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Research Article

The Effectiveness of Social Media on Engineers Related Tasks

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Abstract

In the beginning of 21st Century, Social Media developed and influenced on all aspects of modern lifestyle. Nowadays, Social Media is not only an entertainment and social networking tool, but also can be supposed as a way of linking different businesses, marketing, management, construction industry. Furthermore, it provides a framework for people around the world to interconnect, share information, and interrelate with each other. This study includes an investigation about the effects of Social Media on engineering related tasks, for this purpose, a questionnaire survey was performed for engineers with different gender, ages, and engineering status. Kurdistan Region-Iraq is the case study of this survey, the results of this study reveal that Social Media is one of the mostly used by engineers. It is also illustrated that Google, YouTube and Facebook are the mostly used platforms.

1. Introduction

Social Media (SM) can be defined as an online platform where people use to make conversations with others who have similar personality or occupation interests, professional activities, academic background, or real-life relations for multiple purposes [1]. SM covers are a term for these online tools and platforms which people use to share, converse, download, upload and publish their online contents. The outcome of the application and utilization of SM is a social network. It is a social structure made of a group of people or organizations to represent the associations between them [2]. Nowadays, the internet has become a great source for community conventions around the world. Everyone can obtain all information and important data without any restrictions on time and place [3].

While societies around the globe rate their conventions, thoughts, and standards that make them unique, SM joins individuals around the world irrespective of contrasts and geographical parameters. According to Chen G-M [4], “The compression of time and space, due to the conjunction of new media and globalization, has minimized the world into a much smaller collaborative arena”. Individuals’ crossways the world can interrelate with each other within seconds by sending and getting messages. SM has brought people from different cultures together in the “global village” [5].

Engineering is an information-concentrated social communication process, it is not solitary progress, and a several types of researches have emphasized that well-function engineer's link is a main key factor for project success [6-8].

Recently, the distribution nature of advanced products, technology evolution, changes in the designing process, and the propensity of the engineers to depend on their colleagues and people who can simply reach online tools might be noticeable options for searching information, getting data, and sharing knowledge. The presence of a numerous number of engineering platforms and shared topics worldwide on the net, make it difficult to check and filter what and by whom it is being shared regarding the quality of the published knowledge. This has become a problematical issue by engineers in all status [8].

The aim of this paper is to find out the effectiveness of SM on engineering-related tasks among the engineers of Kurdistan region of Iraq. This includes; the impacts of SM tools on the engineer's daily life, the assessment of the quality of SM platforms for a better link between engineers in different status, and also investigations on SM impacts on engineers` financial status and job opportunity.

2. Literature Review

The development of SM can be linked with the birth of Facebook and Flickr in 2004. Over the past decade, the human style of life has been impacted significantly by the evolution of different SM platforms [9]. There is more than one classification for SM platforms. Golden [10] classifies it into two categories based on ownership, firm-sponsored or individual publications (e.g. blogs) and third-party forums (e.g. Facebook, Twitter, and LinkedIn). The increase in SM usage worldwide is observed; the latest statistics show that there are 3.2 billion users, which is around half of the total world's population. Facebook is currently the largest SM platform in the world with 2.4 billion users, while more than one billion users utilize each of other platforms such as YouTube, Instagram, and WhatsApp [11].

SM, nowadays, is more than a leisure medium. According to results from a study, SM can help to introduce organizational mechanisms that create social spaces between people. This altered the opinion from previous researches that SM is only being used for fun and personal reasons [8]. Commercial benefits are also achieved in a business when SM is implemented effectively, and this leads to a significant influence on the sustainability of the business, especially, economic and social sustainability [9]. There is a suggestion by specialists that says "SM must be encouraged in the working environment for better results" [12]. Several researches have investigated the use of SM as a way of involving employees, suppliers, customers, and end-users, this is within corporate communication, marketing, and consumer research, and innovation management [13]. Despite the geographical distribution, SM establish possibilities for support a more bottom-up creation and sharing of knowledge [14].

Studies illustrate that the most common platform for business and career development is LinkedIn. Others like Twitter, Facebook, YouTube, Blogs, Google, and Pinterest are also used at a smaller percentage. Moreover, SM is now proving to be having commercial potential for businesses to use more than being a personal entertainment medium. However, within the construction field, the implementation of SM is not explored in-depth [9]. According to previous studies, [15-17] it is explored that engineers mainly retrieve information through face-to-face meeting with their colleagues when searching for information. Although email is still the widely used channel [18].

