

Business Management and Competitiveness of Supervision and Chemical Analysis Companies in the Peruvian Mining Sector in 2022

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ABSTRACT

This research aims to determine the relationship between business management and competitiveness of a group of companies that provided supervision and chemical analysis services to the mining sector in Peru in 2022. The methodology consisted of the quantitative approach, the basic type research, the non-experimental, cross-sectional correlational design, and the hypothetico-deductive and inductive method were used. The survey technique and the Likert scale were used as instruments. The simple random probabilistic sample consisted of 70 participants, who are employees of mining companies that received the outsourcing service in supervision and chemical analysis to the mining sector in Peru. The results showed that, at a significance level of 0.05, a p -value = 0.000 and a Spearman's rho correlation = 0.841 were obtained, which allowed affirming the alternative hypothesis and concluding that business management was directly and significantly related to competitiveness in a group of companies that provided chemical analysis and supervision services to Peruvian mining sector in 2022.

Keywords: business management, competitiveness.

INTRODUCTION

The research included a group of renowned companies in the field of inspection, testing, verification, and certification services operating in more than 140 countries, with more than 2000 employees in 28 offices in Peru. Their services cover a wide range of sectors including agriculture, industry, mining, environment, fisheries, and energy. These companies are dedicated to constant improvement, which directly affects their management and competitiveness. Therefore, knowing the correlation between these factors is essential for designing better plans and strategies. This need is the basis for the selection of this research topic.

Dunbar et al. (2020) argued that the prevailing business model within the mining sector was no longer fit for purpose. Despite the large number of technical challenges facing the sector, the ability to meet social expectations had become the sector's main risk for future business. This change in the operating context would require a new business model that would support the effective management of high social and technical complexity through the creation, capture, and delivery of value to a wide range of interested parties, including local communities, rights holders, shareholders, and host governments. An alternative business model was proposed that would rethink the industry's value proposition using local procurement to illustrate how mining companies could leverage previous successful business strategies to generate additional value.

Nedelcheva (2019) established ten periods in the dynamics of competitiveness in which both internal and external factors were presented. The competitiveness of the pharmaceutical industry had to follow a dynamic similar to that of other sciences and in each period a new factor from the external environment had to be added.

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Supriyati et al. (2017) established that in response to recent challenges such as globalization, a knowledge-based economy, and technological evolution, people were becoming valuable assets and could be well recognized in a human capital framework. The human factor was the most important factor due to its performance and increased productivity, which is why employers needed to understand the importance of worker safety in the workplace. Workplace safety was crucial to keep workers in safe conditions through tools such as supervision, knowledge, training, and personality. They concluded that the company should train employees to avoid workplace accidents and allow employees to develop new techniques that could contribute to their emotional stability, safety, and personality.

Gallo (2019) stated that corporate governance is related to the improvement of the competitiveness of a communal multi-service company. Choccelahua and García (2018) established that administrative governance had a significant effect on the competitiveness of a mining and general service company.

The general objective was to determine the relationship between business management and competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022. The specific objectives were: (a) to determine the relationship of business management with internal factors of competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022, and (b) to determine the relationship of business management with external factors of competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022.

The general hypothesis was that business management is directly related to competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022. The specific hypotheses were: (a) business management is directly related to the internal factors of competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022, and (b) business management is directly related to the external factors of competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022.

The results of this research are justified on a theoretical level by their contribution of knowledge related to the variables discussed here (business management and competitiveness), which have been little or not addressed, either independently or in relation to each other. Furthermore, the results of this research are justified on a practical level, since they provide the basis for companies that provide chemical analysis and supervision services to the Peruvian mining sector to make better decisions. This allows them to optimize their business management and competitiveness in their sector. Likewise, it allows understanding whether one variable influences the other, since the development of business management in companies of this type and sector could facilitate the achievement of competitiveness not only at the national level but also at the international level.

The study had limitations in terms of previous works and bibliography of the variables studied that were not oriented to companies of supervision and chemical analysis in the mining sector.

