Int J Syst Assur Eng Manag
https://doi.org/10.1007/s13198-022-01643-z

ORIGINAL ARTICLE

Risk management of data flow under cross-cultural english language understanding

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Received: 26 May 2021 / Accepted: 3 January 2022

Abstract The purpose is to study data flow risk management under cross-cultural English language understanding. Based on cross-border data flow activities and management measures under cross-cultural English language understanding, the related risk management problem is studied and analyzed through the relevant methods of risk management and identification. Changes and differences in data flow regulatory policies of cross-cultural English understanding are proposed. It is pointed out that the management mode relying solely on legal compliance leads to some problems in practice, such as weak links, passive lag, great business impact, high management cost, and uncertain effect. The results show that it is crucial to build a cross-border data flow risk management system in the era of data economy. The current situation of the risk management of data flow under cross-cultural English language understanding is realized, and the key elements of cross-border data flow risk management are preliminarily obtained. These further demonstrate the necessity and feasibility of risk management of data flow under cross-cultural English language understanding, and provide corresponding empirical support for risk assessment and the response of data flow under cross-cultural English language understanding based on "value risk".

Keywords Cross culture · English language understanding · Data flow · Risk management · Risk assessment

1 Introduction

Language is the carrier of the culture. In language learning, it is inevitable to deal with the culture behind the language. The permeation and influence of the culture in the English language are everywhere (Cui and Han 2019). The obstacles of understanding a foreign language are not only limited to language knowledge such as vocabulary and grammar. The cultural background of the language will directly affect the learner's understanding. Cross-culture communication requires sensitivity to both foreign and native cultures and the consciousness to output the target language. This sensitivity and consciousness can be cultivated by learning and practice (Carew et al. 2018).

In the new media era, cloud computing, mobile Internet, Internet of things, big data, artificial intelligence and other new-generation information technologies are developing rapidly. Economic and social innovation and development into a "data-driven" era is the key to the comprehensive arrival of production factors. There are always various risks and challenges in the curve age of data flow (Ali et al. 2020). In the modern market economy, people have realized all kinds of changes and opportunities brought by risk theory. Therefore, how to adjust and measure the uncertainty of risk and correctly understand the contradiction between risk and opportunity is of great significance. It is particularly important to fully understand the causes of risks, scientifically evaluate risks and implement risk control measures. Data flow risk management in cross-

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Published online: 30 January 2022

cultural English understanding is an important topic in risk management research. The research on this topic not only has important theoretical significance for understanding the true situation of human language production system, but also has important practical significance for helping interlocutors improve the quality of speech output and successfully realize their communicative intention (Soldatenko and Backer 2019). At present, there are many theoretical introductions and few empirical studies on data flow risk management under cross-cultural English language understanding in domestic academic circles, and it is rarer to study it comprehensively and deeply.

Risk identification and risk management are carried out through relevant methods. According to the relevant characteristics of data flow risk, a comprehensive risk management concept and its analysis framework based on "value risk" are proposed. The data flow risk comprehensive evaluation index system and its calculation method are established. The results show that it is very crucial to build a cross-border data flow risk management system in the era of the data economy. The current situation of data flow risk management under cross-cultural English language understanding is realized, the key elements of cross-border data flow risk management are preliminarily obtained, and the data flow risk assessment methods are explored, which provides a reference for data flow risk management.

2 Method

2.1 Risk management and identification

The core of risk management is to plan ahead. Risk management emphasizes the identification, analysis and evaluation of risks through scientific and effective methods before risks occur. Therefore, the adverse effects that may occur in the future are predicted. Risk subjects take timely and effective measures to deal with risks to minimize the adverse consequences arising from the occurrence of the risk (Jia 2020). Scientific risk management is the result of the integration of many complex technical methods and subject knowledge. Risk identification, analysis, evaluation, and response are all indispensable elements of systematic risk management activities. Risk assessment includes risk measurement and risk evaluation (Ho et al. 2019). Figure 1 shows the basic process of risk management.

The risk management process mainly includes three stages: the plan formulation, the plan implementation, and the plan adjustment (Hiromoto et al. 2017). The risk management plan is implemented based on the plan formulation. No matter how perfect the plan is, only the implemented plan can achieve enterprise risk management (Araz et al. 2020).

