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Blockchain Technicality to Improve Management Experience in Higher Education System: The Case of Qassim University, Saudi Arabia

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ABSTRACT This research aims to conduct a predictive study for determining the technological and systematic returns of applying blockchain technicality to improve management experience sharing at Qassim University. The study is quantitative in nature and uses descriptive research design. The population consists of teaching staff members and administrative employees at Qassim University in 2019-2020. The research sample is selected using the random sampling method to achieve the targeted sample size of 100 individuals.The questionnaire of technological and systematic returns of blockchain technically is distributed at Qassim University to collect data. The study is quantitative in nature and uses descriptive research design. Results show a huge technological return of applying blockchain technicality to improve management experience sharing in the higher education system at Qassim University. Applying blockchain technicality is recommended because of its vast technological and systematic returns in improving management experience sharing in the Saudi higher education system in general and Qassim University in particular.

INTRODUCTION

Blockchain is the name of a technology that allows one to keep decentralised and distributed digital transactions records. Its first implementation took place in 2009 in Bitcoin as a digital currency (Bartolome et al. 2017). The aim was to eliminate any third-party intermediary and allow users to make their transactions directly by designing it as a decentralised network of peer nodes (Alammary et al. 2019). Blockchain technicality is known as distributed ledger technology that facilitates information sharing between different parties and information sharing through an organised system that comprises transactions and networks (Casino et al. 2019). Distributed ledger technicality registers transactions and ascertains them spontaneously inside blockchain systems. This technicality operates several virtual coins, such as Bitcoins and Ethereum. It can also help improve education and learning all over the world through various methods. This technicality increases transparency and works through a decentralised platform that enables its resistance to deception (Capetillo 2018).

The above mentioned technicality revolutionises different industries, such as the financial, education and health care sectors, on a global scale because it provides transparent and unchangeable solutions (Mahyuni et al. 2020). These secure, quick and transparent solutions can be general or private. This technicality enables people in developing countries to know the acknowledgers' identity, asset ownership and financial inclusion.

Blockchain technicality was used for the first time in 2009. It has quickly penetrated different sectors, including the educational sector. Those who use a blockchain technicality network are anonymous and can be shown by coding the general key. That is every user has private access that only he or she knows and a general key for sharing with other users. All network incidents are delivered to all nodes on the network. The nodes check transactions and group them in masses. Each mass is determined by breaking down, that is, a unique coding signal is broken down from the previous connected masses. This chain of masses registers transactions, such as a general ledger in which all nodes in the blockchain network participate (Grech and Camiller 2017).

The aforementioned technicality provides a safe and creative method to achieve the concept of autonomous supremacy, which indicates the high authority of an individual to full own-

ership. From the individual personality, self-identity stems from supremacy, which is an inalienable right to claim one's own and determines who one is from the world. To date, one depends on the government to secure this right and execute this authority. Notably, one can construct and manage their digital identities easily by using a distributed ledger (Kuperberg 2020).

Blockchain technicality works in popular general networks in building its network, particularly on the idea known as conformity. Suppose any attempt happens to destroy or penetrate the system or build incorrect information. In that case, self-execution follows a consensus by following a long chain of operations from achieving all the network points from the process and their agreement. Notably, several specialists consider blockchain another form of database sharing that enables communicating the origins without copying (Paik et al. 2019).

Blockchain in Education

Digital identites, which use blockchain, are increasingly becoming large scale (Bartolome et al. 2017). Blockchain-based applications development can be divided into three main stages, namely, Blockchain 1.0, 2.0, and 3.0. Blockchain 1.0 was used for cryptocurrencies, and its focus was to facilitate simple cash transactions. Subsequently, Blockchain 2.0 was introduced for properties and smart contracts. Blockchain 3.0, was concerned on developing many applications in various sectors, such as government, education, health and science. The application of blockchain to education is still in its early stages (Alammary et al. 2019).

Nowadays, some universities and institutes have applied blockchain technology for education, and most of them use it to support academic degree management and summative evaluation for learning outcomes (Bartolome et al. 2017). Many institutions used innovative ways to implement Blockchain technology in education beyond degree management and achievements assessment. Blockchain technology has great potential for broader application prospects on evaluation, learning activities and tracking the whole learning processes (Chen et al. 2018).