Engineers primarily depend on their colleagues and people they can easily reach for information seeking and sharing of knowledge. However, the progress in technology changed this work path and now SM can be supposed to be an obvious choice [8]. Additionally, Sarka et al [8] revealed that 88% of the respondents of a question-share (52% engineers and 48% managers) use SM in relation to work and the most addressed purposes are 'Information', 'Networking', 'Search', Knowledge' and 'Solutions'. Software engineers for different purposes such as, communicate with and learn from users, become informed about new technologies and create informal documentation, use a variety of SM tools. This can support software development activities ranging from requirements engineering and development to testing and documentation [19].

Although studies have revealed the use and benefits of SM in different aspects of life, away from leisure and personal sharing, there is still some gap to be found regarding the relationship between SM and engineers. This research is about exploring the common platforms that engineers use, and types of SM activities that are mostly dependent on achieving information in this area.

3. Experimental Methodologies

In order to investigate the effectiveness of social media (SM) on engineers related tasks, questionnaire form was conducted which includes a number of important questions. The statistical analysis has been done to the obtained results by using SPSS software. The detail information about the investigation in separate sub-sections such as study site, participants, sample sizing is illustrated.

3.1 Study Site

The research was performed in Kurdistan Region-Iraq (KRI) which is situated precisely at latitude 36.4103° N, and longitude 44.3872° E. Exclusion criteria for participants were as follows: they had to be engineers and reside in the Kurdistan Region. Anyone with these details is qualified to take part in this survey.

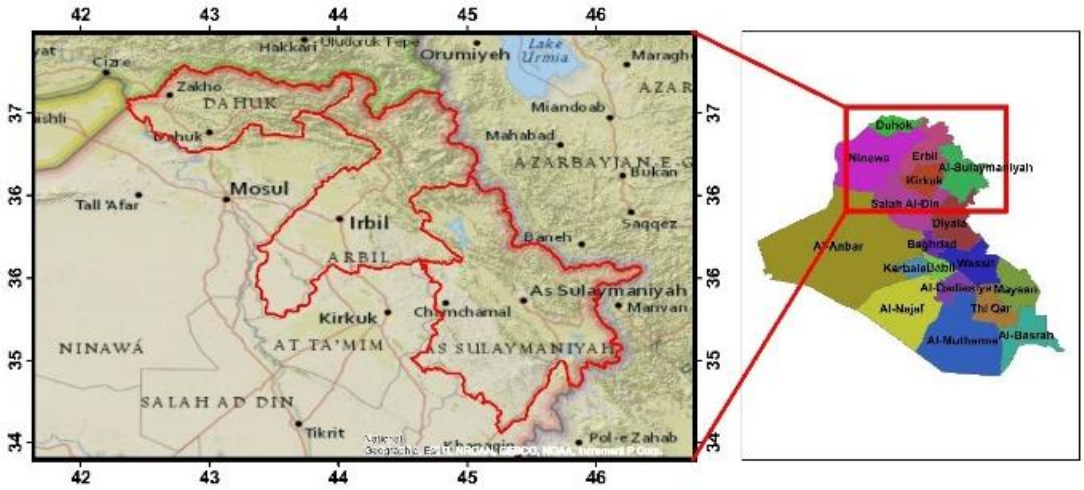

Figure 1. Study site (KRI)

3.2 Participants and Sample Size Technique

In 2020, the population of KRI engineers was estimated to be 20,419 people, with an overall Iraqi population [20]. In this case, the following formula for calculating the necessary sample size for this study will be sufficient. [21]:

$$n = \frac{N}{1+Nd^2} \quad (1)$$

Where n = required sample size, N= population size, and d= margin of error (considered d= 0.05) [22]. The formula stated that about 392 samples would be sufficient for this study, and a simple random sampling technique was used due to the sample size allocated by taking the population in KRI into account [23]. This cross-sectional and quantitative research was performed from 18 January 2021 to 01 February 2021.