The plan adjustment is based on the idea of dynamic risk management. Companies are required to adjust the corporate risk management strategies in time according to different situations. The inappropriate risk management response strategy should be adjusted and modified in time (Kara et al. 2020). Under normal circumstances, companies can make changes in the form of partial adjustments. However, local adjustments should also be coordinated with other parts that have not been adjusted (Calvard and Jeske 2018).

Risk identification is the first step in risk management. It usually refers to the process of identifying external or internal affairs that may affect the realization of the risk entity's objectives before the risk occurs (Yang et al. 2019). External influences include economy, politics, society, and technology. Internal influences include employees, internal processes, and internal technical factors. During risk identification, risk factors and risk items are collected, and risks and opportunities are distinguished (Wang and Li 2019). Risk identification must be comprehensive and systematic. All uncertainties inside and outside the enterprise are identified to prevent the enterprise from encountering risks outside the risk management mechanism. Figure 2 shows the process of risk identification.

The commonly used methods and tools for risk identification mainly include scenario analysis method, field investigation method, checklist method, flowchart method, financial statement method, brainstorming method, fault tree method, and sensitivity analysis method. *In the ISO31000: 2009 Risk Management Principles and Guidelines*, it is mentioned that companies should adopt identification tools and technologies that are suitable for goals, capabilities, and can solve the risks faced by the company (Song 2018).

2.2 Risk identification of data flow

To establish the background relationship of different languages and cultures, the cognitive function of language and culture needs to be realized at all levels. When different learners use English, the derivative languages cannot be used by common psychology. For practitioners, although the knowledge, structure and grammar of English have been mastered, it is impossible to build a cultural background with proficient English. The difference lies in the fact that the connotation is not recognized although the various contents of the palm English language are mastered. Learning English in this way can only exist in museums, not "living" English (Zhang 2019).

Data flow adopts a more conservative attitude due to the national laws, regulations and policy restrictions. On the

