

Research on Requirements of Loader Cab Based on Online Review

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Abstract:

The users' comments on the Internet reflects their views on loaders, which plays an important role in quickly optimizing the interior decoration of loaders and occupying the market. The Gooseeker crawler software is used to collect the user's comments on the loader cab on www.lmjx.net, analyze and mine the text content with high-frequency word semantics and word frequency, sort out the user's overall sensory and detailed concerns on each indicator from the five index keywords including interior, space, configuration, comfort and manipulation and analyze the user needs. It is found after research that users have a large demand for loader cab working space. On this basis, the cab design is improved.

Keywords:

Loader Cab, Online Comments, Gooseeker, User Demands, Design Optimization

1. Introduction

With the rapid development of Web technology and the extensive use of informatization, the way people exchange and obtain information has changed significantly. According to the 51st Statistical Report on Internet Development in China released by the China Internet Network Information Center (CNNIC) in Beijing, as of December 2022, the size of China's netizens reached 1.067 billion, an increase of 35.49 million over that in December 2021, and the Internet penetration rate reached 75.6% [1]. Under this Internet environment, more and more consumers tend to share their experiences and opinions on their purchased loader through the Internet platform, which reflect a consumer's emotional evaluation of the quality of their products [2].

As an indispensable construction equipment in project construction, loader plays a very important role in accelerating project progress, ensuring project quality, improving working conditions, improving work efficiency and reducing construction costs. As an important way for users to express their evaluation and demands for the loader cab in the digital era, online comments are an important basis for collecting, mining and analyzing them to improve the comfort of loaders and strengthen user satisfaction. At the same time, for enterprises, it is conducive to the company operation and management, so as to establish a good brand image [3,4,5].

Taking the comments from the loader users on the construction machinery websites with large traffic in China as the data source, this research excavates the user pain points and user demands in the comments, analyzes the problems in the loader cab and puts forward suggestions for improvement to better meet user demands through filtering, word segmentation processing, word frequency analysis, etc.

2. Research Methods and Data Acquisition

2.1. Research process

The research ideas of the relevant results and the research content of this paper are combined to form the research process shown in Figure 1.

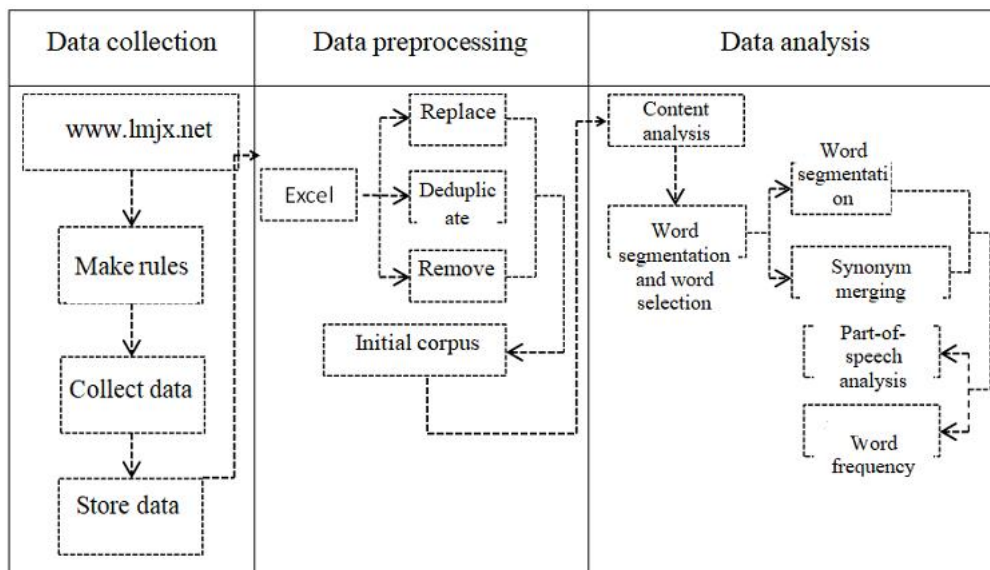


Figure 1. Mining and Analysis Process of Online Comments from Loader Cab Users.

