Article

Supply Chain Ambidexterity and Green SCM: Moderating Role of Network Capabilities

Asif Khan [1,*], Chih-Cheng Chen [1], Kuan-Hua Lu [2], Ardy Wibowo [2,3], Shih-Chih Chen [2,*] and Athapol Ruangkanjanases [4,*]

1   Department of Marketing and Distribution Management, College of Management,
    National Kaohsiung University of Science and Technology, Kaohsiung 824005, Taiwan; volvic@nkust.edu.tw
2   Department of Information Management, College of Management, National Kaohsiung University of Science
    and Technology, Kaohsiung 824005, Taiwan; i108123104@nkust.edu.tw (K.-H.L.);
    ardywif@gmail.com or ardywibowo@almaata.ac.id (A.W.)
3   Faculty of Economics and Business, Alma Ata University, Yogyakarta 55183, Indonesia
4   Chulalongkorn Business School, Chulalongkorn University, Bangkok 10330, Thailand
*   Correspondence: khan_asif04@yahoo.com or i108123112@nkust.edu.tw (A.K.);
    scchen@nkust.edu.tw (S.-C.C.); athapol@cbs.chula.ac.th (A.R.)

Abstract: The purpose of this paper is to examine how supply chain ambidexterity facilitates assistance for green supply chain management and to build on previous work by evaluating how networking capability helps to explain the impact of supply chain ambidexterity on GSCM. This study focuses on the top-level management of different manufacturing companies located in Pakistan. A total of 34 manufacturing industries were selected using a cluster sampling technique. The data collected from 125 top-level managers were analyzed using a partial least square method, while the moderation analysis was conducted by using variance analysis. First, supply chain ambidexterity positively influences green supply chain management. However, networking capabilities do not moderate the relationship between supply chain ambidexterity and green supply chain management. This research was restricted to manufacturing industries in Pakistan because the research intended to gain an understanding of the several supply chain ambidexterity practices in Pakistani businesses and wanted to determine how these practices are associated with various parts of GSCM. Further studies can be extended to examine the impact in other industrial settings and countries. The findings of this research study will allow the managers to identify the right mix of exploitation and exploration techniques required to manage the supply chain in a green and sustainable manner.

Keywords: manufacturing industries; supply chain ambidexterity; green supply chain management; networking capabilities; partial least square; moderation

1. Introduction

Firms are required to strike the appropriate equilibrium between exploitation and exploration to overcome the uncertainty associated with the use of exploration processes and the over-reliance on the use of outdated processes related to exploitation independently [1]. Exploitation includes optimizing the operational procedures by eradicating unnecessary redundant processes and enhancing the efficiency of supply chain technology. On the other hand, exploration incorporates a pursuit of new opportunities and innovative solutions for supply chain issues [2]. If a firm relies extensively on exploitation, it would be advantageous in the short term due to the optimal utilization of current resources. However, if a firm mostly depends on exploration, it might face instability due to constant changes and failure to adopt those changes [1]. Supply chain ambidexterity refers to achieving both the advantages of exploitation and exploration at the same time within the supply chain [2].

Past research has explored the role and effect of organizational ambidexterity with various significant issues such as discovering new information [3], enhancing the firm's performance [4], and designing and manufacturing innovative products [5]. Some researchers

have targeted the conceptual nature of organizational ambidexterity and innovation [6] and relative ambidexterity [7].

Green supply chain management is a multifaceted notion that can be quantified from various perspectives. Several dimensions of green supply chain management systems have been emphasized in the past literature. Zhu et al. [8] proposed a four-dimensional green supply chain management practice, namely, external green supply chain management, internal environmental management, investment recovery, and eco-design. Holt and Ghobadian [9] proposed logistics, core environmental management methods supplier evaluation, logistics strategy, and green procurement, supplier training, as well as business networks as key GSCM practices. According to Chin et al. [10], green manufacturing, green procurement, green logistics, and green distribution are vital components of GSCM practices required by industrial sectors to accomplish superior sustainability performance. Greening a supply chain would include dealing with many dimensions such as buying and managing raw materials, implementation of marketing strategies, and ensuring green reverse logistics initiatives [11]. Supply chain ambidexterity can help the effective and efficient implementation of environmentally friendly supply chain activities such as raw materials procurement, green manufacturing, environmentally friendly packaging, and recycling [12].

Despite the significance of green supply chain practices, only a limited amount of research has been conducted addressing these practices, and in some cases, the findings are inconsistent [13]. The missing link of the current literature is an insight into the cause and effect and understanding in what circumstances supply chain ambidexterity impacts green supply chain management.