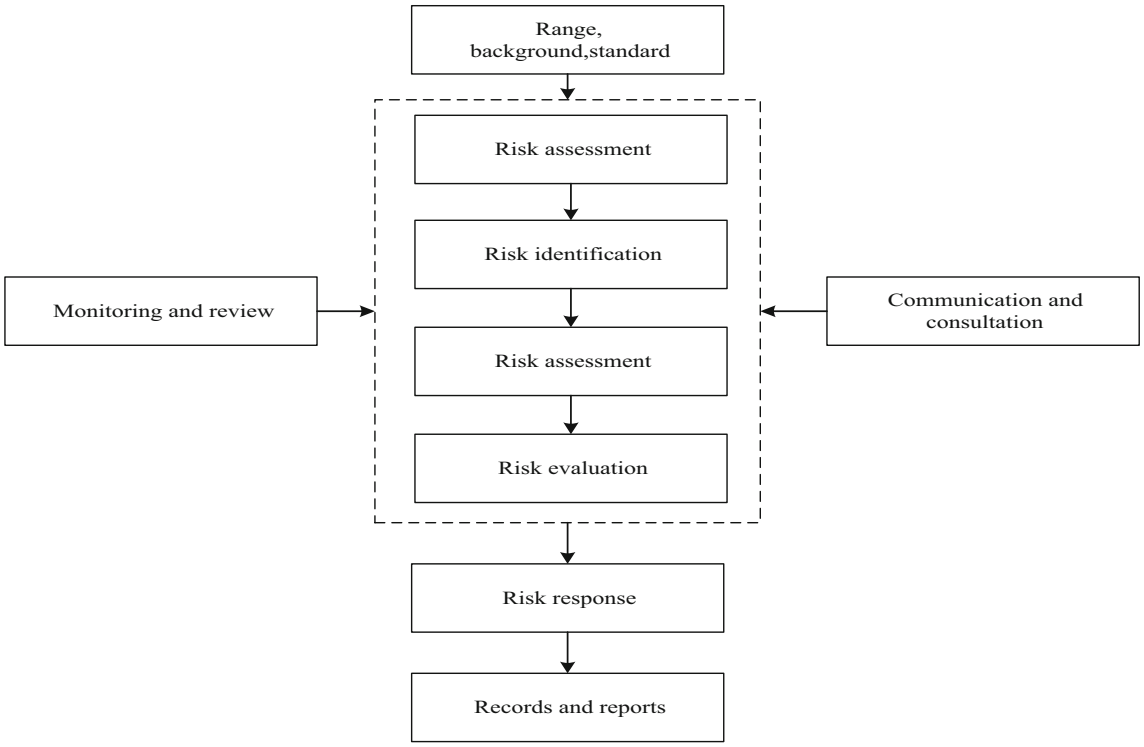

Figure. 1 The basic process of risk management

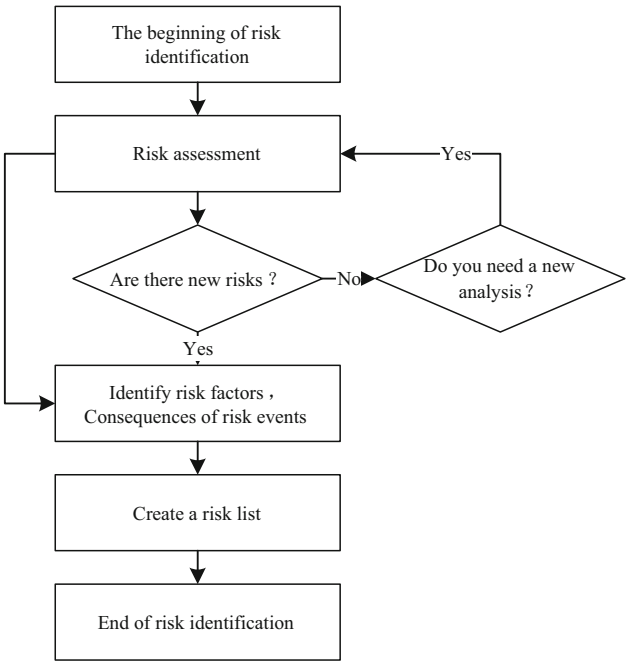

Figure. 2 The process of risk identification

premise of complying with laws, regulations and policies, big data is applied under the relevant requirements of the Communications Administration. If big data cannot be applied and developed following the explicit provisions of current laws and regulations, the method of one discussion and one report for each case is adopted. The method of reporting and soliciting opinions to the competent communications administration can also be used. Under the premise of confirming the development, the related business and development work of big data applications is conducted (Cheng et al. 2017). The scope of data flow applications is still very narrow, related business areas need to be expanded, and data flow products need to be upgraded and improved.

The risk of data flow may not be fully grasped. To make up for the mistakes and omissions in risk identification that may be caused in this situation, brainstorming and field investigation methods are used to identify risks. The risk checklist method and the flowchart method identify risk points supplemented to check for errors and omissions in risk identification (Zhu 2017).

2.2.1 Identification of flowchart method

Figure 3 shows the process of data flow application based on sufficient research, investigation and practice summary.

The flowchart shows the relationship among the various links. Each process may have risks. The main risks of data flow are concentrated in the requirements design and product development links of the early risk process. This is mainly related to the actual situation of data flow applications (Gao and Zuo 2019).

