



The effect of Open Book Accounting on Reducing Production Cost and Enhancing Competitive Advantage (Field study in industrial companies in Khartoum, Sudan)

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Abstract: The policy of open book accounting has become of clear importance and effective role in reducing production costs and raising companies to the competitive level. This study aimed to investigate the impact of disclosure of cost data in reducing the cost of production and increasing the competitive advantage. The primary data was collected through a five-point Likert scale questionnaire that was distributed to a study sample of 200 employees from several companies in Sudan to explore the respondents' views. 170 questionnaires were retrieved, with a response rate of 85%. To analyze the data, the descriptive statistics -mean and standard deviation- were used to measure the respondents' degree of agreement. The simple linear regression analysis was adopted to test the hypothesis of the study. the study concluded that the open book accounting assists in reducing the cost by disclosing cost structure and driver for each product and

developing product manufacturing process,also, motivating supplier to disclose cost data through joint policies between buyer and supplier leads to support the competitive advantage. The study recommended building up joint team which includes members from buyer and supplier to manage costs and develop products according to the information that provided by open book accounting technique.

1- Introduction:

Open book accounting (OBA) is considered as a new way of thinking. It is one of the management accounting tools that emphasize the cost data disclosure between the supplier and the buyer. It enables the suppliers to contribute to designing and redesigning the product to improve its quality and function. Applying open book accounting gives the management the opportunity to discuss the competitive advantages through providing competitive prices and quick delivery of the product. Competitive advantage is what distinguish an institution from another. It represents the methods and techniques that used by the institution's managers to add more value to its customers than the competitors by offering the same service or product with less price.

Production cost is the amounts paid by the institution in exchange of having goods or services. On the other hand, reduction in production cost is minimizing cost through paying less to receive goods or services that is used in production.

2- The study problem:

Companies in the industrial sector in Sudan complain about the high cost of production, which leads to an increase in the prices of goods and products and then reduces their competitiveness. One of the solutions available to these companies is to adopt the open books accounting strategy. The problem of the study is represented in the misunderstanding of OBA concept which focuses on cost data disclosure. some companies believe that sharing cost information with the buyer can affect negatively in the product price and quality. Hence, the study problem can be formulated in the following questions:

- a. what are the effects of using the technique of open books accounting on the production cost in the industrial companies in the Sudan?
- b. what are the effects of using the technique of open books accounting on the competitive advantage of the industrial companies in the Sudan?

3- The study hypotheses:

To answer the questions of the study problem, the study tests the validity of the following hypotheses:

- a. There is a statistically significant relationship between using the open book accounting technique and the reduction of production cost?
- b. There is a statistically significant relationship between using the open book accounting technique and enhancing competitive advantage.

4- The importance of the study:

This study examines the relationship between Open Book Accounting on one hand and Production Cost and Competitive Advantage on the other hand. The study focuses on analyzing one of the Open Book Accounting dimensions represented in cost information sharing and their impact on production cost and competitive advantage. This study helps in organizing the events that take place in industrial sector which leads to enhance the competitive advantage between supply chains.

5- The study methodology:

The study followed the deductive approach in formulating the problem, hypotheses, and study dimensions. The inductive approach was applied in testing the hypotheses of the study whereas, the descriptive analytical approach was applied in the field study and the historical approach was taken into consideration to apply previous relevant studies. Primary data were collected through the questionnaire form various companies placed in Khartoum city during the year 2018, while the secondary data sources were books, references, periodicals, and university theses.

6- Literature review:

Wuoristo and Tuomas (2009) study aimed to collect more empirical data on adopting open book accounting strategy in the context of a mechanical engineering network. They found that the adoption of Open book accounting is a suitable strategy in ensuring the successfulness of the network in mechanical engineering. More precisely, it is a way to ensure a competitive position in the defense industry. Suomala, et.al (2010) found that the use of open book accounting (OBA) can mitigate the component's price increasing pressures and, thus, controlling the costs of the end product in hybrids resembling market conditions very much. Moeller and Windolph (2011) study hypothesize that the implementation of open book accounting can be influenced by trust and commitment as relational factors. They found that while supplier's commitment enhances disclosure of cost data, buyer's commitment is a key enabler for managing the inter-organizational cost. Hussein (2014) Study aimed to analyze the relation between internal auditing and the integration between Lean Accounting and Open Book Accounting. He found that there is a positive correlation between the integration between Lean Accounting and Open Book Accounting that contribute to developing the strategic role of internal auditing to add value to the organization. Daniel Ellstrom (2015) study explored the open book accounting policy with fixed returns in the context of an outsourcing implementation. He concluded that OBA policy with fixed returns can exist despite low confidence in initial efficiency, and that only one party may achieve a benefit from adopting this policy. Samar Mohammed (2018) found that using Open Book Accounting has an important role in determining cost factor that is used to help in reducing cost and concentrate on activities that add value to suppliers. (Sajadvafaei, et.al, 2019) study investigates the influence of innovation and sustainable process management on the relationship between sustainable supply chain management and sustainable competitive advantage. A positive and significant relationship between sustainable supply chain management and sustainable competitive advantage is noticed.

Furthermore, the study also concluded that the variables (innovation and sustainable process management) have a moderating influence on the relationship between sustainable supply chain and sustainable competitive advantage.

7- Theoretical frame:

7-1 Open book accounting:

Open book accounting is a method for introducing transparent processes that provide the basis for clients to create collaborative working arrangements with their contracting partners. It has been also described as “the systematic disclosure of cost information between legally independent business partners beyond corporate borders” (Hoffjan & Kruse, 2006)

(Romano, P., & Formentini, M 2012) has Defined (OBA) as disclosing cost and other data that can be provided by an accounting system through supply chain members. (Mouritsen et al, 2001) described (OBA) as a strategy lead to further cooperation between companies in supply chain and support mutual confidence and commitment which would assist in providing information that could change the flow of products and services between supply chain companies.

According to (Caglio, A., Ditillo, A., 2008) (OBA) is a way to exchange systematically the information of management accounting between legally independent trading partners outside the boundaries of the company and that it held confidentially. while (Yosra & Assad 2018) argued that (OBA) is a managerial accounting technique that disclose cost data between supply chain participating partner which leads to organizing the accounting relationship between them. (Lara Cristina and Welington, 2018) manifested that OBA is an information sharing process between contracting parties to facilitate the process of managing the production cost.

According to Authors (OBA) is a trust-based relationship whereby the supplier discloses his cost data to the buyer to attract more customers and enhance its competitive advantage.

7-2 The need for an OBA implementation model:

To implement OBA successfully, certain factors must be taken in consideration jointly: balance of power between buyer and supplier (customer dominant vs. supplier dominant context). Mutual trust between buyer and supplier (adequate vs. non-adequate) while trust is an essential component for OBA particularly in transactions characterized by committed and long-term-oriented exchange arrangements except in transactional relationships, where the buyer and supplier play “adversarial” roles, trust is less important, as a buyer can more aggressively make the supplier open its books by leveraging contractual power. (Kulmala, 2004).

Kajüter and Kulmala (2005) also developed key aspects in OBA implementation, such as partner selection and motivation. This notion is built upon cost data disclosure which is difficult for the buyer to achieve. Therefore the buyer seeks to motivate the supplier

to reveal cost data using many methods such as compensating the supplier when there is fluctuation in prices and provide technical support for the supplier.

Cost disclosure was the mainstay for open book accounting application whereby the suppliers reveal their cost to the buyers following trust and contractual relationship. Cost disclosures clarify the strength of the financial position of the supplier and its ability to pay liabilities as well as reducing total cost for the final product in business networks. (HarriKulmala, 2002).

7-3 Joint cooperation for cost management:

Companies needs for external exchanges of goods and services has increased to 60-70% recently due business complexity, therefor it turned to collaboration with suppliers to concentrate on its main operation. To ensure the cooperation success, companies would rather use open book accounting technique as it provides modern methods for cost management and control over the resources. (Cullen et al, 1999).