2.2. Data source for online comments of loaders

Online comments are the comment information published by consumers based on their own evaluation standards and use experience, which is not only an objective evaluation of products and services, but also a subjective expression of product and service demand information. Web crawler technology is a program or script that automatically grabs the relevant information about loaders on www.lmjx.net according to certain rules to quickly obtain a large number of original data of online comments. This paper uses the gooseeker crawler software to obtain raw data from consumers' online comments of loaders.

2.3. Preprocessing of online comment data for loaders

Due to the uneven quality of online comment data, the original data obtained by web crawler software will be duplicated and missing, so it is necessary to preprocess its data to ensure the accuracy of the data in the processing process. When processing the original data, this section uses "replacement" in Excel to delete invalid words in the crawler data, such as shortcomings, suggestions, advantages and other invalid nouns at the beginning of the collected data. In view of the duplicate content, the "Remove Duplicates" command in Excel is used to filter to ensure the uniqueness of each piece of data and eliminate the interference of duplicate data on the later data processing results. In view of the invalid data (such as no, none and no defects) in

Excel, in order to ensure that relevant words in other data are not deleted by mistake, manual deletion is selected for this step. After manually deleting a large number of blank rows, filter and delete the blank rows through “text filtering” in Excel to organize the data. In view of useless data (data links, rule names, crawler dates, and other data that are not used in this section), delete entire columns directly in Excel to improve the effectiveness of data processing [6].

The preprocessed raw data ultimately retained 1,942 online comment and suggestion data from consumers on the loader for subsequent research. Table 1 shows an example of online comment and suggestion data for preprocessed loaders.

Table 1. *Example of Online Comments and Suggestions for Loader.*

	Example 1	Example 2
Interior	It would be nice if the cab is more luxurious...	Interior color matching needs to be strengthened...
Space	The space in the car is small, and people will feel very stuffy when staying in it for a long time...	There is no width, nor is the height of the load...
Configuration	The cab configuration is a bit low and there is no diesel meter...	There is no air conditioning or oil meter, the steering gear is relatively heavy, the instructions are not detailed, and the indoor configuration is too low
Comfort	It is not easy to control the light switch and the seat is uncomfortable...	Improve built-in configuration, enhance humanization and make low-end climbing ladder into soft climbing ladder...
Operation	The accelerator pedal is too far back and my ankle is swollen two days after the new machine is replaced...	The workbench is not user-friendly enough, the steering wheel should be designed to be able to adjust back and forth, and the handbrake should be changed to an air brake...

3. Research on the Demands of Loader Drivers

For the comment set of the loader cab, the words are labeled according to the word segmentation and selection tool in gooseeker, and the nouns and adjectives in the comments are selected as product characteristic index words according to the labeling results. Due to the large number of noise words, product characteristic indicator words need to be manually screened and then synonyms-merged.

3.1. Research on interior demand

The interior of the loader cab refers to various parts used inside the cab, including the instrument panel, pendant and storage area. The interior, which is an influential factor affecting consumers' purchase of loaders, provides a driving environment for the driver, and can bring a more comprehensive experience demand to the driver. This time, 35 main words related to the interior of loader cab were obtained through word selection and synonym merging, and the overall sensory and detail attention words of the driver were obtained, including 15 adjectives and 20 nouns, as shown in Table 2.

Table 2. *Drivers' Overall Sensory Words and Detail Attention Words for Interior.*

Overall sensory words (adjective)	Monotonous, beautiful, fine, comfortable, eye-catching, exquisite, safe, luxurious, practical, good-looking, durable, rough, humanized, textured and domineering
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Detail attention words (noun)	Interior, color, intelligence, decoration, fan, oil pressure gauge, seat, detail, dashboard, pedals, armrests, air conditioning, joysticks, workbench, radio, radiator, ventilation, design, workmanship and craftsmanship
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3.2. Research on space requirements

The space inside the cab refers to the volume of each space inside the cab, which mainly affects the suitability and comfort of the driver during driving. The interior space is an area that can meet the driver's activities such as manipulating parts, storing items and resting, and a reasonable space can not only improve the comfort of the driver when working, but also improve the happiness of the driver. This time, 20 main words related to the space of loader cab were obtained through word selection and synonym merging, and the driver's overall sensory words and detail attention words were obtained, including 7 adjectives and 13 nouns, as shown in Table 3.

