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DRIVERS OF GREEN SUPPLY CHAIN INITIATIVES AND THEIR IMPACT ON ECONOMIC PERFORMANCE OF FIRMS: EVIDENCE FROM PAKISTAN'S MANUFACTURING SECTOR

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Abstract

The adoption and implementation of green supply chain management (GSCM) initiatives within an organization have been claimed to create specific ecological, competitiveness and monetary benefits. This study explores the drivers of GSCM initiatives and their effect on the economic performance of manufacturing companies in three sectors (textile, chemical, and pharmaceutical) of Pakistan's economy. The three driver social pressure, competitive pressure, and institutional pressure were chosen as the enablers of GSCM initiatives in Pakistan's manufacturing sector. The data was collected through a questionnaire distributed among managerial level employees working in the manufacturing industry of Pakistan. The study was based on the evaluation of 263 responses through partial least squares structural equation modeling (PLS-SEM) method. The results show that institutional pressures are the most significant enablers towards competitiveness and instituting GSCM initiatives, while social pressures and competitive pressures also have a substantial impact. The effect of GSCM initiatives on firm competitiveness and economic performance was also analyzed and found to be significant. The presented results may be seen as useful for managers, practitioners and policy makers, as well as for society in general in various ways.

Keywords: manufacturing firms, green supply chain initiatives, firm competitiveness, firm performance
JEL Classification: L00, L60, L25

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1. INTRODUCTION

A supply chain involves various parties, e.g. suppliers, manufacturers, distributors, wholesalers, retailers, and customers. These parties are involved directly or indirectly in the production process as well as in delivering finished products to the final users in downstream and upstream distribution (Mentzer, 2001).

It is a well-known fact that business activities can influence the environment significantly in terms of discarded packaging materials, carbon monoxide emissions, scuffled toxic substances,

circulation congestion and other forms of manufacturing waste (Wisner et al., 2012). The concept of GSCM links environmental concerns to supply chain management concepts with the objective of dealing with problems of the industrial sector which create environmental pollution. The main aim of GSCM is to minimalize or eradicate wastages such as emanations, energy and solid waste as well as hazardous chemicals. GSCM also seeks to influence issues such as product design, the manufacturing process, selection of materials, transportation choices of raw materials and the finished goods themselves.

During the past 10 years many researchers have started to investigate the impact of the different phases of the supply chain on the environment (Younis et al., 2016; Fayezi et al., 2018). In the literature, however, only a limited number of studies have been published investigating the impact of GSCM practices on the social, environmental and economic dimensions of sustainability, and relatively few studies have examined the impact of GSCM on economic performance (Castillo et al., 2018). There is a clear research gap in developing countries, as studies conducted on the relationship between GSCM and firm performance have been conducted mostly in developed countries (Geng et al., 2017). According to Rao (2019), GSCM should be considered as a strategic resource that can increase firm performance.

Since the 1990s, when the so-called "great competition era" started, increasing awareness of the implications of green practices have compelled companies to act in an ethical and socially accountable way in their supply chain activities (Diabat & Govindan, 2011). In the period from 1995 till 2010, considerable attention was devoted to GSCM by the scholars around the world (Garg et al., 2014).

Generally, a supply chain has five stages: suppliers of raw materials, manufacturers, distributors, retailers, and customers. These parties are connected through the flow of information, money, and products. The complications involved in these various pathways make it difficult to manage supply chain networks, as many sub-systems, relationships, activities and processes are involved (Chopra & Meindl, 2007). According to Chandra & Kumar (2000), GSCM practices include a set of green activities in the value chain beginning from manufacturing and continuing to the distribution of finished products.

2. THEORETICAL BACKGROUND

The increasing literature sources related to GSCM reflects the fact that researchers and practitioners have begun to understand that programs related to environment management should not end within the boundaries of a firm (Zhu et al., 2005). Many researchers have discussed the relationship between corporate environmental management and practical operations (Angell & Klassen, 1999; Geyer & Jackson, 2004; Melnyk, 2003; Sarkis, 2001). GSCM is strongly related to inter-organizational environmental fields such as industrial ecology, industrial economics, extended manufacturer responsibility, product lifecycle analysis and product stewardship. Questions of GSCM also fall within the issues of ethics and sustainability, with researchers increasingly investigating these "triple bottom-line" issues (Carter et al., 2000; Zaklad et al., 2004).