Other innovative applications of using blockchain technology in the field of education are proposed, and education platforms on the Internet can help to improve the interaction between students and teachers. Learning can become a social experience amongst those who seek work and employers through reliable skills in the market and provide students with enormous freedom to concentrate on the content. In this experience, teamwork and cooperation are practised. Internal training, part-time jobs and tasks of building skills can also be indistinguishable. For example, students can apply all the skills they learned at once in the work market. Blockchain technicality can also change the relations amongst faculties, universities, employers and society (Chen et al. 2018).

As mentioned above, the technicality can maintain students' records, remarks, tests, official papers, and their performance during their education. These data are contained in unique chains that connect relevant authorities through public networks, which serve clerks and governorates' inquiries and others concerned and involved in students' performance and achievements. These networks prevent cheating and falsification, accelerate employment processes, and increase educational institutions' competence (Serdyukov 2017).

Blockchain can empower individuals in designing their paths in learning and working. This technicality also provides confidence, transparency and competence to an educational system. These benefits are multiplied when blockchain power is used to construct secure networks that connect educational institutions, education technology companies (Editk) and learners. The safe empowerment to exchange data in an autonomous frame transfers the learning control to the individual far from the institution. This transfer saves the ability on transferring the environmental system of the education fundamentally (Tapscott and Kaplan 2019; Turcu and Turcu 2018).

Alammary et al. (2019) conducted a literature review for studies about implementing Blockchain technology in education. He found many categories of application to use it in education, such as competency and learning outcome management; evaluating students' professional ability; securing collaborative learning environment; protecting learning objects, fees and credit transfers; obtaining digital guardianship consent,

competing management and copyright management; enhancing students' interactions in e-learning and examination review; and supporting lifelong learning. Blockchain technology in education has limitless possibilities and can become an extensive part of education systems. Some benefits of adopting blockchain technology in education are decentralisation, scalability, reliability and security. Finally, universities can obtain other benefits by adopting blockchain-based solutions, including reducing administrative costs and bureaucracy (Wang et al. 2019).

Blockchain technology also has some technical challenges and limitations. Yli-Huumo et al. (2016) presented seven technical challenges and limitations for the adaptation of Blockchain technology in the future. He identified that these limitations are throughput, latency, size and bandwidth, security, wasted resources, usability, and versioning, hard forks and multiple chains. However, Blockchain, as a technology can change the way how transactions are conducted in everyday life, as its applications are not limited to cryptocurrencies; it can be applied in various environments where some forms of transactions are performed (Yli-Huumo et al. 2016).

Statement of the Problem

As digital identities using blockchain become more robust and widely adopted, education becomes increasingly digital and virtual. Making improved matches is possible between students and teachers through online education platforms and between job seekers and employers through trusted skills marketplaces (Tapscott and Kaplan 2019).

Developing inputs and outputs for university management mechanisms and information all over the world needs related contemporary tools. University leadership and its management require questioning, transparency and secure data. These data pertain to activities of university management, students and university employees. The current technology that uses these data in several universities in Saudi Arabia, including Qassim University, is unreliable in terms of transparency (Al-Yami 2018; Issa and Saleh 2019). This technology may also expose many activities, such as management experience sharing, and other important university management affairs.

The use of technology can revolutionise different universities in maintaining data and increasing questioning amongst the management, lecturers and students. Distributed ledger technicality uses intelligent contracts to achieve security in the educational sector. Registering students and lecturers may be the execution key for several intelligent contracts that confirm achievement of missions. A distributed ledger can facilitate distributed learning plans, where an educational institution can fund students' accounts by using an intelligent blockchain contract and managing financing in advance. A single click on the telephone by a lecturer or a student may be simple but may be used to execute an intelligent contract.

Tapscott and Kaplan (2019), Alammary et al. (2019), Wang et al. (2019) and Grech and Camiller (2017) categorised the ledger technicalities in blockchain technicality into centralised, eccentric and distributed. Blockchain- technicality may be the best option for universities in Saudi Arabia, notably Qassim University. Thus, this research identifies the "technological return" and "systematic return" by applying blockchain technicality at Qassim University.

Research Importance

Contemporary world society has progressed in the 21st century in terms of information technology. Blockchain technicality is one of the change factors in this regard. Using blockchain technicality for management improves competence, adds credibility to the system and promotes the institution level in modern technology.