Networking capabilities refer to the abilities to begin, retain, and handle relationships with different external allies; according to this notion, management of relationships is more than handling single relationships and alliances, for instance, supply chains. Moreover, unlike relational capability and alliance management capability, network capabilities contain analysis of the firm's core communication and the information it retains related to its allies; both of these are considered to be vital for achieving ambidexterity particularly with external allies [14]. Network capabilities are considered to be vital because previous research studies have demonstrated that a multifaceted relationship exists between networking capabilities, ambidextrous networking, trust [15], and performance [16] in the management of supplier associations [17]. Despite prior research studies demonstrating that networking and ambidexterity entail the firm's absorptive capacity and that sharing of knowledge is significant for handling inconsistencies and conflicts of networking related to supply chain ambidexterity [16,18], there is still little known on the thorough nature of networking capabilities as a moderating variable [14]. This research study covers the moderating role of networking capabilities in the context of green supply chain and supply chain ambidexterity and demonstrates that firms can pursue the right balance of supply chain exploration and exploitation by creating new supply chain allies to generate new information and depend on current supply chain allies for exploiting that information.

This research constitutes an attempt to focus on at least two major research gaps associated with supply chain ambidexterity. First, we examine how supply chain ambidexterity facilitates assistance for green supply chain management. This adds to our second research gap; we further develop on previous work by evaluating how networking capability helps to explain the impact of supply chain ambidexterity on GSCM. The internal PLS model analysis was applied to test the hypotheses. It was found that ambidexterity of the supply chain has a positive and significant effect on green supply chain management. Furthermore, the moderation analysis suggested that the representation of networking capabilities has no moderating impact on the firm's green supply chain management.

2. Theoretical Background and Hypotheses Development

2.1. Supply Chain Ambidexterity and Green Supply Chain Management

Exploitation refers to finetuning of the firms' current strategies and operations; however, exploitation strategies are required to tackle the dynamic environment, for example, experimentation, risktaking, and search. Researchers agree on the viewpoint of striking the right balance between exploitation and exploration [14]. According to prior research, there is a choice between exploitation and exploration strategies [19]. However, according to the current research studies, organizations can administer both exploitation and exploration concurrently [20]. A study by Raisch et al. [21] discussed firms' ability to explore new opportunities as exploration processes and exploit current resources as exploitation processes.

Kristal et al. [2] explained exploration and exploitation in the framework of the supply chain. Supply chain exploitation is regarded as the number of processes used to refine and enhance current resources and skills to improve the supply chain, while supply chain exploration stands for the number of practices used to design innovative supply chain solutions. Supply chain exploration can be achieved through the reduction of redundancies in operations, while supply chain exploitation can be attained via experimenting, finding innovative solutions, and opportunities for supply chain issues [2]. The significance of ambidexterity concerning the supply chain context has been recently examined by researchers. According to their findings, they have discovered that in ambidextrous supply chains, the supply chain affiliates explore a new demand of customers and modify the changes in the firm's environment. This can reduce the issues faced in the supply chain and increase the firm's performance [22]. Correspondingly, Wong et al. [23] found evidence related to external and internal integration based on the literature on ambidexterity. According to their findings, external integration includes the sharing of knowledge and alliances between the suppliers and customers, while internal integration includes the alliances between all the internal functional units of the organization to enhance the organizational performance and capability to innovate and design new products.

Green supply chain management is based on the notion to manage information flow, capital flow, and materials. Furthermore, it is also adopted to manage the cooperation and collaboration between supply chain partners, originating from customers and stakeholders, whereas applying all the triple bottom line (TBL) sustainable development goals imitative as environmental, social, and economic dimensions [24]. The green supply chain concept is popular nowadays because of its initiatives leading toward organizational sustainability [25]. Green supply chain strategies are used to cover all the environmental concerns such as reducing the use of toxic chemicals, air pollution, energy consumption, etc., and they also generate a competitive advantage and enhance the performance of the firm [26]. Green supply chain management requires coordination between all functional business units and further demands the implementation of strategies based on inbound and external logistics. Inbound logistics strategies are based on processes related to the internal supply chain and manufacturing, whereas outbound logistics strategies are based on customer needs, acceptance, efficiency, and quality. Initiating GSCM practices in the business segments will ensure a well-organized green supply chain. GSCM processes produce better economic and environmental performances for the supply chain partners that further result in the betterment of the overall organization. In this research, we have used Younis's [27] theoretical model having eco-design, green purchasing, environmental co-operation, and reverse logistics to measure GSCM.

According to the findings of most Asian economies, GSCM positively impacts the firm's performance [28]. Hence, it can be argued that supply chain ambidexterity can be identified as a significant factor to impact green supply chain management. Supply chain ambidexterity's synchronized significance on exploration and exploitation can be enabled by the organization's performance assessment and societal perspective [29]. Recently, researchers have focused to investigate the significance of supply chain ambidexterity literature. Partanen et.al [14] in their study explained supply chain ambidexterity in the framework of SMEs. According to their results, there is a negative relationship between

supply chain ambidexterity and performance. Their findings suggest that supply chain ambidexterity can identify the green customer demands and acclimate to an altering organizational environment to ensure smooth sailing of green supply chain processes in the firm [22]. Therefore, we propose the following hypotheses:

Hypothesis 1 (H1). *Supply chain ambidexterity positively affects green supply chain management.*