Even as recently as two decades ago, there was not much discussion in scholarly or manufacturing circles on the relationship between environmental practices and corporate performance.

Pursuing environmental goals was seen as possibly reducing the profit of owners, thus was not taken as a good business strategy. At that time, conventional wisdom prevailed that any investment which does not generate a direct cash return is a kind of penalty in the form of a higher cost of production and a longer lead time, which was seen to lead to reduced profits for the real shareholders (Melnyk, 2003).

In 1991, Porter confronted these traditional opinions, forming arguments that increased the awareness of the fact that cost-effectiveness and pollution reduction were not mutually exclusive goals. Porter and those who pursued these arguments theoretically and practically eventually began to induce a shift in the attitude of producers towards acknowledging their responsibility to pursue more ecofriendly practices, which could also increase profits (Porter, 1991).

Since then, many research studies have been published in this field. Holt & Ghobadian (2009) studied the UK manufacturing sector and its efforts towards "greening" the supply chain. Researchers have also explored the powerful forces behind inducing environmental-friendly behavior, organizational practices and their results, as well as the specific relationships between all stakeholders involved. Hu & Hsu (2006) explored the critical factors in the implementation of GSCM practices in Taiwan, with the focus of their research examining the electrical and electronics industries. Hu & Hsu determined twenty critical factors, dividing them into four dimensions (organizational involvement, supplier management, product recycling and product lifecycle management)

According to Trowbridge (2006), differences exist between internal and external drivers for the implementation of GSCM at chip manufacturing firms, with internal drivers more focused on the improvement of risk management due to potential interruptions in the supply chain. Collaboration with suppliers also plays an important role in the search for alternative resources of material and equipment that minimize environmental impacts. External drivers are investors, governmental bodies, non-governmental organizations, customers and the society at large. A study conducted by Rao (2007) on SMEs in the Philippines provides an insight into the management of greening supply chain initiatives on Filipino manufacturing firms and how they generically handle environmental matters. Reinhardt (1998) found that environmental quality can be improved with the help of government regulations. The environment is a public good and the biggest stakeholder is society, whereas organizations will only spend enough money for them to accomplish their economic goals, as these investments will not increase their profits in the short run. According to this logic, green practices should not be a matter of choice but a requirement of law.

Lee & Rhee (2007) explain four types of ecofriendly strategies: "reactive, focused, opportunistic and proactive." According to this study, reactive strategies deal with a low level of ecofriendly responsiveness, focused strategies deal with a high level of ecofriendly management, opportunistic strategies are applied at a medium level, and proactive strategies deal with the latest environmental practices. Hervani et al. (2005) found more than 40 different metrics to measure the performance of a company regarding its environmental management practices, e.g. management of air emissions, energy recovery, recycling, etc.

A five-stage Environmental Management System (EMS) was proposed by Pun et al. (2002) after investigating the critical factors and processes that affect EMS. The proposed stages start

with strategy formulation, continue with implementation, and end with the evaluation of results. Holt et al. (2001) found 7 categories of GSC initiatives for improving an organization's environmental performance. The types include trade associations, partnership groups, business support organizations, individual firms, non-profit green business support organizations, green business clubs, and the government at large. Bowe et al. (2001) studied the application of green supply chain initiatives, determining that two types are critical: product based and process based. These researchers also examined the association between supply management capabilities and green supply practices.

Diabat & Govindan (2011) studied an Indian manufacturing firm that produces aluminum products in southern India, concluding that three critical factors are involved in achieving the successful implementation of GSCM practices, i.e. government regulations, legislation, and reverse logistics. According to their findings, these factors are essential to accomplish the collaboration between suppliers and product designers to reduce product environmental impacts, a process which in turn can help a firm to achieve GSCM certification of a supplier's environmental management system.