Table 3. Driver's Overall Sensory Words and Detail Attention Words for Space.

Overall sensory words (adjective)	Flexible, comfortable, spacious, closed, secure, humanized and narrow
Detail attention words (noun)	Space, field of view, head, arms, butter bucket, dimensions, width, toolbox, storage compartment, handling, height, coaster and knee

3.3. Research on internal configuration requirements

The interior configuration of the cab refers to the facilities facilities provided by the loader when leaving the factory or assembled according to the respective demands of the driver, such as mobile phone holders, water cup holders and fans. With the continuous development of humanization, the configuration inside the loader cab has gradually changed from monotonous to rich, better meeting the daily demands of drivers. This time, 39 main words related to the configuration of the loader cab were obtained through word selection and synonym merging, and the overall sensory and detail attention words of the driver were obtained, including 16 adjectives and 23 nouns, as shown in Table 4.

Table 4. Drivers' Overall Sensory Words and Detail Attention Words for Interior Configuration.

Overall sensory words (adjective)	Innovative, rational, comfortable, intelligent, flexible, simple, safe, refined, standardized, meticulous, rigid, beautiful, rough, perfect, durable and strong
Detail attention words (noun)	Brake, air conditioning, configuration, instrument panel, workbench, fan, heater, radiator, gearbox, steering wheel, joystick, seat, recorder, handle, electrical system, control, audio system, bracket, toolbox, steering system, air blower, butter bucket and steering gear

3.4. Research on comfort demands

Loader cab comfort refers to that the cab can provide the driver with a comfortable and pleasant working environment and safe and suitable handling performance, which is an important factor to measure whether the loader is excellent [7]. The comfortable driving experience does not only ensure the driver's physical safety and convenience during operation, but also better relieves fatigue caused by long-term work. This time, 26 main words related to the comfort of the loader cab were obtained through word selection and synonym merging, and the driver's overall sensory words and detail attention words were obtained, including 14 adjectives and 12 nouns, as shown in Table 5.

Table 5. Drivers' Overall Sensory Words and Detail Attention Words for Comfort.

Overall sensory words (adjective)	Feeling, humanized, comfortable, strong, strenuous, balanced, fit, stable, firm, dull, complete, uncomfortable, bad and flexible
Detail attention words (noun)	Seats, handling, steering wheel, pedal, line of sight, size, material, controls, fan heater, engineering, legroom and height

3.5. Research on manipulation demands

The control device in loader cab is the mechanical equipment that mainly controls the work of the loader and the appropriate control device will show flexibility and accuracy in the working condition. It also affects the driver's productivity and health. This time, 20 main words related to the comfort of the loader cab were obtained through word selection and synonym merging, and the driver's overall sensory words and detail attention words were obtained, including 14 adjectives and 6 nouns, as shown in Table 6.

Table 6. Driver's Overall Sensory Words and Detail Attention Words for Control Device.

Overall sensory words (adjective)	Flexible, slow, high-performance, rigid, balanced, humanized, rational, heavy, comfortable, simple and stable
Detail attention words (noun)	Accessory, seat, steering wheel, pedal, joystick and control system

3.6. Research on related word frequency

The loader cab is the main workplace of the driver, and a reasonable working environment will improve the driver's work efficiency and driving comfort, so the driver's demands for the cab will be required. This time, 6 high-frequency vocabulary for loader cab-related parts were selected through word selection and synonym merging, as shown in Table 7.

Table 7. Vocabulary of High-frequency Requirements for Loader Cab-related Parts.