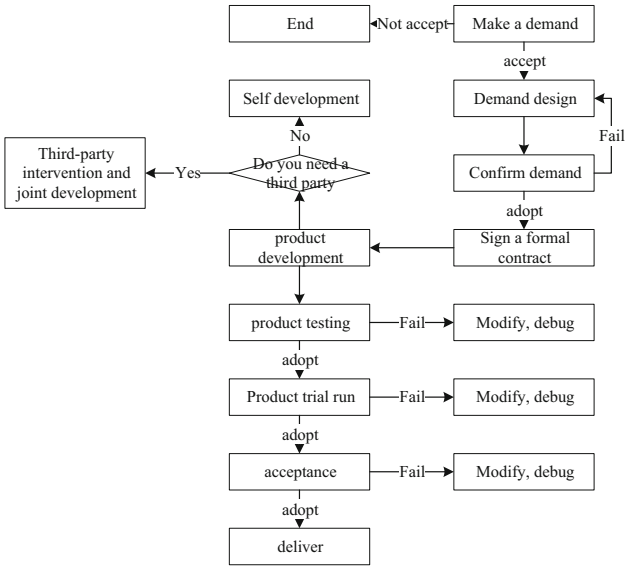

Figure. 3 The process of data flow

The development strength of data flow is relatively weak in the requirements design and product development links. Third-party partners need to be brought in for joint development. Related personnel will be exposed to the data of the data flow, which is the main risk of the current data flow. Meanwhile, internal developers of the data flow will also be exposed to core data, which may also expose data flow to risks (Han and Han 2019). Therefore, the risks are mainly concentrated in the above two links.

2.2.2 Recognition of brainstorming

To advance the progress of the project, a more convenient brainstorming method is adopted to assist risk identification. The specific implementation process is as follows. First, people who need to participate in the brainstorming law are listed based on the experience accumulated in other similar businesses. Next, the problem is listed according to the project's actual situation and the problems found in the early stage. Topics can be quickly opened, and risk items can be quickly collected (Guo et al. 2020). Finally, team members review the collected risk items and identify the core risk points.

The advantage of this method is very fast. The disadvantage is that there may be a disconnection with the risk list, resulting in insufficient risk identification. Therefore, this method is used as an auxiliary method of other methods in risk management projects to promote the project progress as soon as possible.

2.3 Edge computing

The Edge Computing Industry Alliance gave such a definition in a white paper 1.0 given in 2016. Edge computing is conducted at the edge of the network close to the source of the object or data. Edge computing is an open platform that integrates network, computing, storage, and application core capabilities. It provides nearby edge-only services to meet the key needs of industry digitalization on agile connection, fact transfer, data optimization, application capabilities, security and privacy protection. The definition of edge computing was supplemented in the white paper 2.0 given in 2017. Edge computing can be used as a bridge to connect the physical and digital world to achieve smart assets, smart gateways, smart systems and smart services (Alexandrov et al. 2019).

Edge computing has the following basic attributes and characteristics.

2.3.1 Connectivity

Connectivity is the foundation of edge computing. Continuously updated connection physical objects and changeable application scenarios require rich connection functions of edge computing. These functions include network interfaces, network protocols, network topology, network deployment, network configuration, network management, and network maintenance. There are advanced research results in the network field such as SDN, NFV, WLAN, and 5G. The connectivity of edge computing must be applied and combined with these technologies.

2.3.2 Data interface

Edge computing is a bridge between the physical world and the digital world. It faces massive amounts of real-time data which have a complete life cycle. Data are managed to create value, and innovative applications are created to support edge computing scenarios. As a data interface, edge computing also faces challenges brought by the data itself, including real-time data and diversity.

2.3.3 Binding

Edge computing products need to adapt to the relatively harsh working conditions and operating environments of industrial sites, such as anti-electromagnetic, dust-proof, explosion-proof, anti-vibration, and anti-current/voltage fluctuations. The industrial interconnection scenario has higher requirements for the power consumption, cost, and space of edge computing devices.

Edge computing products need to consider the power consumption, cost, and space requirements of hardware

integration. They also need to consider the integration and optimization of software and hardware to adapt to various constraints and support the industry's digital diversity scenarios (Lee et al. 2019).

2.4 Risk assessment of data flow

Risk analysis provides input for risk assessment and determination of whether risks need to be addressed. It can provide the most suitable response strategies and methods. Risk analysis includes considering the causes and sources of risks, the positive and negative consequences and the possibility of these consequences (Schütte and Brost 2018).

The connotations of different cultures reflect the characteristics of the nation. The difference in this specific environment has led to the diversity of world cultures. This is also the tolerance that American society values most at this stage. According to the linguist Wolff's theory, when people face a relativistic language model, different thinking needs to be used to implement structural differences. Especially if learners cannot practice foreign culture in the social environment, the native language environment will constantly dissolve the English cultural background.