3.3 Questionnaire Design and Data Collection

The current study aimed to learn more about the impact of SM on engineer careers and potentiality. Also, show how the results have an unintended consequence. Primary data was collected using the standardized questionnaires created after a review of the literature [8]. A self-administered online questionnaire was used in this cross-sectional study. The questionnaire was created with Google Forms, a free electronic medium provided by Google, in order to collect information voluntarily through the designed questionnaire. This survey consisted of 11 closed-ended questions with a suggested filling time of 3-5 minutes. The authors used snowball sampling to distribute the survey link in all KRI Provinces (Erbil, Sulaimani, Duhok, and Halabja) via SM. The questions were divided into three sections. The first section is about demography;

the demography data is about the general characteristics of the participants. This type of data allowed us to better recognize the responders' perspectives; including their age, gender, location, field of engineering and their experience level of engineers were asked. The second category contained questions about the scientific sources that engineers depend on for getting knowledge. Moreover, the SM platforms which engineers mostly use for this purpose. The final part was about job opportunities from SM platforms. It is also directed to the participants whether SM tools help engineers to interact and meet with other colleagues. The survey questionnaire was sent to about 1000 participants, 415 of whom responded, representing almost all of the country's divisions and ranging from under 25 to above 35 years old. Experts evaluated the draft questionnaire, and the relation between the items was studied before distributing the questionnaire.

3.4 Statistical Analysis Instrument

The Statistical Package for the Social Sciences (SPSS) version 26.0 was used for all statistical analyses. The software analyzed the percentage and frequency, as well as the Cross tabulation is a method for quantitatively analyzing the relationship between multiple variables. Cross-tabulation, also known as contingency tables or cross tabs, groups variables in order to understand the relationship between them [24].

3.5 Ethical Considerations

The study was reviewed and approved by University of Raparin and Tishk International University-Sulaimani research center.

4. Results and Discussion:

This section contains summaries of participant responses to each of the questions posed about the relationship between SM and engineering tasks. The explanations and debates for each question's responses can be found in the sub sections below.

4.1 Socio-Demography Characteristics of Responders’

To investigate the effectiveness of SM on engineer’s related tasks, several questions were asked the participants. The first question group was about demographic information, which consists of three main questions regarding their Gender, Age, and Engineering status. The results were obtained from the participant’s answers, which are demonstrated in Table1, and illustrate that 415 participants were responded 64.1% Males and 35.9% Females. Regarding the age of the participants, the majority of them are under 25

years old and its percentage is about 45.80%, whereas the participants who above 35 years old are the least portion and around 9.6%. Besides, the other participants were categorized into two groups, the first group consists of those aged between 25-30 years old, and they form 26% of the participants. Furthermore, the second group comprises the participants between 31-35 years old who form 18.6%. The last question in this section was about the engineering status of the contributors, the results reveal that the most abundant engineering status are fresh engineers 56.30%, followed by expert engineers 31.30% and students involve the least portion with 12.5%.

Table 1. Demographic Information of the Participants

Quantity	Gender		Age				Engineering Status		
	Male	**Female**	**Under 25**	**25-30**	**31-35**	**Above 35**	**Student**	**Fresh Engineer**	**Expert Engineer**
Count	266	149	190	108	77	40	93	117	205
Percentage %	64.1	35.9	45.80	26	18.60	9.60	12.50	56.30	31.30

4.2. Engineers Rely on Scientific Sources for Information.

4.2.1. Which Sources Do You Use During Your Engineering Tasks?

The above question is one of the main questions directed to the participants in this questionnaire study. This aimed to know about the position of SM as a source by engineers that nowadays has occupied most aspects of human life. Table2 demonstrates the responses achieved from 415 participants to make a selection between the sources which they use during their engineering-related tasks. The results emphasis that the vast majority of the participants 69.4% use SM as the main source, followed by 55.6% and 45.5% using books and university lectures notes respectively. However, the use of research articles is the least between the four choices which are only used by 40.7%.

Moreover, regarding the gender distribution of the responses, males use SM by 72.9% whenever is greater than females with 63%. This can be observed for the two other sources, books and research articles also. On the other hand, for the use of university lecture notes, females are the dominant with 52.3% while only 41.7% of males using it.