7-4 Advantages and limitations of open book accounting to buyer and supplier:

The advantages of initiating (OBA) system to the buyer are to obtain the supplier accounting records as well as obtaining elaborate cost information. In addition to detect any cost inconsistencies or potential waste by conducting an early inspection and forensic investigation that could resolve items disputed which leads to cost reduction. It also gives the buyer the Opportunity to assist the supplier in operational decisions. (Meynardie&Nagorzanski, 2012)

The advantages of (OBA) to the supplier is Cost savings advantage that could result from elaborating with other parties that would otherwise go unnoticed. Open book accounting use detection audit that conducted during the operational process which contribute to eliminating of any end-of-project audit and help in resolution of disputed items. The technical support that can be provided be the buyer and insight into the buyer incentives/motivations. (Meynardie&Nagorzanski, 2012)

The limitations of having an open book accounting system are the lack of business network awareness of the importance of coordination and full cooperation between the contributed parties in supply chain. (Melvor, 2001) The supplier is reluctant to reveal his cost information specially when there are no attractive returns in addition to his concern about Opportunistic Behavior of the buyers. Information asymmetries leads to a gap between the types of information required by the buyer and that information provided by the supplier. The failure of one of the supply chain suppliers in providing materials to the rest of the chain reflect the failure of open book accounting. (Kajuter,2002)

According to the authors, the limitation of (OBA) system is the lack to trust between the buyer and supplier and the adversity of accounting methods and principles used in the supply chain.

7-5 Cost reduction:

As stated by W.M. Baker (1995) “the increasing complexity of economic activity as well as its variety are increasingly requiring an effective management of resources. In this context, cost management tools play an important role”.

One definition of the cost is that it is the total expenses of the enterprise that must be paid to produce the product or render the services. The cost is usually measured by the amount paid to acquire goods or services. An actual cost is the cost incurred and it can be referred to as historical cost, whereby a budgeted cost is a future cost. (Novák, P., et al., 2017).

On the other hand, cost reduction can be defined as reducing the total amount of money that should be paid to creditor or supplier. The cost reduction does not mean reducing the quantity or the quality manufactured, it means eliminate the activities that does not add value. (Eljaber, 1997). Furthermore, cost reduction is defined as receiving greater benefit from the exact resource or to acquire the same benefit with less resources. (Mohammed, 1998)

Cost can be classified according to its behavior into variable cost which changes in total with the change of activity or volume respectively. despite wide changes in the related level of total activity or volume, a fixed cost remains unchanged in total for a given period. (Charles T. Horngren, 2012). Another classification of cost is controllable and non-controllable costs, a manager can influence a controllable cost but cannot influence a non-controllable cost. This type of cost is used to evaluate manager performance. (James Jambalvo, 2016).

Moreover, cost can be assigned its objects as direct and indirect cost. In manufacturing companies this classification is known as direct material, direct labor and manufacturing overhead. Nonmanufacturing companies refer to it as selling cost and administrative cost. For making decisions cost is divided into differential cost which represent the different between any two alternatives and future revenue that differs between any two alternatives is known as differential revenue. (Ray H. Garrison, et al., 2018)

The types of costs in industrial sector can be material cost which includes raw material, sub material. Labor cost it represent wages, salaries, allowances, and social costs. Depreciation such as equipment, building and cars depreciation or any other fixed assets. Interest on borrowed capital. Other cost such as maintenance, taxes and other governmental fees, insurance, advertisement, and other administrative costs (Drury, 2000).

Open book accounting seeks to reduce cost; thus, it coordinates between buyer and supplier to minimize cost by reducing Manufacturing cost in production stage. Reduce costs in developing product stage. Provide communication link between buyer and supplier. Provide accurate and timely data. Eliminate activities that does not add value to the product, (Cooper, 1998). According to authors prospective revealing cost data is essential pillar in applying (OBA) because it insures cost reduction through allocating cost driver. It also assists suppliers in creation and innovation.

7-6 Competitive advantage:

The complexity of business and the intensity of competition has pushed firms to follow a non-traditional path in management. Competitive advantage is a crucial notion because it

represents the goal that all business organizations seek to achieve and maintain (Hung et al., 2010).

(Porter, 1985) suggested cost leadership, differentiation, and cost focus as competitive strategies. Furthermore, he believed that making value to customers and treating them better than other firms is a step toward competitive advantage. Firms attract customer by offering a valuable product, only then the customers will be willing to pay in exchange of obtaining the product. (Slater, 1997).