Management

Management is a fluid and subjective science with divergent perspectives on how to employ its principles. For this reason, most scholars offer variations on the same definition that include the use of resources to achieve a goal. Lussier (2021) defines a manager as the individual responsible for achieving organizational goals through the efficient and effective use of resources. This definition includes the basic elements of using resources to achieve goals (Lloyd & Aho, 2020).

One of the first management scholars, Mary P. Follett, characterized management as the art of getting things done through the efforts of other people (Graham, 1995). This definition implies both the pursuit of objectives (getting things done) and the use of resources (predominantly through people). However, this is also missing an element: organizational context. An important consideration in understanding management is that the term *organization* simply refers to a set of people working together to achieve a common purpose (Schermerhorn, 2013). This means that an organization can be anything from a high school volleyball team to a church or a corporation. Including the term *organization* in the definition leaves open the possibility that management can be practiced in each of these settings and

broadens the use of the term *management*. Thus, a comprehensive definition of management would be *the pursuit of organizational goals through the use of organizational resources* (Bateman & Snell, 2013). The search implies a possibility of failure, and the organization provides a context. This raises the question: how to become effective in the pursuit of objectives or become more efficient in the use of organizational resources? Being good at management requires immense focus on both ends and can be achieved through the functions of management: planning, organizing, directing and controlling. These functions are the essential tools used to manage organizations (Lloyd & Aho, 2020).

Business Management Functions

The management process by which objectives are pursued includes planning, organizing, leading, and controlling.

Planning is the systematic process of making decisions about the goals and activities that the organization will pursue (Bateman & Snell, 2013).

Organizing is the process of assembling and allocating the human, financial, physical, informational, and other resources needed to achieve objectives (Bateman & Snell, 2013).

Leading is to stimulate the high performance of the organization's members (Bateman & Snell, 2013). It means to get the members of the company to join the plan (Lloyd & Aho, 2020).

Control is installing processes to guide the team toward goals, monitoring performance toward goals, and making changes to the plan as needed (Bateman & Snell, 2013). Control does not always mean limiting what the organization can do by having an eye on everything (Lloyd & Aho, 2020).

Business Management in Supervision

Companies often employ supervisors and managers to oversee projects and personnel, as well as to ensure the efficiency and reliability of the organization's workforce. The development of essential skills for supervisory management positions can be accomplished through certification or degree programs (Indeed, 2021). Supervisory business management is the act of supervising groups of employees and overseeing the day-to-day operations in a company. Supervisors and managers are the bridge between employees

and the company's executive team. They conduct interviews, assign productivity goals, observe employee progress, and help set goals for the company and its workers. A competent manager can help employees feel more confident in their roles and improve communication between staff and senior management (Indeed, 2021).

Dimensions of the Variable Business Management

The dimensions of the independent variable business management are (a) planning, (b) organization, (c) leading, and (d) control (Choccelahua & García, 2018; Lloyd & Aho, 2020).

Each of these dimensions has its level as an indicator, which must be measured in business management. Therefore, the corresponding indicators are (a) planning level, (b) organization level, (c) leading level, and (d) control level (Choccelahua & García, 2018).

Competitiveness in Global Terms

Competitiveness can be defined in the broadest sense as a phenomenon related to the ability of a country, in comparison with others, to create and maintain an economic climate that promotes the rapid production of additional profit. Scott et al. (1985) described it as the ability of countries to produce, distribute, and sell goods and services in the global economy and to earn profits that lead to a higher standard of living. The notion of competitiveness has several meanings at multiple levels.

Porter (1998) introduced the latest concept, competitive advantage, which emphasizes the critical value of the productivity of the national economy. As a conclusion, the concept of competitiveness began to have new meanings and definitions: the only complete indicator that defines the concept of competitiveness at the national level is national productivity.

Business Competitiveness

Competitiveness is a complex phenomenon that shows the potential of a company to endure in a competitive environment by providing goods and services that meet certain quality standards at reasonable prices, both domestically and internationally, compared to the capabilities and performance of other companies. The term competitiveness linked to a company suggests safety, efficiency, superiority, high productivity, flexibility, success, modern organization, first-class

products, and optimal costs. The competitiveness of a company can be evaluated by analyzing economic efficiency in comparison with other competitors in the market. In practice, a company's competitiveness is assessed by two indicators: the results obtained and the effect that the products/services have on the market. Experience shows that yield is considered as a way to ensure business profitability (growth and achievement of the set economic and social goals) and not as an objective of the company (Comănescu et al., 2018).