The findings of this research can help the Ministry of Higher Education in the Kingdom of Saudi Arabia understand the role of blockchain technicality in improving management experience exchange in the Saudi higher education institutions, notably Qassim University. This research benefits not only Qassim University but also other Saudi institutions.

Research Aims

This research aims at determining the return of applying blockchain to improve management

experience sharing in Saudi higher education system at Qassim University. Specifically, the following aspects are examined:

1. Technological return of applying blockchain technicality to improve management experience sharing at Qassim University.
2. Systematic return of applying blockchain technicality to improve management experience sharing at Qassim University.

Research Questions

This study seeks ought to determine the benefits of applying blockchain to improve management experience sharing in Saudi higher education system at Qassim University. Specifically the study aims to answer the following questions:

1. What is the technological return of applying blockchain technicality to improve management experience sharing at Qassim University?
2. What is the systematic return of applying blockchain technicality to improve management experience sharing at Qassim University?

METHODOLOGY

Research Design

This research is descriptive, and its main purpose is a description of the state of affairs, as it exists at present. Questionnaires, surveys, interviews and observations are conducted for data collection in descriptive studies.

Surveys are concerned with describing, recording, analysing and interpreting conditions that exist or can exist. Therefore, qualitative data are obtained through this survey to determine the benefits of applying blockchain to improve management experience sharing in the Saudi higher education system at Qassim University.

Population and Research Sample

The research population consists of 3,500 teaching staff members and administrative employees at Qassim University between 2019 and 2020. The research sample is selected using a random sampling method to achieve the targeted sample size of 100 individuals that is appropriate according to Bartlett et al. (2001).

Research Instrument

The questionnaire was designed to recognise the technological and systematic returns of applying blockchain technicality at Qassim University. The researcher reviewed studies on the present applications and recommendations of blockchain technicality in the educational sector. The questioner is a quantitative measure of the benefits of applying blockchain, and this measure includes 33 items using a five-point Likert type scale (1=strongly disagree to 5= strongly agree).

The questioner consists of three different sections. The first section investigates information on the respondents' demographic profile; for instance, types of respondents, academic authority or non-academic authority (an administrative authority) at Qassim University. The second section measures the technological return of applying blockchain technicality in sharing management information at Qassim University. The third section measures the systematic return of applying blockchain technicality in sharing management information at Qassim University.

The survey instrument passed several stages of checking to test its validity and reliability. Firstly, the instrument was discussed with specialised experts and the university management to determine its validity. Secondly, the instrument was applied to obtain answers from academics and administrators and clerks of information technology and other stakeholders in Qassim University. Cronbach's Alpha reliability test results indicated that the overall scale has good reliability and can be used to measure the technological return of applying blockchain technicality in sharing management information at Qassim University.

RESULTS AND DISCUSSION

The survey asked academic authority and non-academic staff (an administrative officer) at Qassim University to report the technological return of applying blockchain technicality to improve management experience.

Technological Return

The first research question is about the technological return of applying blockchain technicality to improve management experience sharing at Qassim University. The researcher answered this question by using descriptive statistics for the three dimensions representing "technological return" in the questionnaire. Table 1 presents the results of enforcing management experience sharing.

Dimension Total Score

In Table 1, the sample strongly agrees that information plays a role in enforcing management experience sharing (M = 4.59, mean percent = 91.7), which indicated a high ascertained score of technological return. The means of the research sample opinions for the first dimension items ranged between 4.44 and 4.68, with a percentage ranging between 88.80 and 93.60 percent. Such a strong agreement between the sample suggests that the technological return plays a critical role in establishing the information determinants of enforcing management experience sharing, and such role is achieved considerably.

The technicality develops the strategy of information systems with all the necessary methods for making important decisions. It also provides a comprehensive database for making decisions on management experience sharing. Information and data are analysed with strategies that help leaders develop effective sharing with the developed incidents to make appropriate successful management decisions. In addition, the technicality provides enormous opportunities to increase the interaction between students and the external society through the available information database. Such a database helps the university determine actual needs and adjust deficiencies through the information derived from evaluation findings.

