MECHANISM ANALYSIS AND APPLICATION STUDY OF SUSTAINABILITY EVALUATION TOOL FOR FURNITURE E-COMMERCE(ICSFE) [1]

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ABSTRACT

Since the 1990s, all trades has been connected with Internet. Many furniture companies are transforming from traditional pattern to e-commerce. Linshimuye is the most representative furniture e-commerce company in China. The article will take Linshimuye as a case.

ICS for Furniture E-commerce(ICSFE)is a localization tool evolved from ICS toolkit, which is developed and adopted by DIS- Polimi. It considers Analytic Hierarchy Process(AHP)as main analytical method and the data comes from Expert Grading Method. The tool will calculate data through its program automatically. Then the users can get a result, and the tool will give recommendations accordingly. The tool can provide some advice on the improvement of furniture e-commerce in China. And it will be improved based on the feedback.

Key Words: e-commerce; furniture; Linshimuye; toolkit

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1. DEVELOPMENT STATUS OF E-COMMERCE FURNITURE INDUSTRY A CASE STUDY OF LNSHIMUYE

With the development of e-commerce, many furniture companies are in transition to e-business. However, many furniture companies failed, because they have neglected the improvement of the product service system. The article uses ISCFE to analyse Linshimuye as a case to evaluate and improve the development of China's furniture e-commerce.

Linshimuye has developed with Taobao and has been the No. 1 seller in the furniture category for five years. In recent years, Linshimuye is developing its offline experience mall and improving its offline services. Linshimuye is the most representative young furniture e-commerce company in China, and it influences many other companies.

2. ICS_ TOOLKIT FOR FURNITURE E-COMMERCE (ICSFE)

ICSFE is based on the research of Chinese online furniture product-service system. It's improved by the research team of Dr . Han Shaohua of Wuhan University of Technology. It is a localization tool improved from ICS_ Toolkit, which is developed and adopted by the Research Unit Design and Innovation for Sustainability (DIS).

2.1Theoretical basis of ICSFE

ICSFE separates and extracts different development elements of the product service system in the three dimensions of economy, society, and environment. And then extract the criterion factors and index factors. Then import the data into the analysis tool after selectivity. When selecting sustainable development indicators, the tool uses Experts Grading Method to determine a more authoritative set of indicators. In the calculation of index weights, the tool uses the Analytic Hierarchy Process (AHP) and comparison method to ensure the scientificity of the weights. Finally, the final data is obtained by arithmetical average method. The feedback utilizes the data to evaluate the behaviour of the nodes in the system, and finally draws conclusions on the degree of sustainable development and gives recommendations accordingly.

2.2Structure of ICSFE

ICSFE consists of four steps. First, determine the list of products and services of the system. Secondly, evaluate the product system and service system in the three dimensions of economy, society and environment. Third, the built-in program automatically completes the calculation and statistics to obtains the results of the system. The results show the degree of sustainable development of the whole system, the degree of sustainable development of the system in each dimension, the degree of development of the enterprise compared with other enterprises in the same industry. And it shows the indicators that are not consistent and partially consistent. Forth, improve them. With the help of corresponding improvement measures , the product service system can be improved and the new system can be re-evaluated.

2.3Using steps of ICSFE

ICSFE has five steps as follows: "Homepage", "List", "Product Evaluation", "Service Evaluation", and "Improvement Measures".

STEP1 In the "Homepage"[Figure 1] section, four questions are asked and answered to help the user identify the object of the tool. The four questions are: What is furniture commerce? What is ICSFE? What is the object of ICSFE? What stage is ICSFE applied to?

STEP2 The tool lists some items to consider in the "List" [Figure 2] section, including the main and subsidiary products and services. It helps users to make certain of evaluation content. The users need to fill in the specific column of each product and service content.