By competitive advantage, companies distinguish itself against competitors (Li et al., 2006). Competitive advantage is related to unique resources and competencies lacked by competitors and leads to a performance better than that of competitors (Sadri and Lees, 2001). In order the firms to accomplish a distinguish position in the market more than their competitors, one factor they resort to is the competitive advantage and it is accomplished when the buyer has a more perceptive value for a product compared to other products. Sustainable competitive advantage is accomplished when other competitors can slowly or with difficulty imitate this value (Li & Toppinen, 2011). A study was conducted by UY (2014) manifested that the revenues and profits are not the only measure for competitive advantage, there are also the ways by which the firms can reduce its costs.

(OBA) is applicable in supply chain. This concept depends mainly on information exchange for cost reduction and competitive advantage purposes. (OBA) achieve competitive advantages by providing a lower price which can be easily managed by cooperation between supply chain parties, (Cooper & Slagmulder, 1999). Information flow through supply chain assist in manufacturing process by controlling product feature and description, maintaining balance between price, quality, and performance, providing distinguished product that meets customer expectations, (Cooper, & Yoshikawaba, 1994) and (Reddy, 1991).

According to authors competitive advantage represent manufacturing the product with a lower cost, a high quality, intensive advertising and rendering an outstanding post-sales service.

8- Data analysis:

The study population is represented in industrial companies which located in Khartoum city, Sudan. The study used the purposive sample technique to obtain specific opinions and data that can only be obtained from the intended group. 200 elements were chosen from the population as study sample and the questionnaire was distributed to all selected sample. the respondents completed and returned 170 valid questionnaires. The response rate was 85%. Then SPSS software was used to obtain the results using simple linear regression to examine the effect of independent variables on the dependent variable. The Alpha Cronbach coefficient was used to test the internal statistical reliability and consistency.

Table (1) Alpha Cronbach test for the hypotheses

Scales Validity	Cronbach alpha value
Overall Scale	0.941

Study Variables	0.965
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The results of the reliability test show that the values of the alpha Cronbach for all hypotheses are greater than 80% and these values mean that a very high degree of "internal consistency" existed for questionnaire and hypotheses either for each separately or collectively. It can be said that the measures that this study relied upon have internal consistency and gives confidence to proceed for testing of hypotheses.

8-1 the role of the open book accounting in enhancing competitive advantage:

This part provides analysis of respondents' perception about the role of the open book accounting in enhancing competitive advantage.

Table (2)The Means and Standard deviations for the Statements related to the Competitive advantage.

No.	Item (statements)	mean	Standard deviation	Degree of agreement
Cost reduction:				
1	Providing information that helps in reducing storage costs	4.5	0.91	Very high
2	Providing information that helps in reducing the administrative costs of the firm.	4.2	0.87	Very high
3	Assisting management in treating the wasted and damaged production.	4.1	0.90	Very high
4	Assisting in the cost control process.	4.1	0.90	Very high
Products Quality:				
5	Taking in consideration the level of quality in designing products according to the target market	4.0	0.92	Very high
6	Achieving the required flexibility in pursuing appropriate production policies	4.0	0.76	Very high
7	Reducing defective and damaged units.	4.1	0.74	Very high
8	Increasing product quality by boosting research and development costs	4.1	0.75	Very high
Delivery time:				
9	Making timely delivery	4.1	0.75	Very high
10	Raising the efficiency of products distribution	4.1	0.78	Very high
11	Increasing the market share of the enterprise by using advanced information systems	4.0	0.81	Very high
12	Adherence to specific timetables in dealing with customers	4.1	0.86	Very high

Source: prepared by the researchers according to the field study (2018)

Table (2) above reports the responses of the study sample about (regarding) the statements related to the competitive advantage. As demonstrated by the table, the highest

value of the mean is 4.5 and the lowest is 4.0, which indicate a very high degree of agreement to all statements in the table, looking again at the table shown earlier, the highest value of the standard deviation is 0.92 and the lowest is 0.74, This decrease in the standard deviation of all statements indicates a low variance in the opinions of the study sample, the table shows also that the value of the standard deviation is less than one which indicate a low dispersion in the response of the study sample members , and hence the consistency and convergence of their answers.

8-2 The nature of the production cost:

The following table shows analysis of the opinions of the study sample on the nature of the production cost.