Customers and the society at large are the primary stakeholders of a supply chain. Social pressure ranks among the most important factors in forcing any recalcitrant organization to reduce harmful activities in their operations (Freeman, 2010). According to Harms et al. (2013) social pressure plays a decisive role in adopting green supply chain initiatives. It is a well-known fact that a strong customer relationship brings financial benefits to an organization. Further, Zhu et al. (2008) found that competitive pressure also enhances green supply chain initiatives and ultimately firm performance. The results of an empirical study conducted by Geffen & Rothenberg (2000) found that the coordination and collaboration with suppliers and customers result in better environmental and economic performance. Corporate social responsibility and transparency about eco-friendly measures can motivate customers and competitors to take part in environment-friendly initiatives (Vaccaro & Echeverri, 2010).

According to Yildiz & Sezen (2019), green marketing activities offer substantial opportunities for companies that want to connect themselves with different segments of society, especially target consumers, whereas some firms only try to achieve this by greening their advertisements. Many firms which spend an additional cost to show their sensitivity to the environment fail to achieve the desired results because of poor communication to the audience, i.e. society at large. Firms which are sensitive to the environment should express the situation in a better way through a persuasive communication to benefit more effectively.

3. RESEARCH OBJECTIVE, METHODOLOGY AND DATA

There are two objectives of this research study. First, to comprehend the understating of manufacturing firms in three sectors (textile, chemical and pharmaceuticals) of Pakistan's economy regarding GSCM practices. Second, what the forces that motivate these firms to adopt GSCM practices in Pakistan are.

Pakistan, as being a developing country, is facing issues of environmental pollution. With the industrialization in the country, the problems related to environmental hazards seem more criti-

cal and threatening. In 1999, US-AEP published a study. According to their findings, majority of the world's manufacturing activities will be carried out in Asia in the next two decades. A recent launch of the project called: China-Pakistan Economic Corridor (CPEC), where China is building an economic corridor starting from China to Gwadar Pakistan, will bring 63 billion USD investment in Pakistan. The passage includes different projects, i.e. highways, railways, commercial and industrial zones, etc. These economic opportunities will bring new concerns about environmental pollution. The role of GSCM will be critical in the future to deal with such matters.

Pakistan is not self-sufficient to deal with environmental issues caused by industrial production. Textile, cement, sugar and chemical sectors are the major contributors of industrial pollution. A suitable development of GSCM ideas and practices may certainly help developing nations, by reducing the ecofriendly problems of both manufacturing and discarding of products, while improving their financial position (Zhu et al., 2007). To achieve the above that need objectives, following hypotheses are proposed.

H1: Social pressure is positively correlated with the GSCMI in a firm.

H1a: Social pressure is positively correlated with the economic performance of a firm.

H2: Competitive pressure is positively correlated with the GSCMI in a firm.

H2a: Competitive pressure is positively correlated with the economic performance of a firm.

H3: Institutional pressure is positively correlated with the GSCMI in a firm.

H3a: Institutional pressure is positively correlated with the economic performance of a firm.

H4: GSCMI are positively correlated with the economic performance of a firm.

In Figure 1, the proposed model of this study is presented. There are three independent variables in this study: social pressure (SP), competitive pressure (CP) and institutional pressure (IP). There is one-second order formative construct: green supply chain management initiatives and economic performance (EP) are taken as dependent variables.

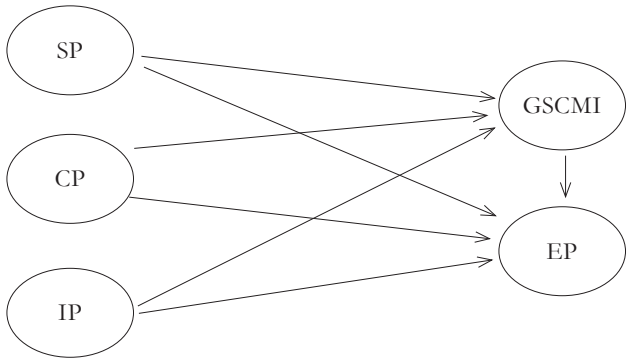

Fig. 1 – A proposed research model. Source: own research

To test the proposed hypotheses, the research instrument was adapted from the study developed by Zhu et al. (2005). The instrument measures the institutional pressure, social pressure and competitive pressure using five points Likert scale where 1= very unimportant to 5= very important. GSCM initiatives are also measures using five points Likert scale where 1= not considered for implication to 5= fully implement. Finally, economic performance was also measured on five-point Likert scale where 1= no improvement to 5= highest improvement.