2.2. The Moderating Role of Networking Capability

This study adopts network capabilities, which can be regarded as the abilities required to begin, retain, and utilize relations with numerous external collaborators. Research scholars seem to agree on the fact that collaborations and networking can provide many benefits to firms [30]; however, based on the empirical findings, there are two opposing perspectives based on the selection of the type of networking relationships used to enhance the performance of the firm [31]. There are two differing theories. The weak-tie theory [32] relates well with the exploration part and recommends a firm to engage in distant, less frequent, and formal relationships to external resources and opportunities. Furthermore, it would also be effective for gaining innovative ideas and contacts [33], although the strong-tie perspective emphasizes that it is the task of close cooperative relations to organize and relocate [34] complicated resources for organizational performance [35]. Supply chain ambidexterity's strategy will not be able to sustain for a long time if it's built on transactional, short-term relationships with allies. Hence, SMEs facing resource limitations require developing their supply chain pursuits on collaborative, relational, and long-term relationships. This viewpoint is supported operation cost economics. According to this view, SMEs depend on factors, such as trust and relational skills in order to manage their supplier relations to avoid the challenges of power on their suppliers [14].

Prior research studies focused on green manufacturing initiatives and strategies based on the attitudes of manufacturing firms regarding green management. A study by Partanen et.al [14] revealed that SMEs in the manufacturing industries within the framework of network capabilities can lessen the adverse impacts of SC ambidexterity on performance. Simpon and Samon [36] recommended a diverse set of strategies for GSCM established on the ways that firms use to initiate greening their supply chain and the way these relationships affect the conservation of resources and the firm's performance. Their approach proposed the following four strategies based on the complexity and level of resource commitment.

(1) Risk-based strategy: This is the simplest type of GSCM strategy. Firms using this strategy will invest the lowest possible resources and will in turn demand from their suppliers to conform with the environmental rules;

(2) Efficiency-based strategy: Firms engaged in these strategies focus on the optimization of cost and operational procedures. This strategy is comparatively complicated, and it benefits the firms not only economically but also toward the efficient management of their resources;

(3) Innovation-based strategy: Firms engaged in this strategy follow a guideline to design green product life cycles, demand their suppliers to follow the environmental concerns and train them in adapting the innovative green initiatives. As a result, firms following this strategy invest more resources and develop up-to-date capabilities to manage the green supply chain;

(4) Closed-loop strategy: In this strategy, the environmental performance is connected to all the links of the supply chain. This is comparatively the most complicated strategy. One of the examples related to this strategy is recycling materials from the manufacturing processes and end-of-life products. This strategy requires the firms to have efficient coordination with many parties to cultivate specialized information.

However, this study conveys that the management of relationships extends beyond handling single affiliations and partnerships such as supply chains [37]. The firm's internal knowledge related to its partners and communication is taken into account in networking

capabilities, which are both significant in achieving ambidexterity [38]. The latent construct networking capabilities comprise four elements including relationship skills, partner knowledge, internal communication, and interfirm coordination [39]. Partner's knowledge facilitates the supply chain ambidexterity because it provides the partners' strategies and competencies [40]. Moreover, internal coordination and relationship skills improve relationships [41] and loyalty [40] among a firm and its allies. It can further lower the transaction expenses, raise the exchange value [42], and moderate the issues concerning power asymmetry, the deficit of attraction, and the allies' subsequent unwillingness to obligate to and capitalize in ambidextrous relations. Lastly, internal communication is essential for ambidexterity since exploration and exploitation are distinctive or even contradictory based on their operational practices and objectives [43]. Internal communication also facilitates collaborative and equally reinforcing knowledge of current and new information [44] and aids in dealing with the conflicting knowledge procedures, which are necessary to achieve an ambidextrous orientation [45]. Additionally, internal communication is considered to be more significant if it targets the supply chain's exploration and exploitation [46]. Based on the mentioned literature and theories, we explored the moderating effect of networking capability on the relationship between supply chain ambidexterity and green supply chain.

Hypothesis 2 (H2). *Networking capability positively strengthens the influence of supply chain ambidexterity on the green supply chain.*

3. Research Method

This study focuses on the top-level management of different manufacturing companies located in Pakistan. The research model is shown as Figure 1. A total of 34 manufacturing industries were selected using a cluster sampling technique. The industries were divided into clusters based on their geographical location and industry type. Manufacturing industries that were located in the industrial zones of Peshawar and Islamabad were selected in this study. Peshawar and Islamabad were selected based on their geographical proximity and their importance as the capital cities of KP and Punjab Provinces, respectively. The sample contained small and medium manufacturing enterprises operating in different industries such as shoes, FMCG and textiles, etc. A close-ended self-administered questionnaire was distributed to the top management of manufacturing firms. Instead of requesting respondents merely whether they approve or agree to a statement, Likert scale components queried how firmly they approve or oppose it, normally on a five-point scale from 1 (=strongly disagree) to 5 (=strongly agree), with the value of 3 associated with a neutral category. Supply chain ambidexterity was measured by items suggested by Ojha et al. [47], while the items for measuring GSCM were adopted from the research study by Chin et al. [10]. Furthermore, the methodology of Walter et al. [48] was used to measure networking capability. The questionnaire items can be found in the Appendix A.
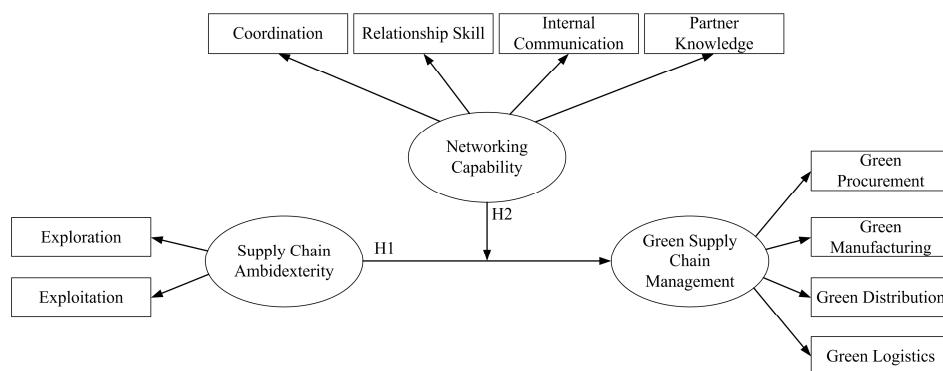
Figure 1. Research framework.