Word	Frequency	Sample
Control device	464 times	The cab configuration should be improved. A good reputation depends on the driver's operating feeling, so it must meet the driver's demand...
Pedal	188 times	The accelerator pedal and brake pedal are too small...
Joystick	26 times	The front and rear control range of the joystick is too large and is out of the reach of the hand, and the lever is too large to hold...
Steering wheel	42 times	It hurts when the knee bumps the edge under the steering wheel...
Seat	83 times	The low seat backrest causes back pain during long driving time...
Interior	28 times	The cab should be more humanized and there is no place to put mobile phones, cigarettes, drinks and other things...

Through word frequency analysis, the driver's demand for the loader cab is mainly focused on the control device, space and interior. On the one hand, it is the physiological demands for the size and position that are compatible with the body during the driver's control and on the other hand, there is the psychological demand of the drivers for the interior space of the cab in their daily work.

4. Optimization Scheme for Loader Cab Layout

The structure is designed with edges, which can not only highlight the sense of technology of the loader, but also show the sense of power of its equipment, giving people a strong and powerful visual sense. The color is mainly black due to the fact that black is dirt-resistant and the black decoration shows a sense of stability. In terms of space layout, storage compartments, water cup tanks, warm air tunnels, etc. are added to expand the overall space in the cab and meet the demands of users to a large extent. The design scheme is as follows:



Figure 2. Schematic Diagram 1 of the Scheme.

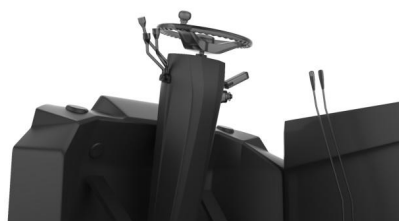


Figure 3. Schematic Diagram 2 of the Scheme.



Figure 4. Schematic Diagram 3 of the Scheme.

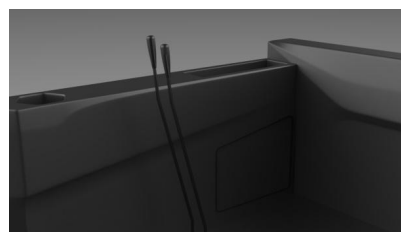


Figure 5. Schematic Diagram 4 of the Scheme.

5. Conclusions

The loader cab is an important part of the loader, and its design process should adhere to the people-centered principle. It is an effective choice to improve the cab by collecting online user comments on the loader cab and analyzing the user pain points and user needs. In this digital era, timely collection, scientific analysis and reasonable optimization, which is of great significance to promote the high-quality development of the loader industry and improve user satisfaction, should become a regular work in the design process.

Conflicts of Interest

The author declare that there is no conflict of interest regarding the publication of this article.

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References

- [1] China Internet Network Information Center. The 51st Statistical Reports on Internet Development in China [EB/OL]. Available online:

- <https://www.cnnic.net.cn/n4/2023/0302/c199-10755.html>, 2023.03.02 (accessed on 30 March 2023).
- [2] Nan H.; Ling, L.; Jie, Jennifer.; Zhang. Do online reviews affect product sales? The role of reviewer characteristics and temporal effects. *Information Technology and Management*, 2008, 9(3), 7.
 - [3] Yang, J.L.; Bao, H.L. Text-Mining and Sentiment Analysis of User's Online Comments on Provincial Public Libraries. *Research on Library Science*, 2021, 21, 10-17, DOI: 10.15941/j.cnki.issn1001-0424.2021.21.011.
 - [4] Wang, R.W.; Song, J.Y.; Chen, C.B. Application of Sentiment Analysis Based on Word2vec in Brand Awareness. *Library and Information Service*, 2017, 61(22), 6-12, DOI:10.13266/j.issn.0252-3116.2017.22.001.
 - [5] Gu, Y.; Li, H.; Li, Y.Y.; Liu, J.Y. Research on Demand Mining of Enterprise Competitive Intelligence Based on Online Reviews. *Journal of Modern Information*, 2021, 41(01), 24-31.
 - [6] Yuan, X.D. Research on Consumer Demand for New Energy Vehicles Based on Online Comments. *Trade Fair Economy*, 2023, 01, 62-64, DOI: 10.19995/j.cnki.CN10-1617/F7.2023.01.062.
 - [7] Xue, B. Research of Skid Steer Loader Cab's Comfort. China University of Mining and Technology, 2014.



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