After all, blockchain technicality works on achieving continuous development to manage information systems whilst ensuring appropriateness to the necessary needs and the future challenges that the university may face (Chen et al. 2018). A blockchain is a distributed digital ledger that enables the information recording and sharing by a community (Bartolome et al. 2017). Tapscott and Kaplan (2019) also indicated that Blockchain removes the hurdles of measurement and geography. Specifically, teachers and employers can access and analyse (with individuals) vast amounts of educational data or other types of data in their scientific research.

Table 2 shows that the sample option's mean of the second dimension as a whole (M = 4.64, percent = 92.8) came in the direction of strongly

Table 1: The sample opinions about the role of the information in enforcing management experience sharing

S. No.	*Statements*	*Ascertain score*	*Percentage*	*Mean*	*Estimated score*
1.	Blockchain technicality depends on continuous development to manage information systems inside the university.	468	93.60	4.68	High score
2.	Information and data are analysed in a way that helps leaders in terms of effective sharing.	459	91.80	4.59	High score
3.	The strategy of information systems is developed with methods that are necessary for making important decisions.	462	92.40	4.62	High score
4.	The technicality provides a database containing all data and information necessary to make decisions for management experience sharing.	461	92.30	4.61	High score
5.	The technicality provides large opportunities to increase management experience sharing between students and the external society through the available information database.	457	91.40	4.57	High score
6.	The technicality helps determine the university's actual needs and adjust deficiencies through the information derived from evaluation findings.	444	88.80	4.44	High score
	Dimension total score	2751	91.70	4.59	

Table 2: The sample opinions about the methods to collect information to contribute in improving management experience sharing

S. No.	*Statements*	*Ascertain score*	*Percentage*	*Mean*	*Estimated score*
7.	The technicality determines the strengths and weaknesses in the methods of collecting information and data.	456	91.20	4.56	Large scale
8.	Most recent apparatuses are used to collect information for management experience decisions.	464	92.80	4.64	Large scale
9.	Employees are trained on collecting information and data that are necessary for management experience sharing in making decisions scientifically.	446	89.20	4.46	
10.	The technicality develops a perception of the suitable budget to collect data and information that help in making decisions.	475	95.00	4.75	Large scale
11.	The technicality continuously evaluates the information state of the university and determines appropriate development methods.	479	95.80	4.79	
	Dimension total score	2320	92.80	4.64	

agree, suggesting a high ascertain score of technological return. Meanwhile, the means of the items ranged between 4.46 and 4.79 (89.20% and 95.80%), indicating that the research sample opinions strongly agree to the determining methods of collecting information contributing to improve the management experience sharing means of the research sample in the technological return.

These findings are due to the fact that blockchain technicality has the following capabilities. It continuously evaluates works on the university's present information state to determine the best development methods suitable for the current status (Chen et al. 2018). The technicality develops a perception of the reasonable budget to collect data and information, both of which help the higher management at the university make decisions because of its use of recent apparatuses to obtain data on making decisions for management experience sharing. The technicality also determines the strengths and weaknesses in the methods of gathering information and data. It helps prepare and train employees on collecting data necessary for management experience sharing in making decisions scientifically. Tapscott and Kaplan (2019) also emphasised the necessity of preparing courses to educate students (and the guardians) and employees regarding the use of blockchain technicality. The technicality can help the university determine the best methods for collecting information and improving management experience sharing. Thus, the university can keep pace with the developments and achieve the most benefits to develop university work at the Kingdom.

Table 3 shows the mean and percent representing the sample opinions in the third dimension of technological return. The mean of the dimension (M = 4.62, percent = 92.4) reveals a strong agreement between the sample, indicating a high ascertain score of technological return in developing inputs and outputs for mechanisms and information systems. The technicality develops a perception of the reasonable budget to collect data and information, both of which help the higher management at the university make decisions because of its use of recent apparatuses to obtain data on making decisions for management experience sharing. The means of the third dimension items ranged between 4.53 and 4.71, with a percent that ranged between 90.60 and 94.20. Such results indicated that the sample strongly agrees that technicality has high capability to develop inputs and outputs for work mechanisms and information systems at the university. Grech and Camiller (2017) similarly indicated that the dependency on blockchain technicality in education leads to achieving contemporary technological development for all. This capability is attributed to that the apparatus used in saving information and data in the technicality has a considerable storage memory which can be restored any time. The technicality reviews internal records and updates them continuously, and it develops a system for internal