After refining the items, the questionnaire was translated into the Urdu language which is the national language of Pakistan. This was done to make sure that all respondents fully understand the questions and they are on the same page while responding. It was also ensured that the meanings of all versions of the questionnaire are same as in the English version. Some changes in the scales were made to match the Pakistani context. Before the large-scale data collection, pilot testing was conducted to improve the measurement items. The pilot test was carried out with 30 experts in the field, ten part-time MBA students at the National University of Modern Languages, Islamabad, Pakistan, who were working in the manufacturing sector of Pakistan and remain full-time practitioners in the field of supply chain. Another 20 participants in pilot testing were senior executives working in the field of supply chain and operations management in manufacturing sectors of Pakistan. The respondents were requested to indicate their response on a five-point Likert scale questionnaire, the extent to which they agree or disagree with the items. In addition to their response, each respondent was requested to give their suggestions at the end of questionnaire regarding further improvement of the content and structure of the survey. Pilot testing resulted in some minor improvements in the wording and several minor editorial issues related to the format of the questionnaire.

Data for this research is collected from three different manufacturing sectors of Pakistan's economy including textile, chemical, and pharmaceutical. These sectors are selected since they are primary contributors of GDP in Pakistan's economy. Textile sector contributes 8.5%, chemical sector 3.2% and pharmaceutical contributes 1.5% in Pakistan's economy (economic survey of Pakistan 2017-2018). The impact of these three industries on environmental conditions and green environmental initiatives is also high. The contact details of companies working in these sectors were taken from the ministry of commerce and industries. A data collection agency was hired to collect the data from the target population. Clear guidelines were given to the agency to increase the response rate. Data collection started in June 2018, and it ended up in the middle of September 2018. The list of companies which were sourced from the ministry of commerce and industries were handed over to the data collection agency. Each potential respondent company was mailed a questionnaire together with a personalized cover letter requesting them to participate in this study. The data collection agency contacted the respondent firms by telephone as a follow up on the mailed questionnaire. To encourage accurate responses and to increase the overall response rate, each potential respondent was promised a copy of the survey results. A total of 800 questionnaires were mailed, out of which 300 were returned; 260 were returned from the first mailing while 40 were received from the second wave. After analyzing the state of completion of the returned questionnaires, 37 were found unusable because of significant data being missing or incomplete. The remaining usable 263 responses represented 32.87% of the mailed questionnaires. The 32.87 % response rate can be considered a good response rate

considering the fact that in a country like Pakistan surveys are not a common practice to collect research data. Table 1 summaries the survey responses.

Tab. 1 – Summary of the Survey Responses. Source: own research

Total number of Questionnaires Sent	Questionnaires Returned	Usable Questionnaires	Rejected/ Incomplete	Response Rate
800	300	263	37	32.87%

Table 2 below shows the profile of the respondents. 80% of the respondents were middle level managers, as they have the best knowledge of management initiatives and their impact on the overall firm performance, thus their profiles most closely met the requirements for the respondents of this study.

Tab. 2– Management Profile of Respondents. Source: own research

Management Level	Frequency	Percentage
Senior Managers and Executives	25	8.33
Middle Level Managers	240	80
Other Professional	35	11.66

It is always advised to test the reliability and validity of an adapted construct. The reliability of a construct can be measured with the help of Cronbach's alpha and AVE. According to Bagozzi & Yi (1988) and Hair et al. (2012), composite reliability can be used as a replacement for Cronbach's alpha in the PLS-SEM model. Reliability was measured for all the indicators of each latent variable using the method and criteria proposed by Hair et al. (2012). A value of Cronbach's alpha more than 0.60 is acceptable for social sciences research, while a value of 0.70 should be considered good (Bagozzi & Yi, 1988). In addition, two more model-based estimates of reliability and validity are examined in this study, namely composite reliability, and average variance extracted (AVE) (Bollen, 1989). Composite reliability is used to measure the internal consistency of a set of measures, while AVE is used to calculate the amount of variance in the indicators accounted for by the latent construct. Table 3 confirms the validity and reliability of the construct used for this research. All indicators of the latent variable have factors loading above 0.70, which is the recommended value. Cronbach's alpha and AVE also show a level above the value recommended by Hair et al. (2012).