Table (3) The Means and Standard deviations for the Statements related to the Production cost:

No.	Item (statement)	mean	Standard deviation	Degree of agreement
1- Direct costs:				
1	The cost of produced unit may change with the changes in volume of production.	4.7	0.59	Very high
1	The cost of produced unit is the minimum limit of products pricing.	4.2	0.65	Very high
3	It reduces the cost of inventory carried forward to future periods.	4.1	0.74	Very high
4	Direct costs neglect the importance of indirect marketing costs.	4.1	0.72	Very high
5	it directly Affects the production process.	4.2	0.81	Very high
6	It can be tracked based on the manufacturing process	4.1	0.72	Very high
2- Indirect cost				
7	It remains constant as the volume of activity changes.	4.0	0.76	Very high
8	It identifies and quantifies what was really spent in each center.	3.9	0.77	high
9	It can be clearly and directly traced (tracked).	4.0	0.82	Very high
19	it contributes to the production process indirectly.	4.2	0.69	Very high
11	it is difficult to be allocated to products.	4.1	0.89	Very high
12	it disrupts the production processes in the organization.	4.2	0.72	Very high

Source: prepared by the researchers according to the field study (2018)

As par table (3) above, the respondents either strongly agree or agree with all the statements shown in the table concerning the production cost (direct and indirect), this can be drawn from the mean values ranging between 4.7 and 3.9. the statement No.1 (The cost of produced unit may change with the changes in volume of production.) came first with a mean of 4.7 and the statements No.8 (It identifies and quantifies what was really spent in each center) came last with a mean of 3.9. the table also illustrates a low value of standard deviation for all the statements which ranging between 0.89 and 0.59. the low standard

deviation for all statements indicates a low variance in the opinion of the respondents. the table shows also that the value of the standard deviation is less than one which indicates a low dispersion in the perception of the respondents, and hence the consistency and convergence of their answers.

8-3 the supplier disclosure of the cost data as a dimension of OBA:

This part of the study illustrates the descriptive analysis of the perception of the respondents regarding the supplier disclosure of the cost data as a dimension of OBA.

Table (4) The Means and Standard deviations for the Statements related to the disclosure of cost data

NO.	Item (statements)	mean	Standard deviation	Degree of agreement
1	It shows the strength of the firm's financial position compared to competitors	4.5	0.96	Very high
2	it Includes the disclosure of cost structures and drivers for each product	4.3	0.88	Very high
3	It shows the technical capabilities and the economic stability of the firm to other party.	4.2	0.97	Very high
4	It describes the strategy used, research and development of the firm to the other party.	4.0	0.86	Very high
5	existence of widespread feedback between the parties involved	4.0	0.86	Very high
6	Optimizing production costs and developing manufacturing processes	4.0	0.88	Very high
7	Achieving a reasonable price for the participant parties.	3.9	0.94	high
8	Building high-efficiency and advanced accounting systems.	3.9	0.94	high
9	It Includes the disclosure of direct and indirect industrial costs.	4.0	0.91	Very high
10	Using modern methods such as value engineering and target cost.	4.1	0.85	Very high
11	Developing knowledge about supply in the market and following up the supplier closely.	4.1	0.83	Very high
12	It includes the disclosure of expectations about future price cuts	4.1	0.79	Very high
13	It includes disclosure of detailed data of production processes.	4.1	0.84	Very high

Source: prepared by the researchers according to the field study (2018)

Table (4) above presents the perception of the respondents in the study sample about the statements regarding the disclosures of cost data, as shown from the table, the respondents gave either very high or high degree of agreement, this evident from the mean values ringing between 4.5 and 3.9. the statements No.1 (It shows the strength of the firm's

financial position compared to competitors) came first with a mean of 4.5, whereas the statements No.7 (Achieving a reasonable price for the participant parties) and No.8 (Building high-efficiency and advanced accounting systems) came last with mean of 3.9. as can be noticed, the table reflect a low value of standard deviation for all statements ranging between 0.97 and 0.83. the decrease in the standard deviation of all statements indicates a low variance in the opinions of the study sample, the table shows also that the value of the standard deviation is less than one which indicates a low dispersion in the response of the study sample members, and hence the consistency and convergence of their answers.