According to the age distribution of the participants, it seems that using SM with age is almost dis-proportional. engineers under 25 years old use it with a great rate of 72.1%, this declined for older engineers

(above 35) with only 57.5%. This can be assumed to be true for the use of lecture notes also that starting from 61% to 30% as the age increases. But the equation is completely disproportional for the rest of the choices. It is shown that the use of research articles and books are more favorable for older ages, for instance, people above 35 use books at a rate of 62.6% while only 52.6% of under 25 years old engineers using them.

Engineering status is another aspect of the distribution. However, engineering students use SM with 64.5%, but fresh and experienced engineers are using it with above 70% ratio. On the other side, Students use of research articles is dominant. Additionally, there is a vast difference from the rest two in using university lecture notes with 70.9%.

According to a survey of nearly 1,500 engineers by the Institute of Electrical and Electronics Engineers (IEEE), demonstrates that engineers are not only using SM for personal reasons, but they're seeking out information related to their professional fields [25].

Table 2. Engineering Sources of Knowledge

Which source(s) do you use during your engineering tasks?		**Gender**		**Age**				**Engineering Status**			**Total**
		Male	**Female**	**Under 25**	**25-30**	**31-35**	**Above 35**	**Student**	**Fresh Eng.**	**Exp. Eng.**	
Books	**Count**	159	72	100	60	46	25	54	60	117	231
	Percentage %	59.70	48.30	52.60	55.50	59.70	62.50	58.00	51.20	57.00	55.60
Research Articles	**Count**	120	49	79	36	36	18	43	43	83	169
	Percentage %	45.10	32.80	41.50	33.30	46.70	45.00	46.20	36.70	40.40	40.70
University Lectures	**Count**	111	78	117	40	20	12	66	58	65	189
	Percentage %	41.70	52.30	61.50	37.00	25.90	30.00	70.90	49.50	31.70	45.50
SM	**Count**	194	94	137	72	56	23	60	83	145	288
	Percentage %	72.90	63.00	72.10	66.60	72.70	57.50	64.50	70.90	70.70	69.40
Others	**Count**	13	5	6	9	1	2	1	7	10	18
	Percentage %	4.80	3.30	3.10	8.30	1.30	5.00	1.00	5.90	4.80	4.30
Total	**Count**	**266**	**149**	**190**	**108**	**77**	**40**	**93**	**117**	**205**	**415**

4.2.2 Which SMs Do You Use During Your Daily Engineering-Related Tasks?

According to research, SM may aid in the introduction of organizational structures that build social spaces between people. There is a suggestion by specialists that says “SM must be encouraged in the working environment for better results” [12]. Regardless of place, SM creates communication opportunities and encourages more bottom-up information building and sharing [14].

Based on the responses, it has been observed that the top used platforms by engineers are Google and YouTube with 86.7% and 76.8% respectively. Facebook, which has the most users among SM platforms all over the world, is used by engineers for the same reason with 55.6%. Wikipedia is also used 17.1%, and LinkedIn which is an academic platform is in level five of use with the rate of 11.8%.

The gender distribution reveals that male's use of Facebook and YouTube is much higher than females (Facebook; Males 64.7%, Females 39.6%) and (YouTube; Males 80%, Females 69.8%). On the other hand, it is the opposite for the use of Google (Males 85%, Females 90%) and Wikipedia (Males 13.5%, Females 23.5%). It can be noted also that for the rest of the platforms, both genders are almost similar. However, Skype is rarely used by engineers for this purpose and exchange ideas between them. This may be because of the variety of tools that exist today.

Concerning age distribution of the participants, Google user engineers are the dominant (above 35 years old) age with 92.5%, similarly for LinkedIn platform which is 15%. While YouTube and Wikipedia users are dominated by (under 25) engineers.

The last category for the same question is engineering status. As shown in the table below, students are the top users of the platforms; Google, Wikipedia, and YouTube with ratios of 91.4%, 23.6%, and 84.9% respectively. Additionally, it is quite similar for other platforms that there is no significant change between the ratios, while for Facebook users it’s the opposite, experienced engineers use it at the top with 63.9%.

According to another study that conducted by IHS Engineering 360 Media Solutions surveyed 1356 engineers and technical professionals and found that 57% of the engineers use SM sites to find product reviews. LinkedIn is by far the most popular SM platform for engineers. 63%, Twitter 55% of engineers. YouTube ranks third in terms of popularity with 48% of engineers using this platform. Facebook could turn out to be a suitable platform too [26].