Tab. 3 –Validity & Reliability of the Construct. Source: own research

Latent Variable	Indicators	Factor Loadings	Cronbach's Alpha	Composite Reliability	AVE
Social Pressure	SP_1	0.80	.90	0.93	0.73
	SP_2	0.89			
	SP_3	0.84			
	SP_4	0.90			
	SP_5	0.88			

Competitor Pressure	CP_1	0.75	.85	0.83	0.70
	CP_2	0.71			
	CP_3	0.74			
	CP_4	0.68			
	CP_5	0.68			
Institutional Pressure	IP_1	0.84	.88	0.89	0.71
	IP_2	0.89			
	IP_3	0.78			
	IP_4	0.80			
GSCMI	GSC_1	0.90	.80	0.79	0.68
	GSC_2	0.89			
	GSC_3	0.76			
EP	EP_1	0.82	.78	0.76	0.66
	EP_2	0.80			
	EP_3	0.78			

4. RESULTS AND DISCUSSION

Partial Least Square Structural Equation Modeling (PLS-SEM) was used to test the model. PLS is a composite based technique which is considered suitable for testing a complex model even with a small sample size (Fornell & Larcker, 1981). PLS-Smart version 03 was used to check the validity and reliability of the construct of the present study as well as to test the main model hypotheses. Another benefit of using PLS-SEM is that it can handle non-normal data (Burnett et al., 2007).

The relationship between the independent and dependent variable was estimated through a structural model assessment. Path direction, beta coefficients, and R-square values were observed to identify the significant paths which finally led towards the acceptance of hypotheses (Peng & Lai, 2012). A path weighting scheme was run with default software settings with a stop criterion of (1x10-7) and a maximum of 300 iterations. To ensure the significance level of the path coefficients, an error probability of 5%, i.e. a 95% confidence interval was chosen.

Figure 2 presents the results of the structural model. According to the PLS method, the analysis does not directly provide confidence interval estimates and tests of significance. The value of R^2 and structural path's values provide a primary assessment of the predictive capacity of the model. R^2 values can be interpreted in the same way as those obtained for multiple regression analysis. For our study, Figure 2 indicates that three drivers, namely SP, CP, and IP, explain the 67 percent variance in GSCMI. Similarly, the total effect of SP, CP, IP, and GSCMI is 75 percent variance in the dependent variable of this research, which indicates the economic performance (EC) of a firm.

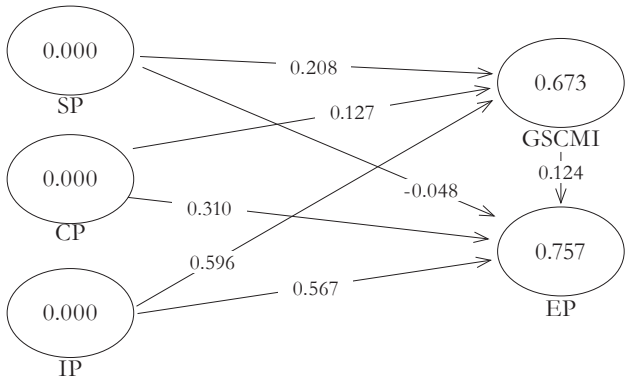

Fig. 2 – Standardized Regression Weights and Coefficients of Determination for the Proposed Research Model.

Table 4 summarizes the overall results of the proposed model by presenting the proposed hypotheses, the respective paths, the standardized regression coefficients of the paths, t-statistics and levels of significance, all listed in p-values. Seven specified paths were chosen in the research model representing the seven proposed hypotheses. Six specified paths showed a significant relationship, while only one path from SP to EP (path coefficient -0.48, t=1.10, p=0.12) was shown to be insignificant, thus not supported.

The path from SP to GSCMI (path coefficient=0.20, t=10.63, p=0.00), path from CP to GSCMI (path coefficient=0.12, t=6.98, p=0.00), path from IP to GSCMI (path coefficient=0.59, t=30.76, p=0.00), and path from IP to EP (path coefficient=0.56, t=23.00, p=0.00) are all positive and significant. This shows that institutional pressure IP is the main driver of GSCM initiatives and the economic performance of Pakistan's manufacturing sector.