8-4 Hypotheses testing and explanation:

Testing the First hypothesis:

The simple linear regression model was used to measure the effect of the open book accounting on competitive advantage. The open book accounting represents the independent variable (X) whereas, the competitive advantage is the dependent variable (Y₁) as shown in the following table (5):

Table (5) Simple linear regression analysis of the first hypothesis

DESCRIPTION	Regression coefficients	t-test	Significance Test	Results
$\hat{\beta}_0$	-0.411	-1.563	0.120	Not Accepted
$\hat{\beta}_1$	1.079	17.500	0.000	Accepted
Correlation coefficient (R)	0.804			
Coefficient of determination (R ²)	0.646			
F-test	306.266	Results are significant		
$Y_1 = -0.411 + 1.079X$				

Source: prepared by the researchers according to the field study (2018)

The results of table (5) above can be expressed as follows:

- The results showed that there was a strong direct correlation between the open book accounting as an independent variable and competitive advantage as a dependent variable where the value of the simple correlation coefficient is found as (0.804).
- The value of the coefficient of determination calculated as 0.646, and this value indicates that open book accounting as an independent variable has an effect of 64.6% on competitive advantage (dependent variable).
- The simple regression model was significant as the value of F-test was (306.266), which is accepted at significance level (0.000).
- $\hat{\beta}_0 = 0.411$ shows the average of competitive advantage when open book accounting is equal to zero.

- $\hat{\beta}_1=1.079$ indicates that if open book accounting increase by one unit the competitive advantage will increase by 64.6%.

From the above, we can conclude that the first hypothesis is accepted, which states that: "There is a statistically significant relationship between open book accounting and competitive advantage".

8-5 Testing the second hypothesis:

The simple linear regression model was used to measure the effect of open book accounting on production cost. The open book accounting represents the independent variable (X) whereas, the production cost represents the dependent variable (Y₂) as shown in the following table (6):

Table (6) : Simple linear regression analysis of the second hypothesis

DESCRIPTION	Regression coefficients	t-test	Significance Test	Results
$\hat{\beta}_0$	0.829	3.226	0.002	Accepted
$\hat{\beta}_1$	0.795	13.196	0.000	Accepted
Correlation coefficient (R)	0.713			
Coefficient of determination(R ²)	0.509			
F-test	174.124	Results are significant		
$Y_2 = 0.829 + 0.795X$				

Source: prepared by the researchers according to the field study (2018)

The results in table (6) above can be explained as follows:

- The results shows that there is a strong direct correlation between the open book accounting as an independent variable and production cost as a dependent variable where the value of the simple correlation coefficient is found as (0.713).
- The value of the coefficient of determination calculated as 0.509, and this value indicates that the open book accounting as an independent variable has an effect of 50.9% on production cost (dependent variable).
- The simple regression model is significant as the F-test value was (174.124), which is accepted at significance level (0.000).
- $\hat{\beta}_0=0.829$ indicates the average of production cost when open book accounting is equal to zero.
- $\hat{\beta}_1=0.795$ indicates that if the open book accounting increase by one unit, the production cost will increase by 50.9%.

From the above, we can conclude that the second hypothesis is also accepted, which states that: "There is a statistically significant relationship between open book accounting and reducing production cost".

9- Conclusion:

The study concluded that applying open book accounting techniques with providing a high-quality product leads to satisfy the current customers and attract new potential ones, the suppliers are encouraged to disclose cost data through joint policies between buyer and supplier which leads to support the competitive advantage taking into account the availability of the trust between the buyers and suppliers to ensure that the data provided will not be used in harming the contributed parties which assists in achieving competitive advantage. On the other hand, open book accounting reduces activities costs through classifying them into activities that add value and do not add, and then eliminate those which do not add value. Also, it assists in reducing cost by disclosing cost structures and drivers for each product and developing product manufacturing process. again, the trust between buyers and suppliers contributes to reducing costs through providing technical support to the supplier. The study recommended that it is necessary to encourage the supplier to disclose his cost data by providing appropriate environment to examine and study the available opportunities and, accordingly, compensate him when raw material prices fluctuate. Moreover, the suppliers must use the modern technology to facilitate the process of managing and controlling costs, also it is of high importance to build up a joint team which include members from buyer and supplier to manage costs and develop product according to the information that provided by open book accounting technique, and to employ competent employees who are able to create new product, develop and innovate an existing product. eventually, the open book accounting culture should be spread in industrial and service sector to ensure achieving competitive advantage through providing a high-quality product with minimum cost.

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