Dimensions of the Dependent Variable Competitiveness:

The dimensions of the variable competitiveness are (a) internal factors and (b) external factors (Choccelahua & García, 2018; Zuñiga et al., 2019).

The dimension internal factors is divided into (a) managerial function, (b) administrative function, (c) commercial and logistics function, (d) financial function, (e) human talent, (f) technological function and (g) environmental function (Choccelahua & García, 2018).

The dimension external factors has as dimension: (a) level of external functions (Choccelahua & García, 2018).

METHODOLOGY

This research was developed considering the quantitative approach, basic type and non-experimental cross-sectional correlational-causal design of explanatory scope.

The population was comprised of mining companies employees to whom the outsourcing service of supervision and chemical analysis. A simple random probability sampling of 70 participants was considered.

In this research, the hypothetical-deductive and inductive method, the survey technique, and the Likert scale were used as instruments to collect information. These were previously validated by experts in the field, both in previous studies where they were used and in the specific context of this research.

Instrument for the Dependent Variable Business Management

Data sheet

Name: Administrative management scale.

Authors: Melanio Choccelahua Donaires and Alejandro Jesús García Tapullima.

Year: 2018.

Source: Prepared by the authors.

Adaptation: Acosta (2021).

Number of items: 21 items.

Application time: 40 minutes.

Type of scale: Polytomous.

Division: The variable has four dimensions (see Table 1).

Validation: Validation was given according to the criterion of expert judgment.

Target population: Mining companies employees to whom the outsourcing service in supervision and chemical analysis was provided.

Objective: To measure the variable business management (see Table 6).

Rating: See Table 2.

Instrument for the Variable Competitiveness

Data sheet

Name: Competitiveness Scale.

Authors: Melanio Choccelahua Donaires and Alejandro Jesús García Tapullima.

Year: 2018.

Source: Prepared by the authors.

Adaptation: Acosta (2021).

Number of items: 24 items.

Application time: 40 minutes.

Type of scale: Polytomous.

Division: The variable has two dimensions (see Table 3).

Validation: The validation was carried out with the criterion of expert judgment (see Table 5).

Target population: Mining companies employees to whom the outsourcing service in supervision and chemical analysis was provided.

Objective: To measure the variable competitiveness (see Table 6).

Rating: See Table 4.

RESULTS

Descriptive Results

Figure 1 shows that most respondents, 36%, state that business management is "always" adequate. This rating is followed by "almost always", with 31%;

Table 1. Division of the variable Business Management.

Dimensions	Indicators	Items
1. Planning	1.1. Planning Level	1. The company has management tools or instruments (strategic plan). 2. The company has a strategic direction (vision, mission, objectives). 3. The company has clear and precise goals and objectives. 4. The company sets goals and objectives by functional areas. 5. The planning for the activities and tasks in the company are formulated in an adequate way allowing its fulfillment. 6. Strategies and tactics are formulated or elaborated for the development of the activities or functions in the company.
2. Organization	2.1. Organization Level	7. The company has a clearly defined organizational structure (organization chart). 8. The levels and areas of the company are clearly defined. 9. Teams are efficiently organized to achieve the established goals and objectives. 10. In the pursuit of goals and objectives, the work team develops in a coordinated and organized manner. 11. The necessary people are available to carry out the tasks and activities. 12. The necessary material and monetary resources are available to carry out the tasks and activities.
3. Leading	3.1. Leading Level	13. Decisions made are properly implemented by the work team. 14. There is motivation from the boss or superior to perform the activities or tasks at the company. 15. There is efficient communication for the proper development of tasks or functions at the company. 16. There is supervision and follow-up in the development of tasks or activities at the company.
4. Control	4.1. Control Level	17. The progress of the vision and the fulfillment of the institutional mission are periodically evaluated at the company. 18. The fulfillment of the expected results based on the goals and objectives established are periodically evaluated at the company. 19. Feedback on the process of developing activities is provided at the company. 20. Mistakes or deficiencies in the development of activities are corrected in an efficient and timely manner at the company. 21. There is strict control of the resources (material, equipment, human, financial, etc.) at the company.