Tab. 4 – Hypotheses Results. Source: own research

Regression Path	Standardized Coefficients Betas	T Statistics	P Values	Test Results
SP -> GSCMI	0.20*	10.63	0.00	Supported
CP -> GSCMI	0.12*	6.98	0.00	Supported
IP -> GSCMI	0.59*	30.76	0.00	Supported
SP -> EP	-0.048	1.10	0.12	Not Supported
CP-> EP	0.31*	14.97	0.00	Supported
IP -> EP	0.56*	23.00	0.00	Supported
GSCMI -> EP	0.12*	2.65	0.00	Supported

Figure 2 and Table 4 show the structural model with the results quantified through PLS- Smart. With the t-value <1.96 and significance level, p>.05, H1a is not supported in this model. All other hypotheses meet the statistical criteria of significance (t>1.96 and p<.05) and are accepted. The acceptance of H3 & H3a confirms that manufacturing firms in Pakistan initiate green supply chain initiatives when they have a fear of legal repercussions. Social pressure H1 also pushes

manufacturing firms to adopt green supply chain initiatives in their operations. The significant path (beta coefficient .12, t>1.96 and p<.05) between GSCMI and EP shows that the economic performance of manufacturing firms increases as they take on green supply chain initiatives.

The significant results regarding H4 also show that GSCMI has a positive impact on the economic performance of the industrial firms within the selected sectors. The primary target of environmental-related strategies is to minimize the adverse effects of production activities by reducing the use of harmful materials and waste reduction. These activities improve the image of firms in society as well as bring more business and profits. Empirical evidence is available in the literature showing how GSCM initiatives have had significant positive impacts on firm economic performance (Eltayeb & Zailani, 2009; Green Jr et al., 2012; Mitra & Datta, 2014).

In the field of GSCM, it is essential for academia as well as practitioners to seek ways to facilitate a higher level of economic performance, as this is the primary goal of any business organization. The implementation of GSCM practices should thus be taken on as a strategic goal by firms. In the short run, GSCM may not bring direct or immediate economic benefits for a firm because of the higher cost of implementation, however in the long run green supply chain initiatives help to lower overall manufacturing costs as well as to improve the overall image of the company and enhance positive associations with the brand names of its products or services (Green Jr et al., 2012).

5. CONCLUSIONS

The results of our study show that IP, SP, and CP are the drivers of GSCM initiatives in the manufacturing sector of Pakistan. Each of these three pressures has its own distinct and meaningful impact. The significant association between IP and GSCMI that was found implies that regulatory pressure is a vigorous force stimulating the manufacturing sector to adapt and improve internal green supply chain practices, an effect which is shown by the study's highest beta coefficient value of .59 among all three variables (IP, SP, and CP). These outcomes are in line with many studies conducted in developing and developed countries which have found that regulatory pressures are the most critical drivers towards the adoption of GSC practices (Eltayeb & Zailani, 2009; Hanim et al., 2012; Yu & Ramanathan, 2015; Zhu & Sarkis, 2004) .

The empirical results of this study, which should prove helpful for managers, policy makers and future researchers, are applicable in several different ways:

1. To aid the results guide managers of Pakistani manufacturing firms in understanding the different pressures that lead towards the initiatives of green supply chain management. These managers can also become acquainted with how much economic benefit can be achieved by adopting GSCM initiatives.
2. The significant relationship between GSCMI and EP of the firms should prove to be an encouraging sign for the managers. Managers can more readily identify the most influential initiatives of GSCMI, and focus more on improving the image of their brand and thus enhance economic benefits.
3. The results of this study indicate that the manufacturing firms of Pakistan seem to embrace

the responsive approach to GSCMI, adopting these practices mainly to avoid legal actions and penalties. Managers should adopt a more proactive attitude to the implementation of GSCMI, which has been proven in various studies to increase the chances of competitive advantages (Green Jr et al., 2012).

4. For policymakers, these results show the importance of institutional pressures. Policymakers should combine the objectives of regulatory agencies with instructive plans for both manufacturers and customers to achieve the anticipated goals. Regulatory institutions should fulfill their role as an enabler to the manufacturing firm by providing inspiration, instruction, and encouragement (Chandra et al., 2009).
5. It is hoped that this study will serve as an effective guide for future researchers. The model can be enhanced, e.g. with more sectors of Pakistan's economy included in future investigations.

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