[Figure 1] Homepage

[Figure 2] List

[Figure 3] select evaluation indicators

STEP3&STEP4 It contains multiple dimensions and multi- level indicators in the "Product Evaluation" and "System Evaluation" sections. It mainly includes selecting evaluation indicators [Figure 3] and viewing the evaluation results. When selecting evaluation indicators, select "economic dimension", "social dimension" and "environmental dimension" respectively. Each dimension contains several primary indicators. And each primary indicator contains several secondary indicators. Users evaluate different dimensions and different indicators by switching pages. After all the secondary indicators have been evaluated, users can switch to the evaluation results page to view the evaluation results. The evaluation results include two parts: "summary of indicator evaluation results" [Figure 4] and "comparison on industry level" [Figure 4]. The summary page of indicator evaluation results includes the development degree of all indicators in the economic, social and environmental dimensions. It shows the total number of all evaluation indicators, the number of responses, the number of fully qualified indicators, the number of partially qualified indicators, the number of non-conforming indicators, and the sustainable development degree of the system. The industry level comparison page compares the degree of sustainability of the system in the economic, social, and environmental dimensions with other systems or industry average to help users understand the advantages and disadvantages in the industry.
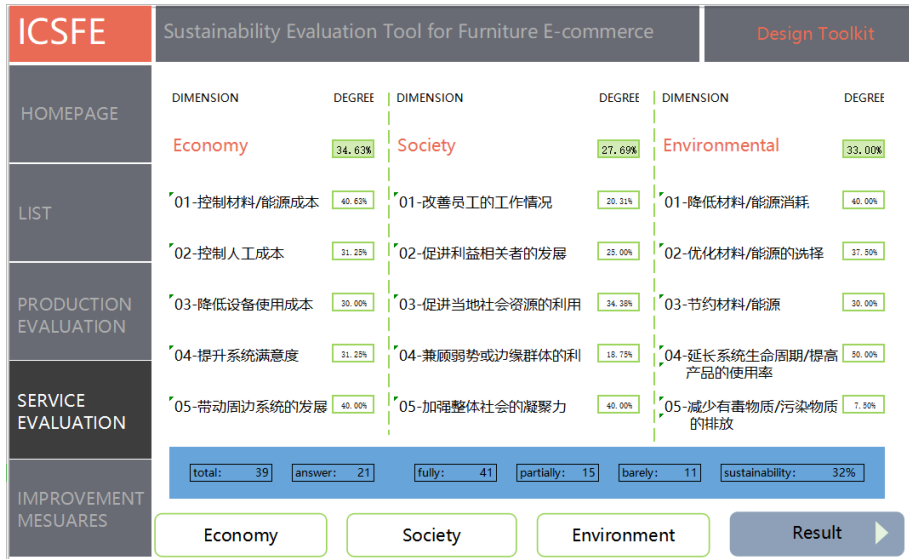
[Figure 4] the summary of indicators

[Figure 5] the comparison on industry level

[Figure 6] prioritization of improvement measures

STEP5 In the "Improvement Measures" section, there are two parts. One is "Prioritization of Improvement Measures" [Figure 6] and another one is "View Specific Improvement Measures". In the prioritization interface of improvement measures, all the primary indicators are ranked according to the level of sustainable development in the three dimensions of economy, society and environment. In the specific improvement measures page, the secondary indicators that are evaluated as partially or non-conforming are listed under the primary indicators, and the system

can be improved in these aspects.

3. EVALUATION OF LINSHIMUYE' S SUSTAINABILITY

This article invites four experts who are engaged in e-commerce, furniture, environmental art design and product service system design. They both have a deep knowledge of Linshimuye. When dealing with every secondary indicator, experts can only choose one of the four choices including complete compliance, partial compliance, non-compliance and lack of understanding.

3.1Product system evaluation of sustainability

Economic dimension: According to the data in the table, the sustainable development degree of Linshimuye' s product system in the economic dimension is 59.75%. Among them, the degree of sustainable development is 67.19% in terms of reducing materials and energy costs, 40.63% in reducing labour cost, 60% in reducing the cost of equipment,60.49% in terms of improving customers' satisfaction, and 70% in driving development in the surrounding areas.

