project team	0.2464
	A2 Programming	A21 HR planning	0.3181
		A22 Partner's schemes	0.3269
		A23 System construction	0.3550
	A3 Organizat-ional preparation	A31 Organizational adjustment	0.4726
		A32 Capital plan	0.5274

Table 2. A partial calculating results of indicators weights

5 EMPIRICAL STUDY

In this section, we will justify the evaluation indicators system of e-readiness using an empirical research method based on the data from 124 service enterprises. According to the indictors of the strategy layer and the resource layer, we use K-MEANS clustering method to classify the samples into four categories. The hypothesis is proposed for the causal relationships among strategy, resources, capability and performance. Then we analyze the data of the enterprises in these four categories. These hypotheses and the reasonableness of the indicators system are also confirmed. This substantiation of the causal relationships among the four dimensions also testifies that the evaluation indicators system of e-readiness has the capabilities of dynamic tracking e-business value creation.

5.1 Instrument and data collection

From May to July of 2007, we conducted a survey of representative service enterprises in China. A 5-point Likert scale (from best adoption to none) is used to measure quantitative questions. During the whole survey process, we received a total of 124 usable samples. A summary of enterprises in the sample is shown in Table 3.

Types of business	Obs.	No. of employees	Obs.
Finance, insurances, securities	4	> 100	92
Real estate	3	101-500	6
Storage and logistics	8	501-1,000	15
Information, computer service and software	57	1,001-5,000	5
Hotel service	7	5,001-10,000	8
wholesale (foreign trade)	16	< 10,000	6
Others	39		

Table 3. The sample characteristic

5.2 Reliability and Validity

All scales were tested for various validity and reliability properties. We use the average extraction variation (Average Variance Extracted, AVE) to examine the validity of the discriminate validity of the model. Table 4 presents AVE explained in the measure model. The AVE is greater than 0.5, which suggests that the items share more common variance with their respective constructs than with other constructs. All our constructs meet this criterion.

Each indictor in the evaluation indicators system was tested for reliability using Cronbach's coefficient alpha. The Cronbach alpha ranges from 0.82-0.97 for all indicators which reveal an acceptable internal consistency, as shown in table 5.

5.3 The Rationality of Indicators System

Four levels in evaluation indictors system corresponding to four dimensions of e-business value creation process are causally related. According to the view of RBV theory, the critical resource has a significantly positive effect on the performance of the enterprise. The actual results from the four layers of the indicators system should show that the difference of the strategy level and resource level of the enterprise will inevitably lead to significant differences of its capabilities and performance. That is, we should validate the following assumptions:

H: the critical strategies and resources of the enterprise have a positive effect on the creation of its capabilities and performance.

In this paper, we use K-MEANS approach to classify enterprise samples into following four categories (S1-S4), and the indicators of strategy layer (R1-R3) and resources layer of the (R4-R11) are the basis for clustering. The levels of e-readiness in different service enterprises are presented in four categories:

S1:basic informationalization; S2:initial adoption of e-business; S3:profound implementation of e-business; S4: extensive integration of e-business.

The averages of indicators of the four kinds of enterprises are shown in figure 2. The averages of indicators of S1 to S4 have a significantly upward trend in figure 2, and the broken lines representing four layers (the strategy, resources, capability and performance) from S1 to S4 has four distinct phases. There are obvious differences among the indicators. The results of the variance are shown in table 6.

From table 6, we note that not only the ANOVA test results of cluster indicators R1-R11 have significant differences ($p < 0.001$), but also the indictors between S1-S4 in capabilities and performance layer ($p < 0.001$).

Therefore, Figure 2 and Table 6 have proved our hypothesis. It reflects the validity of our evaluation indicators system of e-readiness. Based on the value creation process, we also ascertained the existing causal relationships among strategy, resources, capability and performance.