This approach is not conducive to cross-cultural English language understanding. It often causes social restrictions for learners and even deepens cultural differences (Chi et al. 2018). There are similarities and differences between English culture and native language culture, which have an enhanced significance for the learning and understanding of English and its culture. Personality is the particularity of native culture and English culture.

The key elements of risk and value are analyzed by investigating. On this basis, it is necessary to combine the risk analysis model and further carry out structural analysis and combination of risk elements and value elements, so as to provide demonstration basis for the formation of index system.

This evaluation index system is designed under the guidance of the dual unified thinking of "value-risk", and based on relevant factors and rules generated through policy document research and enterprise surveys.

2.4.1 Comprehensive risk evaluation index of data flow

According to the analysis framework of the "value-risk" dual unified cross-border data flow risk, when the harm of data flow is greater than value, the cross-border data flow activities of enterprises will exert a negative impact on the overall business objectives. On the contrary, it has a positive impact. Equation 1 shows its impact.

$$\begin{aligned}&\text{Comprehensive risks of enterprise cross}\\&\quad-\text{border data flow}\\&\quad=(\text{Data flow risk}-\text{Data flow value})\end{aligned}\tag{1}$$

Theoretically, risk can be represented by the product of the consequences of an event and the likelihood of the event. That is, risk (Risk) = likelihood (Likelihood) × consequence (Consequence). Based on the above analysis, the overall risk of cross-border data flow of Internet companies can be further decomposed into Eq. 2.

$$\begin{aligned}&\text{Comprehensive risks of cross}-\text{border data flow for}\\&\text{Internet companies}=\sum(\text{Possibility of harm}\\&\text{caused by mobility}\times\text{Harmful consequences}\\&-\text{The possibility of flow creates value}\times\text{Value output})\end{aligned}\tag{2}$$

Risk and value of data flow need to be further refined and quantified. According to the risk analysis of key risk elements, the risk and value indicators of data flow are refined from impact and possibility to form a secondary indicator system (Table 1).

1. Secondary indicators of data flow risk
   Impact indicators: according to the analysis of key elements, the sensitivity and scale of cross-border data content determine the ultimate impact of risk. Personal data, business data, and public data have different regulatory requirements and correspond to different sensitivities.
   Possible indicators: the possibility of damage caused by the risk element depends on the trust relationship between the two parties in the data flow. The risk of transmitting the same data content to different objects is also different. Based on risk factor analysis, this trust relationship includes the trust relationship among cross-border mobile enterprises and the trust relationship among the target environments (country, region or economy) of the enterprise. That is, the same data flow has different risks in different countries.
2. Secondary indicators of data flow value
   Impact indicators: the most important reason for the value of cross-border data flow of enterprises is the benefits created by data flow activities for enterprises. The benefit can be observed through current benefits and potential benefits.

Possible indicators: the necessity of cross-border data flow can be further decomposed into cross-border dependence and users' dependence. These indicators are mainly judged by all levels of regional companies, business units or management departments within the enterprise that proposes the cross-border data flow (Ding 2017).

Table 1 The composition of secondary indicators for data flow risk evaluation

First-level indicators	Data flow risk	Data flow value
Possible indicators	Trust in data flow	The need for data flow
Impact indicators	Data sensitivity	Business benefits based on data flow

The data flow risk-related elements of cross-cultural English language understanding cannot cover all aspects of enterprise cross-border data flow risk assessment (Song et al. 2018). To facilitate analysis and observation, key indicators are selected for research. Because the three-level and four-level indicators play different roles in the actual risk formation process, AHP is used to weight their risk and value respectively (Table 2).

2.4.2 System construction of risk evaluation index

Specifically, the indicator system consists of two first-level indicators: cross-border data flow risk and cross-border data flow value. The secondary indicators are decomposed from consequences and impacts. In the risk dimension, secondary indicators of cross-border data flow sensitivity and cross-border data flow trust are formed. In the value dimension, a secondary indicator based on the business income of cross-border data flow and the necessity of cross-border data flow is formed. The third-level indicators are under the framework of the second-level indicators. A number of key risk factors are selected according to the company's survey results. The four-level index is a further decomposition of the three-level index, which can correspond to the specific objects in the actual work for subjective and objective evaluation (Chen 2018).