Source: Prepared by the author.

Table 2. Rating of the Variable Business Management.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

Source: Prepared by the author.

“sometimes”, with 24%; “rarely”, with 8%; and finally, “never”, with 1%. It can be stated that business management is adequate in the companies to whom the chemical analysis and supervision outsourcing service is provided.

Figure 2 shows that most respondents, 41%, state that competitiveness is “almost always” adequate. This rating is followed by “always”, with 33%; “sometimes”, with 19%; “rarely”, with 6%; and finally, “never”, with 1%. It can be stated that competitiveness is adequate in the companies to whom the chemical analysis and supervision outsourcing service is provided.

Inferential Results

Hypothesis Testing

General Hypothesis.

H_0 : Business management is not directly related to competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022.

H_1 : Business management is directly related to competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022.

Table 3. *Division of the Variable Competitiveness.*

Dimensions	Indicators	Items
1. Internal Factors	1.1. Managerial Function	1. The educational level of the company's managers is highly specialized for the industry in which the company operates. 2. The level of experience of the company's personnel, at all levels, is adequate to perform their respective tasks effectively. 3. The opinions of all employees are taken into consideration in the company's decision-making process.
	1.2. Administrative Function	4. The company, from a general perspective, has an adequate administration, which allows it to be one of the best in its field.
	1.3. Commercial and Logistics Function	5. The personnel in contact with the customer have sufficient autonomy to solve their needs at the company. 6. The resources allocated to marketing (advertising material, commissions, among others) are adequate and used efficiently at the company. 7. The points of contact (physical or virtual) in the company are adequate. 8. The prices of the services offered by the company are competitive within the industry in which it operates.
	1.4. Financial Function	9. The company makes decisions considering financial indicators. 10. The company has an adequate costing process. 11. The company has formal financial planning (income and expense budget, cash flows, financial ratios, break-even point, among others). 12. The company has an acceptable level of profitability. 13. The company's level of indebtedness is acceptable.
	1.5. Human Talent	14. The company has an appropriate work environment (norms, values, habits, etc.). 15. The company has plans that allow for staff development (for example, promotions or salary increases). 16. The company trains employees in mining and construction processes to improve their skills. 17. The company has an area exclusively in charge of human talent.
	1.6. Technological Function	18. The machinery and equipment used in the company are adequate for the different jobs. 19. The company periodically makes changes in machinery and equipment to increase productivity. 20. The company has a plan for the maintenance and care of the various machinery and equipment.
	1.7. Environmental	21. The company complies with environmental laws and regulations (for example, environmental protection, proper recycling, etc.).
2. External factors	2.1. Level of External Functions	22. The company is prepared for any fluctuations in the country's economic situation that may occur. 23. The company is prepared to face technological changes in the area in which it operates (for example, it has the capacity to acquire new technology). 24. The company is prepared for political and legislative changes that may occur in the industry.

Source: Prepared by the author.

Table 4. *Rating of the Variable Competitiveness*

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

Source: Prepared by the author.

Table 5. *Content Validity of the Instruments for Measuring the Study Variables.*

Validator	Result
PhD. Jenry Salazar Garcés	Applicable
PhD. Martha Rocío Gonzales Loli	Applicable
M.Ed. Marcos Walter Acosta Montedoro	Applicable

Source: Prepared by the authors.

Table 6. Results of the Calculation of Cronbach's Alpha for the variables.

	Cronbach's Alpha	Number of Elements	Result
Business Management	0.931	21	High
Competitiveness	0.911	24	High

Source: Prepared by the author.