Table 3. Common SM used by Engineers

Which SM(s) do you use during your daily engineering-related tasks?		Gender		Age				Engineering Status			Total
		Male	Female	Under 25	25-30	31-35	Above 35	Student	Fresh Eng.	Exp. Eng.	
Google	**Count**	226	134	169	86	68	37	85	99	176	360
	Percentag %	85.0	90.0	88.9	79.6	88.3	92.5	91.4	84.6	85.8	86.70
Facebook	**Count**	172	59	88	67	51	25	31	69	131	231
	Percentag %	64.7	39.6	46.3	62.0	66.2	62.5	33.3	58.9	63.9	55.60
LinkedIn	**Count**	32	17	28	10	5	6	11	19	19	49
	Percentag %	12.0	11.4	14.7	9.2	6.5	15.0	11.8	16.2	9.2	11.80
Skype	**Count**	0	1	1	0	0	0	1	0	0	1
	Percentag %	0.0	0.7	0.5	0.0	0.0	0.0	1.0	0.0	0.0	0.20
Wikipedia	**Count**	36	35	40	14	12	5	22	17	32	71
	Percentag %	13.5	23.5	21.0	12.9	15.8	12.5	23.6	14.5	15.6	17.10
YouTube	**Count**	215	104	153	73	62	31	79	86	154	319
	Percentag %	80.0	69.8	80.5	67.5	80.5	77.5	84.9	73.5	75.1	76.80
Others	**Count**	6	10	8	5	1	2	2	9	5	16
	Percentag %	2.3	6.7	4.2	4.6	1.3	5.0	2.1	7.6	2.4	3.80
Total	**Count**	**266**	**149**	**190**	**108**	**77**	**40**	**93**	**117**	**205**	**415**

4.2.3 Which Part of SM Attracts Engineers More?

Since the obtained results of this study emphasized that 70% of engineers use SM as a source of knowledge and for cooperation between each other, it is also confirmed by [20] the use SM in relation to work by engineers. This question is considered to investigate more about the tools in SM that are more common and attract engineers. In this regard, four categories are defined; shared posts in text format, shared related videos, and the discussion that occurs under each SM published post, and online courses. The results are displayed in Table 4, shared posts in text format and sharing related videos are the most attractive part of SM by engineers 54.7% and 58.5% respectively.

The distribution of gender for this question shows that shared related videos attract males (61.2%) more than females (53.7%). However, online coursed is the attractive part of SM that 36.2% of females use it, whereas only 30% of males use it. In addition to age category, it can be seen from the responses that participants between age (31 – 35) are mostly attracted by shared posts in a text format 62.3% and least for

age (above 35). However, in shared related videos it is completely opposite between the mentioned ages. Engineers of age (under 25) are mostly interested in the discussion between engineers on a specific topic shared post, as shown in Table 4. Moreover, online courses are disproportional with age; young engineers (under 25) are the most interested in online courses with a rate of 34.2% of participants.

In 2016, a survey of over 1,000 engineers about their information habits, including SM. Approximately 40% said that they use SM as a source of engineering information. The respond of 42% of the users are reading work-related articles that appear in their personal feed. In addition of 23% that they search or share information with professional contacts [24].

Table 4. Different Parts of SM Which Used by Engineers

Which part of SM attracts engineers more?		Gender		Age				Engineering Status			Total
		Male	Female	Under 25	25-30	31-35	Above 35	Student	Fresh Eng.	Exp. Eng.	
Shared Posts (Text Format)	**Count**	145	82	105	58	48	16	51	60	116	227
	Percentag %	54.5	55.0	55.2	53.7	62.3	40.0	54.8	51.2	56.5	54.70
Shared Related Videos	**Count**	163	80	115	61	42	25	52	72	119	243
	Percentag %	61.2	53.7	60.5	56.4	54.5	62.5	55.9	61.5	58.0	58.50
Discussion inside comments on a specific topic	**Count**	83	39	65	28	18	11	34	31	57	122
	Percentag %	31.2	26.1	34.2	25.9	23.3	27.5	36.5	26.5	27.8	29.40
Online courses	**Count**	80	54	65	39	20	10	32	42	60	134
	Percentag %	30.0	36.2	34.2	36.1	25.9	25.0	34.4	35.9	29.2	32.20
Others	**Count**	1	1	1	1	0	0	0	2	0	2
	Percentag %	0.3	0.6	0.5	0.9	0.0	0.0	0.0	1.7	0.0	0.40
Total	**Count**	**266**	**149**	**190**	**108**	**77**	**40**	**93**	**117**	**205**	**415**