According to the dual unified analysis model of "value-risk", two first-level indicators and four second-level indicators are equally weighted. The 8 third-level indicators and 16 fourth-level indicators are given weights based on AHP. From the perspective of the weight composition, the type of data content, the cooperation/control relationship between enterprises, and the data protection level of the countries/regions where the two parties are located have a key influence on the risk assessment of cross-border data flow for Internet companies. The cross-border business income and business model dependence have a key impact on the value evaluation of Internet companies' cross-border data flow (Ren et al. 2019).

This indicator system gives descriptions for the assignment of 16 four-level indicators, and sets the evaluation departments for different indicators. The data flow risk of cross-cultural English language comprehension can be evaluated according to the characteristics of the enterprise itself, and a comprehensive risk assessment of cross-border data flow can be carried out from the bottom up.

3 Results and discussion

This indicator system includes 8 three-level indicators and 16 four-level indicators. The four-level indicators are divided into five levels according to the impact of indicator elements on the target, namely very high (5), high (4), medium (3), low (2) and very low (1). Relevant departments will score and evaluate based on subjective and objective judgments, and form five levels of three-level indicators through a weighted combination. Different cross-cultural English language understandings have different identification standards for risk and value. Specific index evaluation rules cannot be standardized and defined. In practice, the specific index evaluation rules need to be further designed according to the conditions and specific cross-border business scenarios in the context of cross-cultural English language understanding (Wang 2020).

Different states of data sensitivity can be derived according to the weighted calculation of the four-level indicators. Further data sensitivity is divided into five different levels. These five levels reflect the data flow risk management requirements of the country (region) where the sender of cross-border data flow is based on cross-

Table 2 Three-level and four-level indicators of the dimensions of data flow risk

Secondary indicators	Data sensitivity				Trust in data flow			
Three-level indicators	Content sensitivity		Scale sensitivity		Trust between companies		Inter-regional trust	
Four-level indicators	Type of data content	Degree of processing	The scope of the object	The amount of the data volume	Cooperation/control relationship	Protection level	trust relationship	trust relationship

Table 3 Reference instructions for assignment

Assignment	1	2	3	4	5
Mark	Very low	Low	Medium	High	Very high
Instruction	Ordinary business data, and the amount of data is average	Contain general anonymity personal data, and the amount of data is average	Contain common alias data and the amount of data is average, the amount of ordinary commercial data is large	Contain sensitive personal data or important business data, but the amount of data is average	Contain highly sensitive personal data, important commercial data and public data, and the amount of data is very large

cultural English language understanding. Table 3 shows the calculation results.

According to the "value-risk" analysis model, data flow risk = data sensitivity × data flow trust (where '5' is the "lowest" trust and '1' is the "highest"). The method of multiplying and rounding the integer is adopted to facilitate the analysis and calculation using the risk matrix method. The data flow risk value is controlled at an integer between 1 to 5. It should be pointed out that when the data sensitivity level is 5, the cross-border data flow activities of Internet companies have clearly touched the relevant laws and regulations of most countries (Feng 2020). Therefore, when the data sensitivity level is 5, regardless of the data flow trust level, the data flow risk result is 5. The equation after further adjustment of data flow risk reads:

$$\text{Data flow risk} = \begin{cases} \sqrt{\text{Data sensitivity} \times \text{Data flow trust}} & (\text{Data sensitivity} \neq 5) \\ 5 & (\text{Data sensitivity} = 5) \end{cases} \tag{3}$$

Table 4 shows the analysis table of the risk matrix.

Data flow value = data flow profitability × data flow necessity. The method of multiplying and rounding the integer is adopted to facilitate the analysis and calculation using the risk matrix method. The data flow risk value is controlled at an integer between 1 to 5.