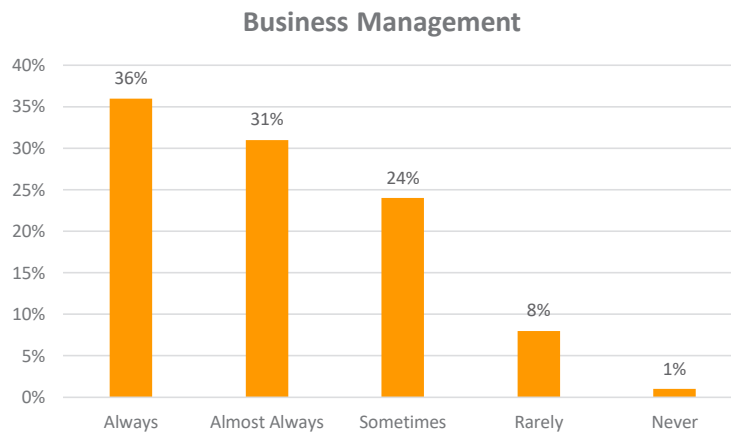


Figure 1. Survey results for the variable business management.

Source: Prepared by the author.

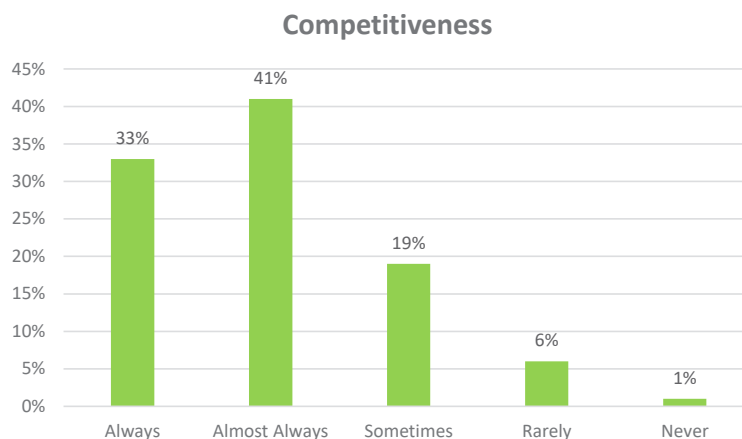


Figure 2. Survey results for the variable competitiveness.

Source: Prepared by the author.

Table 7 shows that at a significance level of 0.05, a p -value = 0.000 and a Spearman's rho correlation = 0.841 were obtained so that the alternative hypothesis that establishes that business management is directly related to competitiveness in a group of companies that provided chemical analysis and supervision services to the Peruvian mining sector in 2022 is accepted. It is important to highlight that the relationship is significant.

DISCUSSION

Regarding the general hypothesis, a p -value = 0.000 and a Spearman's rho correlation = 0.841 were obtained at a significance level of 0.05, thus

confirming the alternative hypothesis that business management is directly related to competitiveness in a group of companies that provided supervision and chemical analysis services to the Peruvian mining sector in 2022. It is important to highlight that the relationship is significant. In his research, Gallo (2019) used the chi-square test at a significance level of 0.05, yielding a p -value = 0.001, thus confirming the alternative hypothesis and concluding that business management is directly related to improving competitiveness. Furthermore, Choccelahua and García (2018) conducted research using the multinomial variable dispersion statistical model, as well as Fischer's F -test and Student's t -test. Particularly important

were the results of the F -test, where a p -value = 0.0001 was obtained. This result led to the acceptance of the alternative hypothesis and the conclusion that administrative management significantly influences competitiveness. On the other hand, Supriyati et al. (2017) established that in the face of recent challenges such as globalization, a knowledge-based economy, and technological evolution, people are becoming valuable assets in a human capital framework. The human factor is the most important due to its performance and increased productivity. Employers must understand the importance of ensuring worker safety in a safe workplace. Workplace safety is crucial for maintaining workers in safe conditions. Additionally, employees must be trained to prevent workplace accidents and must be allowed to develop new techniques that contribute to improving their emotional stability, safety, and personality. In this way, they contribute to excellent business management and, consequently, greater competitiveness.