4. Data Analysis

Two measures of evaluating and measuring partial least squares (PLS) were conducted. In the initial step, the validity and reliability analysis were carried out, while in the following step, the coefficients path and the explanatory power of the structural model were tested and reviewed. The goal of the two steps mentioned above was to confirm the construct's validity and reliability, as well as to check the relationship between the construct [49,50]. PLS has been implemented and considered as the best tool for describing the causal interaction between construct variables and hence can concurrently handle model constructs and measurement items [51]. In addition, since PLS has simpler parameters for variable normality and randomness, it is ideal for discussing the relationship between variables in the irregular distribution of results. It has the benefits of evaluating dynamic prediction models [52]. Earlier studies found that each construct included a set of measurement items and examined the causal effect of the supply chain ambidexterity and the green supply chain management. PLS was thus more acceptable to this research than other SEM analysis approaches in order to evaluate the relationships between variables, eliminate measurements errors, and avoid collinearity.

4.1. Outer Model and Validation

The related external model measurements included the reliability and the internal consistency of each item, convergent validity, and discriminating validity of each design. By an appropriate loading of questions, the reliability of the products was tested. Factor loading was the expressive degree of determination and the threshold value of 0.6 for individual reliability [53]. This threshold value represents individual reliabilities. In this research study, "partner knowledge" was eliminated as an indicator of networking capabilities because its factor loading value was less than the threshold value. Both observed variables follow the criteria after the elimination of any model. Table 1 indicates the composite reliability of each construct. For each construct, any composite-reliability (CR) rating was higher than that of 0.7 [54], suggesting that the construct was internally acceptable.

Table 1. Reliability and AVE of the outer model.

Construct	Cronbach's Alpha	Composite Reliability	AVE
GSCM	0.909	0.923	0.501
NTCA	0.882	0.905	0.517
SCAX	0.899	0.920	0.590

Note: GSCM = green supply chain management; NTCA = networking capability; SCAX = supply chain ambidexterity.

To measuring each issue by using factor loading and composite reliability, the average of variance (AVE)-extracted parameters for each construct were considered. This construct would have good convergent validity if this indicator were higher than 0.5 [55]. Table 1 reveals that the AVEs in this analysis is between 0.501 and 0.590 for hypothetical construct variables, indicating that there is significant convergence.

The level of discrimination between testing variables and numerous construct criteria was identified by discriminatory validity. Table 2 indicates a fair discriminant validity for each indicator when the loading factor of each item in the specified latent structure exceeds the loading factor of any other structure [56].

This research measured the goodness of fit (*GOF*) following Tenenhaus et al. [57] in order to explain the overall quality of the developed framework, which calculates as follows:

$$GOF = \sqrt{\overline{AVE}} \times \sqrt{\overline{R^2}} = \sqrt{0.536 \times 0.757} = 0.637$$

According to the aforementioned result, the *GOF* is 0.637, which reaches the 0.36 cut-off criteria for a large impact size [58].

Table 2. Standardized factor loadings and cross loadings of the outer model.