Table 4 Calculation matrix

	Trust	1	2	3	4	5
Sensitivity	1	1	2	1	2	3
	2	1	2	3	3	4
	3	2	2	3	4	4
	4	3	3	2	3	3
	5	5	5	5	5	5

Table 5 Calculation matrix

	Profitability	1	2	3	4	5
Necessity	1	1	2	2	1	2
	2	1	2	2	3	5
	3	2	3	3	4	3
	4	2	2	2	3	4
	5	3	3	2	4	5

$$\text{Data flow value} = \sqrt{\text{Data flow profitability} \times \text{Data flow necessity}} \tag{4}$$

Table 5 is obtained.

The overall risk value of data flow is equal to the comparison of data flow risk and data flow value. The data flow risk is 5, which clearly touches the requirements of relevant laws and regulations. Even if the profits are high, most legally operating companies will not touch the bottom line of the law. Therefore, in this case, no matter how great the value of the data flow is, the enterprise's overall risk value is the highest. The adjusted equation reads:

$$\text{Data traffic overall risk value} = \begin{cases} \text{Data flow risk} - \text{Data flow value} & (\text{Data flow risk} \neq 5) \\ 4 & (\text{Data sensitivity} = 5) \end{cases} \tag{5}$$

Table6 Comprehensive risk comparison matrix

	Data flow value	1	2	3	4	5
Data flow risk	1	0	1	2	3	4
	2	− 1	0	1	3	3
	3	− 2	− 1	0	1	4
	4	− 3	− 2	− 1	0	4
	5	− 4	− 3	− 2	− 1	5

Combined with the risk matrix, Table 6 is further analyzed.

The overall risk value of data flow ranges from − 4 to 4. The smaller the negative number is, the greater the value is. The greater the positive number is, the greater the risk is. 0 means that risk and value are basically equal. All risk calculation results are graded and summarized after risk quantification. The overall risk level of data flow based on cross-cultural English language understanding is derived. Response practices of data flow risk in cross-cultural English language comprehension are provided as a basis for evaluation (Jiang 2018). To facilitate qualitative analysis, the classification of the overall risk assessment results is the simplest way to present it. A segmented evaluation for the actual data flow risk of cross-cultural English language understanding need to be conducted in practical applications.

The cross-border data flow activities and management measures based on cross-cultural English language comprehension are investigated to present the basic situation of data flow risk under cross-cultural English language understanding and risk management. The risk management problems of data flow under cross-cultural English language understanding are analyzed, and the changes and differences of data flow supervision policies under cross-cultural English language understanding are put forward. The management mode relying solely on legal compliance leads to weaknesses in practice, passive lag, large business impact, high management cost, and uncertain effect. It is essential to build a cross-border data flow risk management system for the era of data economy. The current risk management situation of data flow under cross-cultural English language understanding is realized, and the key elements of cross-border data flow risk management are preliminarily obtained, thus further confirming the necessity and feasibility of the risk management of data flow under cross-cultural English language understanding. It provides empirical support for data flow risk assessment and response under cross-cultural English language understanding based on "value-risk".

4 Conclusion

Based on the relevant characteristics of data flow risk under cross-cultural English understanding, a comprehensive risk management thinking and analysis framework based on "value risk" is proposed by using relevant methods such as risk identification and risk management. The core elements of data flow risk management under cross-cultural English understanding are refinement and structure. On this basis, the data flow risk comprehensive evaluation index system and calculation method are established. In the context of cross-cultural English understanding, it provides a systematic reference and guidance for the practice of data flow risk management.

Although data flow risk management based on cross-cultural English understanding has certain practical significance, limited by the research ability and research conditions, there are still some problems to be further studied, which are also the direction of future research. Qualitative analysis methods is mainly adopted. Although there is a certain job processing, the job has a certain subjectivity. In addition, such tasks will also change during business operation.

Therefore, in the future research, the risk management should be studied in a planned and step-by-step manner according to the actual situation; how to integrate risk management into the value at risk evaluation system can be further considered. Besides, online + offline data flow risk management can also be adopted for research, bringing breakthrough discovery and development to the research field.

Acknowledgements The authors acknowledge the help from the university colleagues.

Author contributions All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Funding This work was supported by the National Social Science Fund Project methodology construction of contemporary international comparative literature and Research on academic frontier issues (1989–2019) (No: 20xww004).

Declarations

Conflict of interest All Authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was obtained from all individual participants included in the study.

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