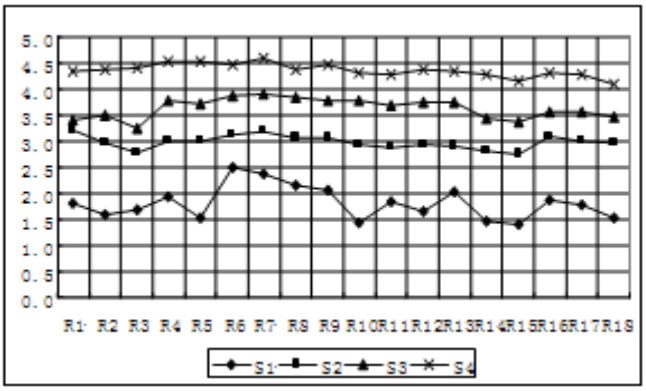

Figure 2. Measurement result s of four type's enterprises

	EBSO	ISI	ITHR	CER	KNS	ISC	CPC	PF	FF	SF
EBSO	**0.85**									
ISI	0.83	**0.90**								
ITHR	0.69	0.75	**0.89**							
CER	0.72	0.74	0.75	**0.89**						
KNS	0.65	0.76	0.81	0.76	**0.95**					
ISC	0.78	0.77	0.71	0.79	0.76	**0.91**				
CPC	0.76	0.77	0.70	0.79	0.79	0.86	**0.92**			
PF	0.67	0.69	0.65	0.72	0.74	0.77	0.80	**1.00**		
FF	0.77	0.73	0.70	0.76	0.76	0.79	0.84	0.83	**1.00**	
SF	0.74	0.68	0.66	0.70	0.67	0.72	0.79	0.73	0.88	**1.00**

Notes：EBSO=Strategy Planning，ISI=Information System Integration，ITHR=IT Human Resource，CER=Readiness of Value Chain Partners，KNS=Knowledge Sharing，ISC=Information Sharing Capability，CPC=Collaborative Process Capability，PF=Process Performance，FF=Financial Performance，SF=Strategy Performance

Table 4. Correlative matrix in the criteria layer (A) and AVE test

Object layer（O）	Corresponding points	Value range of coefficient Cronbach α					
		Maximum	Minimum	>0.9	0.8－0.9	0.7－0.8	Needless to measure*
Strategy construction	3	0.90	0.88	1	2	0	0
Resource analysis	8	0.95	0.82	5	3	0	0
Capability assessment	4	0.94	0.86	3	1	0	0

Performance measurement	3	0.97	0.96	3	0	0	0

Table 5. Reliability test in object layer (O)

Index codes	S1		S2		S3		S4		ANOVA
	Average	Variance	Average	Variance	Average	Variance	Average	Variance	F value
R1	1.83	0.584	3.21	0.344	3.40	0.458	4.33	0.238	84.26***
R2	1.59	0.441	2.97	0.306	3.49	0.379	4.38	0.292	91.77***
R3	1.68	0.685	2.77	0.551	3.26	0.585	4.41	0.343	67.4***
R4	1.95	0.997	3.00	0.516	3.77	0.417	4.54	0.320	62.15***
R5	1.52	0.449	2.99	0.397	3.72	0.205	4.54	0.235	105.05***
R6	2.50	1.173	3.14	0.279	3.88	0.223	4.46	0.218	57.23***
R7	2.38	1.102	3.18	0.278	3.91	0.287	4.60	0.183	58.73***
R8	2.15	1.023	3.07	0.318	3.83	0.393	4.39	0.460	62.86***
R9	2.05	1.024	3.06	0.184	3.77	0.387	4.46	0.448	71.99***
R10	1.45	0.462	2.95	0.274	3.79	0.282	4.32	0.256	79.27***
R11	1.85	0.945	2.87	0.282	3.70	0.250	4.29	0.478	45.91***
R12	1.64	0.653	2.95	0.224	3.74	0.389	4.37	0.235	89.87***
R13	2.04	1.134	2.91	0.248	3.76	0.300	4.35	0.345	64.4***
R14	1.45	0.352	2.82	0.215	3.45	0.569	4.28	0.434	95.9***
R15	1.42	0.267	2.75	0.228	3.38	0.517	4.16	0.652	76.59***
R16	1.88	0.655	3.08	0.348	3.55	0.578	4.32	0.249	67.01***
R17	1.78	0.719	2.99	0.235	3.57	0.315	4.30	0.344	75.78***
R18	1.53	0.577	2.96	0.395	3.46	0.611	4.11	0.486	46.97***

Notes：(***)represents $p<0.001$， indicator codes are the same in table 2

Table 6. Analysis results of ANOVA of four types of service enterprises

6 CONCLUSIONS

The paper proposes a new evaluation indicators system of e-readiness for service enterprises based on our value creation process model. From the value creation process perspective, the four object layers in evaluation indicators system indicate the causal relationships among strategy, resources, capability and performance. Through data from 124 services enterprises, and the analysis results, we prove the rationality of the indicator system.