	COOR	GRDS	GRLG	GRMF	GRPC	INCM	RLSK	XPLR	XPLT
COOR1	0.842	0.536	0.486	0.343	0.505	0.602	0.529	0.420	0.460
COOR2	0.758	0.514	0.466	0.297	0.487	0.476	0.513	0.479	0.413
COOR3	0.734	0.515	0.462	0.412	0.466	0.390	0.580	0.478	0.494
GRDS3	0.504	0.776	0.453	0.495	0.563	0.489	0.482	0.498	0.498
GRDS4	0.439	0.754	0.471	0.464	0.582	0.470	0.412	0.504	0.529
GRDS5	0.362	0.663	0.418	0.390	0.524	0.384	0.349	0.470	0.436
GRDS6	0.551	0.765	0.572	0.266	0.523	0.599	0.465	0.431	0.516
GRDS7	0.508	0.659	0.525	0.407	0.482	0.561	0.474	0.417	0.524
GRDS8	0.601	0.745	0.602	0.329	0.488	0.563	0.540	0.436	0.495
GRLG1	0.555	0.639	0.904	0.495	0.553	0.573	0.523	0.592	0.633
GRLG2	0.522	0.575	0.879	0.375	0.484	0.590	0.455	0.491	0.523
GRMF3	0.448	0.522	0.491	1.000	0.527	0.512	0.537	0.525	0.513
GRPC1	0.504	0.574	0.494	0.399	0.791	0.561	0.410	0.665	0.657
GRPC2	0.458	0.628	0.498	0.440	0.837	0.513	0.495	0.617	0.618
GRPC3	0.591	0.642	0.489	0.429	0.886	0.522	0.536	0.689	0.712
GRPC4	0.485	0.506	0.425	0.463	0.750	0.429	0.502	0.632	0.641
INCM1	0.470	0.548	0.471	0.394	0.560	0.844	0.330	0.568	0.561
INCM2	0.535	0.574	0.495	0.420	0.503	0.833	0.430	0.491	0.556
INCM3	0.621	0.633	0.694	0.502	0.545	0.908	0.539	0.517	0.533
RLSK1	0.624	0.534	0.383	0.436	0.517	0.457	0.860	0.416	0.392
RLSK2	0.521	0.486	0.490	0.510	0.467	0.398	0.880	0.494	0.482
RLSK3	0.650	0.565	0.558	0.455	0.559	0.470	0.865	0.567	0.556
XPLR1	0.436	0.455	0.407	0.361	0.560	0.411	0.434	0.786	0.586
XPLR2	0.504	0.497	0.455	0.386	0.656	0.485	0.438	0.831	0.678
XPLR3	0.448	0.521	0.549	0.481	0.600	0.540	0.532	0.776	0.677
XPLR4	0.422	0.471	0.474	0.394	0.644	0.433	0.347	0.698	0.635
XPLT1	0.370	0.450	0.407	0.431	0.595	0.442	0.388	0.628	0.749
XPLT2	0.486	0.603	0.605	0.452	0.689	0.500	0.444	0.626	0.842
XPLT3	0.531	0.621	0.599	0.392	0.667	0.624	0.491	0.670	0.858
XPLT4	0.535	0.540	0.543	0.430	0.709	0.534	0.494	0.825	0.864

Note: COOR = coordination; GRDS = green distribution; GRLG = green logistics; GRMF = green manufacturing; GRPC = green procurements; INCM = internal communication; RLSK = relationship skill; XPLR = exploration; XPLT = exploitation; The diagonal values of gray color are standardized factor loadings for each construct, and the other values are cross loadings.

4.2. Inner Model Result and Hypotheses Testing

The internal PLS model analysis was applied to test the hypotheses. The path coefficients are the strength and direction of the connection between the variables that indicate cause and effect between the measured variables and the latent ones. Moreover, the R square value corresponds to the percentage of predictor variables that represent the model's predictive capacity. Bootstrapping was used to estimate the degree of any path coefficient. Resampling data was used to estimate, and the calculated value was more accurate than the normal estimated limit value [59]. This study, therefore, used this approach to determine the significant relationship between variables. Table 3 and Figure 2 indicate that ambidexterity of the supply chain has a positive and important effect on green supply chain management.

Table 3. Summary of the inner model result.

| Hypothesis	Path Coefficient	*t*-Value	Result
H1: SCAX → GSCM	0.447 ***	6.085	Supported
H2: SCAX × NTCA → GSCM	−0.047 (0.600)	0.524	Not Supported

Note 1: GSCM = green supply chain management; NTCA = networking capability; SCAX = supply chain ambidexterity. Note 2: *** *p*-value < 0.001.
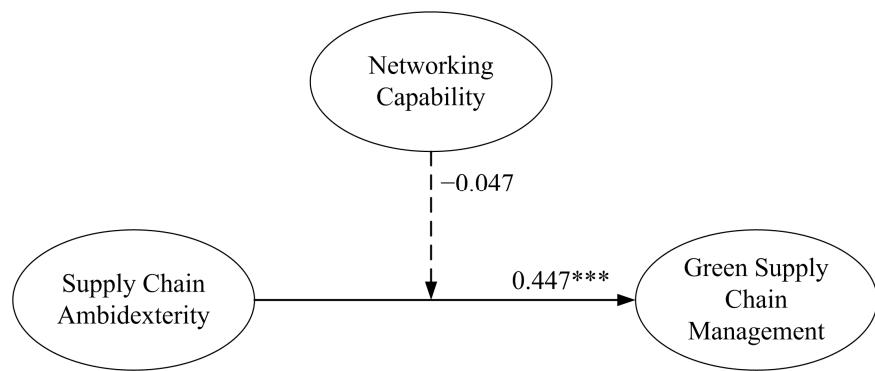
Figure 2. A framework of the inner model result. Note: *** *p*-value < 0.001.