4.3 Job Opportunities from SM Platforms

4.3.1 Economical Support and Job Carrier.

In this study, there are some other important questions involved to evaluate the effectiveness of SM on engineer's related tasks and the participant responds have been demonstrated in table 5. The achieved responses to this question; (is SM your first platform for engineering purposes?), revealed that about 46.3% and 7.2% of the participated engineers are agreed and strongly agree respectively with it. However, about

9.2% and 37.3% of the participants disagree and poorly disagree with the question. In the next question (to what extend SM is less time-consuming for getting specific information?), the vast majority of the participants agree 59.8% and strongly agree 16.1% that SM has the time facility to obtain specific information in a short time. While about 24.1% of them are disagree and poorly disagreeing with the question. In the next question regarding job careers for engineers, more than half of the participants 54% are disagreed and poorly disagree, and they think that SM does not have job career facilities in Kurdistan. However, about 47% of them agree and strongly agree. Concerning the question that to what extent SM tools help you to interact and meet with other colleagues, the majority shows that SM help them to meet new colleagues, and it gives them a chance to discuss engineering information with each other. The last question is about economic status and it asks (Have you ever used SM as economical support for your profession?) the vast majority 76.6% are not agreed, and they did not use SM as economical support in their engineering activities. Whereas, about 23.4% are agreed and used SM as an economical way for advertising their engineering and professional abilities to earn more jobs and money.

Table 5. Analysis of Likert Scale questions.

Questions	Quantities	Disagree	Poorly Disagree	Agree	Strongly Agree	Total
Is SM your first platform for engineering purposes?	**Count**	38	155	192	30	415
	Percentage%	9.2	37.3	46.3	7.2	100.0
To what extent SM is less time consuming for getting specific information?	**Count**	24	76	248	67	415
	Percentage%	5.8	18.3	59.8	16.1	100.0
Does SM facilitate the job career for engineers?	**Count**	80	144	159	32	415
	Percentage%	19.3	34.7	38.3	7.7	100.0
To what extent SM tools help you to interact and meet with other colleagues?	**Count**	29	109	210	67	415
	Percentage%	7.0	26.3	50.6	16.1	100.0
Have you ever used SM as an economical support for your profession?	**Count**	255	63	88	9	415
	Percentage%	61.4	15.2	21.2	2.2	100.0

5. Conclusion

With development of technology, the social networking has become a substantial routine for every individual, people and different groups. This research mainly focused on a highlighted group of people in community who are engineers to identify and evaluate the effectiveness of SM on them in daily related

tasks. The questionnaire form which is used in this study could provide rich information regarding to the different effects of SM tools on engineers in Kurdistan Region of Iraq. The questions asked engineers are grouped into three categories: demographic questions, main questions and additional questions. In our study, it has been found that there is a generally positive impression among engineers to use social media. The most important conclusions which gained though results are; it is noteworthy that SM is the most common and the most popular sources of seeking information.

Regarding to engineering status of the participants, it can be found that 70% of the fresh and experienced engineers are using SM, while about 64.5% participants who are engineering students. The results of the question concerning the types of used SM, illustrate that the top used platforms by engineers are Google, YouTube and Facebook respectively. Moreover, Posts in text format and sharing related videos are the most attractive part of SM by engineers. The vast majorities of the participants emphasized that SM has the time facility to obtain specific information in a short time. In addition, the outcomes regarding to economical support show that, the SM could not be an appropriate financial support for engineers.

Based on obtained findings we propose following up by investigating the implications of the SM for the engineering design process and exploratory in detail how engineers assess the reliability of identified information and knowledge. Moreover, it can be suggested for the future study to work on how to establish engineering platforms from SM such as Google, YouTube and Facebook. Moreover, the study can also suggest investigations on how to control the quality of the published knowledge in terms of referenced and updated sources.

Declaration of Competing Interest: The authors declares that they have no conflict of interest.

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