In a word, comparing with the other evaluation indicators system of e-readiness, this indicators system is based on value creation process model of e-business. The evaluation indicator system of e-readiness has following characteristics. Firstly, the process from the strategy construction to the final e-business value realization reflects the causal relationships in the e- business value creation process. Based on the causal relationships between these four dimensions, our indicators system evaluates e-readiness factors triggered by the value creation process. Secondly, the indicators system of e-readiness is capable of dynamic tracking evaluation, because there exists the transformation mechanism of strategies planned resources, resources produced capabilities and capabilities create e-business values.

There are still some limitations. First, we must recognize that the indicators and weights are different in different service sectors, while the conclusion in this paper only pertains to the service enterprises e-readiness. Second, our indicators system remains at the evaluation layer (B), while the detail indictors in the indicator layer (P) are not focused. It is our intent to broaden our scope to include other sectors and layers in the future.

7 ACKNOWLEDGEMENTS

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References

Barua, A., et al.(2004). An Empirical Investigation of Net-enabled Business Value. MIS Quarterly,28(4),585-620.

Criscuolo, P., Salter, A. and Sheehan ,T.(2007). Making Knowledge Visible: Using Expert Yellow Pages to Map Capabilities in Professional Services Firms. Research Policy, 36(10), 1603-1619.

Hartman A.,Sifonis J. and Kador J.(2000). Net Ready: Strategies for success in the economy. McGraw-Hill, New York.

Huang, J.H. (2004).An e-readiness assessment framework and two field studies. Communications of the Association for Information Systems,14,364-386.

Jiang X.M., Huang J.H., Wang H.(2006). E-commerce system evaluation model and application. Journal of Tsinghua University(Natural&Science),46 (S1), 1019-1024.

Maruca, Burke R.F.(1999). Retailing: Confronting the Challenges That Face Bricks-and-Mortar Stores. Harvard Business Review,159-168.

Melville, N., Kraemer K., and Gurbaxani, V. (2004).Review: Information technology and organizational performance: An integrative model of IT business value.MIS Quarterly, 28(2), 283-322.

Minges, M. (2005). Evaluation of e-Readiness Indices in Latin America and the Caribbean (online). Santiago: ECLAC.

Mutulaa, S.M. and Brakelb P.(2006).An evaluation of e-readiness assessment tools with respect to information access: Towards an integrated information rich tool. International Journal of Information Management,26, 212-223.

Piccoli, G. and Ives, B.(2005). Review: It-dependent strategic initiatives and sustained competitive advantage: A review and synthesis of the literature, MIS Quarterly,63(4) , 747-776.

Porter, M.E. (2001).Strategy and the Internet. Harvard Business Review,79(3), 62-78.

Vargo, S. and Lusch, R.(2004). Evolving to a New Dominant Logic for Marketing, Journal of Marketing, 68,1-17.

Wang, S., and Cheung, W.(2004).E-business adoption by travel agencies: Prime candidates for mobile e-business. International Journal of Electronic Commerce, 8(3), 43-63.

Zhuang, Y.L. and A.L. Lederer.(2003). An instrument for measuring the business benefits of e-commerce retailing.International Journal of Electronic Commerce, 7(3), 65-99.

Zhu K, XuS. and Dedrick J.(2003) Assessing drivers of e-business value: Results of across-country study.24th International Conference on Information Systems C.Seattle: AIS, 181-193.

Zhao C.J.(2005). Theory and application of e-commerce operation. Tsinghua University Press, Beijing.(in Chinese).

Zhao J. and Zhu Z.(2006). An empirical research of the critical success factors of implementing the e-business strategy. Journal of Tsinghua University (Nature &Science), 46(S1), 914-922. (in Chinese).