4.3. Moderation Test

This research hypothesized that networking capability would have a moderate influence on the relationship between supply chain ambidexterity and green supply chain management. Moderation analysis is evaluated using the PLS product-indicator approach. As mentioned by Chin, Marcolin, and Newsted [60], PLS can provide more precise estimates of moderator effects by reporting an error that attenuates approximated relationships and enhances the validation of theories [61]. In order to test the potential of a moderating effect, the supply chain ambidexterity (predictor) and the networking capability (moderator) were multiplied to create an interaction construct (supply chain ambidexterity of networking capability) to predict the firm's green supply chain management. As Table 3 shows, the estimated standardized path coefficients for the effect of the moderator on the green supply chain management (β-0.047; $p > 0.001$) were not significant. This suggests that the representation of networking capability has no moderating impact on the firm's green supply chain management. Other than that, the slope analysis shown in Figure 3 explains that there is no change on the moderator slope line. The slope of the line for moderator at −1 SD is the simple effect of networking capability minus the interaction effect. The slope of the line for moderator at +1 SD is the simple effect of networking capability plus the interaction effect. Hence, H2 was not approved.
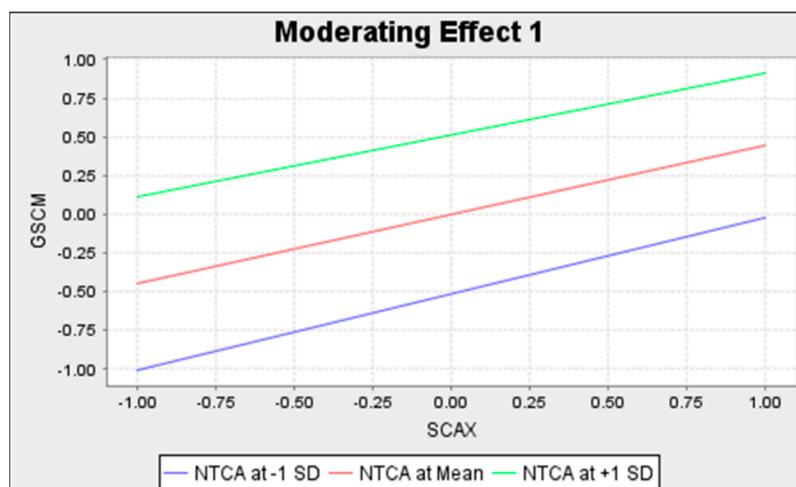
Figure 3. Slope analysis.

5. Discussion and Implications

Researchers related to the literature of ambidexterity have opposed perspectives about the idea of ambidexterity. The foremost difference is related to the static contrasted with the dynamic viewpoint of ambidexterity. Research scholars that consider ambidexterity as a static procedure claim that organizations engage in exploitation and exploration

pursuits at the same time [29,62], although others claim that an organization will go across a temporal round of exploration and exploitation. They believe that ambidexterity is a dynamic and chronological procedure [63]. This research adds to the organizational ambidexterity literature. It presents the idea of ambidexterity as a static method in the present study, keeping in mind that the respondents were inquired to suggest their degree of agreement/disagreement concerning both the exploitation and exploration supply chain methods of their organization. Organizations might have been exploiting their existing supplies or abilities, however, simultaneously experimenting through innovative methods to improving the effectiveness of a supply chain.

Lately, the significance of GSCM has received great attention because of climate change concerns, degradation, and pollution of natural resources. Our study endeavored to contribute to the debate by examining the involvement of networking capability as a moderator in the association between supply chain ambidexterity and GSCM within manufacturing organizations. Based on the previous studies, networking capabilities can improve the supply chain ambidexterity processes. However, in this research study, we also reveal that manufacturing organizations, equipped with network capabilities, have no role to alleviate the relationship between supply chain ambidexterity and GSCM in the manufacturing industries of Pakistan. We recommend that engaging in supply chain ambidexterity involves a more adaptable and responsive information stream between associates [18,64]. Regarding the impact, our results might be most interesting for executives and supply chain experts, as well as for policymakers who could be encouraged by the role of specific drivers on the execution of GSCM practices and by the degree of performance attainable due to the embracing of several green practices.

6. Research Limitations and Future Directions

In terms of limitations to this research, since data were gathered from a particular country, findings might vary in other situations, especially under the institutional setting. Furthermore, this research is centered on the view of respondents. Hence, this view could surpass or underrate the actual part of supply chain ambidexterity on GSCM. Future researchers can apply the research model in a different country following a different culture. Since this research applied the model in an emerging country, future researchers can apply the research model in a developed economy and compare the results based on the use of green supply chain practices used between an emerging and developed economy.

Another limitation in this research was the attention on organizations in the manufacturing segment; however, this segment was specifically chosen because the manufacturing industry is accountable for a large amount of environmental effect and manufacturing is also accountable for the reduction of natural resources. This research was also restricted to manufacturing industries in Pakistan because the research intended to gain an understanding of the several supply chain ambidexterity practices in Pakistani businesses and wanted to determine how these practices are associated with various parts of GSCM. Future researchers can target a different set of industries to obtain various new insights regarding the practices of GSCM. Future research can be based on adapting the research model in a raw materials industry or a service industry.