Regarding the first specific hypothesis, a p -value = 0.000 and a Spearman's rho correlation = 0.841 were obtained at a significance level of 0.05, thus confirming the alternative hypothesis that business management is directly related to the internal factors of competitiveness in a group of companies that provided supervision and chemical analysis services to the Peruvian mining sector in 2022. It is important to mention that the relationship is significant. In her scientific article on the variable competitiveness, Nedelcheva (2019) explained that, given the role of the pharmaceutical industry in healthcare, special attention was paid to the impact of state supervision. Thus, the study results determined ten periods in the competitiveness dynamics considering their internal factors. Choccelahua and García (2018) concluded that administrative

management significantly influences the internal factors of competitiveness. Finally, Wu et al. (2017) aimed to investigate the comprehensive competitiveness of the coal industry in China's political and economic environment. They then used the diamond model to analyze the internal factors that had a significant influence on China's coal industry competitiveness, which are resource condition, demand condition, industry structure, and business strategy, related and support industries, government, technology, and chance.

Regarding the second specific hypothesis, a p -value = 0.000 and a Spearman's rho correlation = 0.759 were obtained at a significance level of 0.05, thus confirming the alternative hypothesis that business management is directly related to the external factors of competitiveness in a group of companies that provided supervision and chemical analysis services to the Peruvian mining sector in 2022. It is important to mention that the relationship is significant. In her scientific article on the variable competitiveness, Nedelcheva (2019) explained that, given the role of the pharmaceutical industry in healthcare, special attention was paid to the impact of state supervision. Thus, the study results determined ten periods in the competitiveness dynamics considering their external factors. Both internal and external competitiveness factors were presented. They concluded that the competitiveness of the pharmaceutical industry must follow a dynamic similar to that of other sciences, with a new external environmental factor added in each period. Contemporary competitiveness is defined by external factors and, to a greater extent, by the state as a supervisor and contributions from other sciences. Choccelahua and García (2018) concluded that administrative management significantly influences the external factors of competitiveness. Finally, Wu et al. (2017) used the diamond model to analyze the

Table 7. Spearman's Rho Correlation of the Study Variables.

		Spearman's Rho		Cronbach's Alpha (α)	
		Business Management	Competitiveness	Business Management	Competitiveness
Business Management	Correlation Coefficient	1.000	.841	1.000	.834
	Sig. (two-tailed)	.	.000	.	.000
	N	70	70	70	70
Competitiveness	Correlation Coefficient	.841	1.000	.834	1.000
	Sig. (two-tailed)	.000	.	.000	.
	N	70	70	70	70

Source: Prepared by the author.

external factors that had a significant influence on the competitiveness of China's coal industry and determined that the coal industry should give priority to these key factors, as each one crucially influenced the comprehensive competitiveness of China's coal industry.

CONCLUSIONS

Business management is directly and significantly related to competitiveness in a group of companies that provided supervision and chemical analysis services to the Peruvian mining sector in 2022 at a significance level of 0.05, with a p -value = 0.000 and a Spearman's rho correlation = 0.841. It is recommended that companies providing supervision and chemical analysis services to the Peruvian mining sector continuously work on improving their strategies, plans, and programs so that their business management can generate competitiveness. This will benefit their current users, attract new users, generate better revenues, and increase market share.

Business management is directly and significantly related to the internal factors of competitiveness in a group of companies that provided supervision and chemical analysis services to the Peruvian mining sector in 2022 at a significance level of 0.05, with a p -value = 0.000 and a Spearman's rho correlation = 0.841. It is recommended that companies providing supervision and chemical analysis services to Peru's mining sector continuously work on improving their strategies, plans, and programs so that their managerial function, administrative function, commercial and logistical function, financial function, human talent, technological function, and environmental function can generate competitiveness. This will benefit their current users, attract new users, generate better revenues, and increase market share.

Business management is directly and significantly related to the external factors of competitiveness in a group of companies that provided supervision and chemical analysis services to the Peruvian mining sector in 2022 at a significance level of 0.05, with a p -value = 0.000 and a Spearman's rho correlation = 0.759. It is recommended that companies providing supervision and chemical analysis services to Peru's mining sector continuously work on improving their strategies, plans, and programs to be prepared for economic fluctuations in the country, technological changes, and political and legislative changes. This will enable them to generate competitiveness and thus benefit their current users, attract new users, generate better revenues, and increase market share.

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