Table 3: The sample opinions about developing inputs and outputs for mechanisms and information systems

S. No.	*Statements*	*Ascertain score*	*Percentage*	*Mean*	*Estimated score*
12.	The apparatus used in saving information and data in the technicality has a huge storage memory which can be restored at any time.	471	94.20	4.71	High score
13.	The technicality helps in reviewing internal records and updates them continuously.	470	94.00	4.70	High score
14.	The information system in the technicality provides accurate collection of data of students and the management system inside the university.	456	91.20	4.56	High score
15.	The technicality works on developing a system for internal records. The system offers reports on internal activities of the university and the extent of their effective contribution.	460	92.00	4.60	High score
16.	The technicality depends on necessary reports that help in making decisions.	453	90.60	4.53	High score
	Dimension total score	2310	92.40	4.62	

ledgers (Chen et al. 2018). The system offers reports on the internal activities of the university and the extent of their useful contribution. The technicality system provides an accurate collection of data of students and the management system inside the university. It prepares necessary reports to help leaders make decisions.

Systematic Return

The second research question is about the "systematic return" of applying blockchain technicality to improve management experience sharing at Qassim University. The researcher answered this question by using descriptive sta-

Table 4: The sample opinions about improving academic leadership

S. No.	*Statements*	*Ascertain score*	*Percentage*	*Mean*	*Estimated score*
17.	Blockchain technicality helps the university leaders in solving different academic issues.	467	93.40	4.67	High score
18.	The technicality works in a reliable systematic and information frame that allows the university administration to enforce methods of exchanging management information freely.	463	92.40	4.62	High score
19.	Blockchain allows a distributed ledger pattern to maintain records for academic evaluation and supervision.	471	94.20	4.71	High score
20.	Blockchain technicality is considered very documented and protected against penetration or a change in any information on the university's internal academic and management activities.	486	97.20	4.86	High score
21.	Blockchain technicality facilitates information exchange inside the university campus, other universities and outside the society for mutual activities or projects amongst stakeholders.	481	96.20	4.81	High score
22.	Blockchain technicality works on helping leaders by allowing more than one substitutions during decision making and selection.	456	91.20	4.56	High score
	Dimension total score	2823	94.10	4.71	

tistics for the three dimensions representing "Systematic Return" in the questionnaire. Table 4 presents the results of improving academic leadership.

Dimension Total Score

Table 4 represents the research sample opinions in the first dimension of systematic return (improving academic leadership). The general mean (M = 4.71, percent = 94.1) suggests that the sample strongly agrees that systematic return improves academic leadership. The means of the item ranged between 4.56 and 4.86, with a percent ranging between 91.20 and 97.20. All means of the statements came in the direction of strongly agree, which indicated high ascertain score of systematic return (the first dimension).

Another finding is blockchain technicality is documented and protected against penetration or a change in any information on the university's internal academic and management activities. As previously mentioned Tapscott and Kaplan (2019) also indicated that blockchain removes measurement and geography hurdles. The technicality facilitates information exchange inside the university campus, other universities and outside the society for joint activities and projects. Therefore, teachers and employers can access and analyse (with individuals) vast amounts of educational data or other types of data in their scientific research. Moreover, the technicality allows a distributed ledger pattern to keep records for academic evaluation and supervision purposes, and it can also help solve different educational issues. The technicality works in a documented systematic and information frame that allows the university management to freely enforce management information methods (Bartolome et al. 2017). Similarly Tapscott and Kaplan (2019) mentioned the potential of blockchain in support of the talent management strategies in preparing current and future employees for the future's new-collar jobs.

Dimension Total Score

The findings from Table 5 show that the mean of the dimension as a whole (M = 4.52, percent = 90.48) suggests that the sample strongly agrees, which indicated a high ascertain score of systematic return in enforcing records of transparency and management. The mean that reflects the research sample opinions about the second dimension of systematic return ranged between 4.39 and 4.62, and the percent ranged between 87.80 and 92.40. These findings indicated high agreement about systematic return in enforcing records of transparency and management.