This research study also faced research limitations measuring, supply chain ambidexterity. It was unable to examine the differential impact of supply chain ambidexterity on GSCM because supply chain ambidexterity's impact may not be equally divided into exploitation and exploration. Hence, by handling supply chain ambidexterity as one construct, this research fails to report the extent of differentiation in exploitation and exploration of supply chain ambidexterity. Future researchers can treat supply chain ambidexterity as a first-order construct to achieve a comparatively more in-depth analysis of supply chain ambidexterity. Researchers have contradictory views regarding the notion of ambidexterity. One of the conflicting points to the dynamic versus static viewpoint of ambidexterity. According to the static viewpoint of ambidexterity, exploitation and exploration activities occur at the same time (e.g., [65]), whereas according to the dynamic

view, exploitation and exploration activities occur in a sequential manner (e.g., [66]). In this paper, the static viewpoint of ambidexterity was adapted and analyzed the responses based on the combined effect exploration and exploitation processes. However, one limitation of this approach was the certainty of whether the exploitation and exploration processes were occurring simultaneously and whether the processes were based on the same concepts or products. To tackle this issue, future researchers can modify this model and use a dynamic approach of ambidexterity to obtain a different set of insights regarding the exploitation and exploration processes.

Author Contributions: Conceptualization, A.K. and C.-C.C.; Formal analysis, A.W., S.-C.C. and A.R.; Investigation, A.K.; Methodology, A.K., S.-C.C. and A.R.; Supervision, C.-C.C.; Validation, K.-H.L. and A.R.; Writing—original draft, A.K., C.-C.C., S.-C.C. and A.R.; Writing—review & editing, A.K., C.-C.C., K.-H.L., A.W., S.-C.C. and A.R. All authors have read and agreed to the published version of the manuscript.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Scales

Exploitation Part of Supply Chain Ambidexterity, Ojha et al. [47]:

- In order to stay competitive, our supply chain managers focus on reducing operational redundancies in our existing processes;
- Leveraging our current supply chain technologies is important to our firm's strategy;
- In order to stay competitive, our supply chain managers focus on improving our existing technologies;
- Our managers focus on developing stronger competencies in our existing supply chain processes.

Exploration Part of Supply Chain Ambidexterity, Ojha et al. [47]:

- We proactively pursue new supply chain solutions;
- We continually experiment to find new solutions that will improve our supply chain;
- To improve our supply chain, we continually explore new opportunities;
- We are constantly seeking novel approaches to solve supply chain problems.

Green Procurement Part of Green Supply Chain Management, Chin et al. [10]:

- We follow the principles of the 3Rs: reuse, recycle and reduce in the process of green procurement in terms of paper and parts container (plastic bag/box);
- We place purchase orders through email (paperless);
- We use eco-labeling on our products;
- We ensure our suppliers' environmental compliance certifications;
- We conduct auditing for suppliers' internal environmental management.

Green Manufacturing Part of Green Supply Chain Management, Chin et al. [10]:

- We as a manufacturer, design products that facilitate the reuse, recycle and recovery of parts and material components;
- We avoid or reduce the use of hazardous products within the production process;
- We minimize the consumption of materials as well as energy.

Green Distribution Part of Green Supply Chain Management, Chin et al. [10]:

- We use strategies to downsize packaging;
- We use "green" packaging materials;
- We promote recycling and reuse programs;
- We cooperate with vendors to standardize packaging;
- We encourage and adopt returnable packaging methods;

- We minimize material uses and time to unpack;
- We use a recyclable pallet system and lastly;
- We save energy in warehouses.

Green Logistics Part of Green Supply Chain Management, Chin et al. [10]:

- We collect used products and packaging from customers for recycling;
- We return packaging and products to suppliers for reuse;
- We require suppliers to collect their packaging material.

Internal Communication Part of Network Capability, Walter et al. [48]:

- In our company, we have regular meetings for every project;
- In our company employees develop informal contacts among themselves;
- In our company managers and employees often give feedback to each other.

Coordination Part of Network Capability, Walter et al. [48]:

- In our company, we analyze what we would like and desire to achieve with which partner;
- In our company, we develop relations with each partner based on what they can contribute;
- In our company, we discuss regularly with our partners how we can support each other.

Relationship Skills Part of Network Capability, Walter et al. [48]:

- In our company, we have the ability to build good personal relationships with our business partners;
- In our company, we can deal flexibly with our partners;
- In our company, we almost always solve problems constructively with our partners.

Partner Knowledge Part of Network Capability, Walter et al. [48]:

- In our company, we know our partners' markets;
- In our company, we know our partners' products/procedures/services;
- In our company, we know our partners' strengths and weaknesses.