Social dimension: The sustainable development degree of Linshimuye' s product system in the social dimension is 56.09%. Among them, the degree of sustainable development is 57.50% in promoting the utilization of local social resources, and 54.64% in promoting the interests of marginal and vulnerable groups.

Environmental Dimensions: The sustainable development degree of Linshimuye' s product system in the environmental dimension is 41.44%. Among them, the sustainable development degree is 46.88% in reducing materials and energy consumption,46.88% in optimizing materials and energy, 40% in saving materials and energy,48.44% in extending the system life cycle and promoting the utilization of product, and 25% in reducing emissions of toxic substances and pollutant.

3.2 Service system evaluation of sustainability

Economic dimension: The sustainable development degree of Linshimuye' s service system in the economic dimension is 34.62%. Among them, the degree of sustainable development is 40.63% in terms of reducing the costs of materials and energy,31.25% in reducing labour costs,30% in reducing equipment costs,31.25% in terms of improving customers' satisfaction, and 40% in driving the development of peripheral systems.

Social dimension: The sustainable development degree of Linshimuye' s service system in the social dimension is 27.69%. Among them, the degree of sustainable development is 20.31% in improving the work of employees,25% in promoting the development of stakeholders,34.38% in promoting the utilization of local social resources,18.75 in terms of promoting the interests of the marginalized groups, and 40% in strengthening the cohesiveness of the overall society.

Environmental dimensions: The sustainable development degree of Linshimuye' s service system in the environmental dimension is 33%. Among them, the degree of sustainable development is 40% in reducing materials and energy consumption,37.5% in optimizing materials and energy,30% in saving materials and energy,50% in extending the life cycle of the system and promoting the use of products, and 7.5% in reducing emissions of toxic substances and pollutants.

4. PRIORITIZATION AND IMPROVEMENT MEASURES.

4.1Economic dimension

Priority 1: Control labour costs. It' s sustainability degree is 23.44%.
Priority 2: Reduce equipment costs. It's sustainability degree is 45%.
Priority 3: Improve the satisfaction of the system. It's sustainability degree is 46.9%.
Priority 4: Reduce materials and energy costs. It' s sustainability degree is 53.91%.
Priority 5: Drive the development of peripheral systems. It' s sustainability degree is 55%.

4.2Social dimension

Priority 1: Improve the work of employees. It' s sustainability degree is 20.31%.
Priority 2: Promote the sustainable development of stakeholders. It' s sustainability degree is 25%.
Priority 3: Enhance social cohesion. It' s sustainability degree is 27.08%.
Priority 4: Promote the interests of marginalized groups. It' s sustainability degree is 36.72%.
Priority 5: Promote the use of local social resources. It' s sustainability degree is 45.94%.

4.3Environmental dimension

Priority 1: Reduce emissions of toxic and pollutants. It's sustainability degree is16.25%.
Priority 2: Make use of materials and energy. It' s sustainability degree is35%.
Priority 3: Add options of materials and energy. It' s sustainability degree is42.19%.
Priority 4: Reduce materials and energy consumption. It' s sustainability degree is 43.44%.
Priority 5: Extend the system life cycle and improve the usage of products. It' s sustainability degree is 49.22%.

5.FEEDBACK

According to the feedback of Linshimuye staff, all the secondary indicators in the tool are guiding the enterprise to comprehensively examine its own development from every detail. The evaluation results help them visually evaluate the development of the enterprise. Among the suggestions for improvement, some of the suggestions will play a role in the future development of the company. But other points may not be considered because of the company's own development plan. However, during the communication with the staff and industry experts, it was found that there are some problems in ICSFE that need to be improved. First, the tool structure is complex .Users need to spend a lot of time understanding the tools before using it. Second, there are some descriptions in the tool that are vague,so users need to guess and trial to know how to understand and operate it. In the later stage, a sub-bar would to be added to explain the operation items.

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