These results are also due to the high ability of the blockchain technicality in transferring Qassim University to a unique and documented digital university. The technicality increases the university's acceptance and registration system by making it more organised than before, enabling digital registration and making management information further transparent and easily accessible (Bartolome et al. 2017). Using block-

Table 5: Sample opinion about enforcing records of transparency and management

S. No.	*Statements*	*Ascertain score*	*Percentage*	*Mean*	*Estimated score*
23.	Blockchain technicality works on making management information further transparent and easily accessible.	456 .	91.20	4.56	High score
24.	Blockchain technicality allows control in academic and non-academic activities at the Qassim University campus.	445	89.00	4.45	
25.	Blockchain technicality works on improving the system of acceptance and registering at the university by making it more organised than before and enabling digital registration.	460	92.00	4.60	High score
26.	Blockchain technicality transfers Qassim to a unique and documented digital university.	463	92.40	4.62	High score
27.	Blockchain technicality works on making university clerks and students more related than ever before.	439	87.80	4.59	High score
	Dimension total score	2262	90.48	4.52	

Table 6: Sample opinion about security and identity protection

S. No.	*Statements*	*Ascertain score*	*Percentage*	*Mean*	*Estimated score*
28.	Blockchain technicality helps with keeping important university documents digitally by using a safe method.	429	85.80	4.29	High score
29.	Blockchain technicality helps the university administration in eccentricity management work burdens and helps exchange information in a reliable and safe way.	483	96.60	4.83	High score
30.	Data of blockchain technicality cannot be changed. This factor way helps Qassim University overcome many challenges, such as honesty, security and originality.	498	99.60	4.98	High score
31.	Blockchain technicality helps Qassim University be further independent and safe in the Kingdom.	491 4.	98.20	4.91	High score
32.	Blockchain technicality helps determine management gaps in a short time and determine human faults and solve them accordingly.	466	93.20	4.66	High score
33.	The technicality helps in exchanging information and opinions through distance dealing. This capability distinguishes it under the second COVID-19 pandemic.	491	98.20	4.91	High score
	Dimension total score	2858	85.27	4.76	

chain technicality in the educational system can save the best documented educational information (Wang et al. 2019), and allow the potential to control academic and non-academic activities in the Qassim University campus, and make university clerks and students more related than ever.

Dimension Total Score

Table 6 shows that the mean in the third dimension "security and identity protection" as a whole (M = 4.76, percent = 95.27) came in the direction of strongly agree, which indicated a high ascertain score of systematic return in the security and identity protection. The means of the items ranged between 4.29 and 4.98, and the percent ranged between 85.80 and 99.60. The findings indicate that the research sample opinions in the systematic return strongly agree, suggesting a high ascertain score of systematic return in security and identity protection.

These findings are due to the ability of the blockchain to overcome many challenges in terms of honesty, security, and originality confronted by Qassim University. Alammary et al. (2019) also revealed that blockchain technicality has various unique advantages, such as eccentricity and secure, reliable and integrated data, which are useful for the educational sector.

The technicality helps exchange information and opinions through distance dealing, managing eccentricity work burdens, and exchanging information reliably and securely. The technicality also determines management gaps quickly and defines human faults and solves them accordingly. It keeps the university digital and other necessary management affairs essential documents safe to achieve systematic return in a high degree of security and identity protection (Bartolome et al. 2017).

CONCLUSION

According to the research results, applying blockchain technicality can improve management experience sharing in the Saudi higher education system at Qassim University and has a vast technological return. Blockchain technicality helps establish information and works on determining information collection methods contributing to and developing inputs and outputs for information mechanisms and systems, which improve management experience sharing at Qassim University. Applying blockchain technicality also has a large systematic return to improve management experience sharing in Saudi higher education system at Qassim University. It enhances academic leadership, helps enforce transparency and management records, and implements security and identity protection mechanisms at Qassim University.

RECOMMENDATIONS

Accordingly, the researcher encourages the application of blockchain technicality because

of its technological and systematic returns for improving management experience sharing in Saudi higher education system in general and Qassim University in particular. A clear and specific strategy that can be followed should be developed to promote the provided educational service level by using blockchain technicality. For the maximum benefits, students, employees and teaching staff members must be prepared for digital citizenship. This preparation needs courses to educate students (guardians), employees and teaching staff members on blockchain technicality and how to be good digital citizens and proficient in using the technology. Further studies and future works on blockchain technicality in the education field should be conducted.

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