References

1. Levinthal, D.A.; March, J.G. The myopia of learning. *Strateg. Manag. J.* **1993**, *14*, 95–112. [CrossRef]
2. Kristal, M.M.; Huang, X.; Roth, A.V. The effect of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance. *J. Oper. Manag.* **2010**, *28*, 415–429. [CrossRef]
3. Borzillo, S.; Schmitt, A.; Antino, M. Communities of practice: Keeping the company agile. *J. Bus. Strategy* **2012**, *33*, 22–30. [CrossRef]
4. Junni, P.; Sarala, R.; Taras, V.; Tarba, S. Organizational ambidexterity and performance: A meta-analysis. *Acad. Manag. Perspect.* **2013**, *27*, 299–312. [CrossRef]
5. Zhang, X.; Yang, B.; Hui, J.; Liu, M.; Chi, Z.; Liu, S.; Xu, J.; Wei, Y. A novel method for preparing AIE dye based cross-linked fluorescent polymeric nanoparticles for cell imaging. *Polym. Chem.* **2014**, *5*, 683–688. [CrossRef]
6. Parikh, M. Move over Mintzberg, let adhocracy give way to ambidexterity. *Manag. Decis.* **2016**, *54*, 1047–1058. [CrossRef]
7. D'Souza, D.E.; Sigdyal, P.; Struckell, E. Relative ambidexterity: A measure and a versatile framework. *Acad. Manag. Perspect.* **2017**, *31*, 124–136. [CrossRef]
8. Zhu, Q.; Sarkis, J.; Geng, Y. Green supply chain management in China: Pressures, practices and performance. *Int. J. Oper. Prod. Manag.* **2005**, *25*, 449–468. [CrossRef]
9. Kumar, V.; Holt, D.; Ghobadian, A.; Garza-Reyes, J.A. Developing green supply chain management taxonomy-based decision support system. *Int. J. Prod. Res.* **2015**, *53*, 6372–6389. [CrossRef]
10. Chin, T.A.; Tat, H.H.; Sulaiman, Z. Green supply chain management, environmental collaboration and sustainability performance. *Procedia CIRP* **2015**, *26*, 695–699. [CrossRef]
11. Younis, H. The Impact of the Dimensions of Green Supply Chain Management Practices on Corporate Performance. Ph.D. Thesis, University of Wollongong in Dubai, Dubai, United Arab Emirates, 2016.
12. Kumar, S.; Putnam, V. Cradle to cradle: Reverse logistics strategies and opportunities across three industry sectors. *Int. J. Prod. Econ.* **2008**, *115*, 305–315. [CrossRef]
13. Golicic, S.L.; Smith, C.D. A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *J. Supply Chain Manag.* **2013**, *49*, 78–95. [CrossRef]
14. Partanen, J.; Kohtamäki, M.; Patel, P.C.; Parida, V. Supply chain ambidexterity and manufacturing SME performance: The moderating roles of network capability and strategic information flow. *Int. J. Prod. Econ.* **2020**, *221*, 107470. [CrossRef]

15. Morrissey, W.J.; Pittaway, L. Buyer-supplier relationships in small firms: The use of social factors to manage relationships. *Int. Small Bus. J.* **2006**, *24*, 272–298. [CrossRef]
16. Kauppila, O.-P. Alliance management capability and firm performance: Using resource-based theory to look inside the process black box. *Long Range Plan.* **2015**, *48*, 151–167. [CrossRef]
17. Wynarczyk, P.; Watson, R. Firm growth and supply chain partnerships: An empirical analysis of UK SME subcontractors. *Small Bus. Econ.* **2005**, *24*, 39–51. [CrossRef]
18. Im, G.; Rai, A. Knowledge sharing ambidexterity in long-term interorganizational relationships. *Manag. Sci.* **2008**, *54*, 1281–1296. [CrossRef]
19. March, J.G. Exploration and exploitation in organizational learning. *Organ. Sci.* **1991**, *2*, 71–87. [CrossRef]
20. Kortmann, S. The mediating role of strategic orientations on the relationship between ambidexterity-oriented decisions and innovative ambidexterity. *J. Prod. Innov. Manag.* **2015**, *32*, 666–684. [CrossRef]
21. Raisch, S.; Birkinshaw, J. Organizational ambidexterity: Antecedents, outcomes, and moderators. *J. Manag.* **2008**, *34*, 375–409. [CrossRef]
22. Lee, S.M.; Rha, J.S. Ambidextrous supply chain as a dynamic capability: Building a resilient supply chain. *Manag. Decis.* **2016**, *54*, 2–23. [CrossRef]
23. Wong, C.W.; Wong, C.Y.; Boon-itt, S. The combined effects of internal and external supply chain integration on product innovation. *Int. J. Prod. Econ.* **2013**, *146*, 566–574. [CrossRef]
24. Bui, T.-D.; Tsai, F.M.; Tseng, M.-L.; Tan, R.R.; Yu, K.D.S.; Lim, M.K. Sustainable supply chain management towards disruption and organizational ambidexterity: A data driven analysis. *Sustain. Prod. Consum.* **2020**, *26*, 373–410. [CrossRef] [PubMed]
25. De Oliveira, U.R.; Espindola, L.S.; Da Silva, I.R.; Da Silva, I.N.; Rocha, H.M. A systematic literature review on green supply chain management: Research implications and future perspectives. *J. Clean. Prod.* **2018**, *187*, 537–561. [CrossRef]
26. Rao, P.; Holt, D. Do green supply chains lead to competitiveness and economic performance? *Int. J. Oper. Prod. Manag.* **2005**, *25*, 898–916. [CrossRef]
27. Younis, H.; Sundarakani, B.; O'Mahony, B. Green supply chain management and corporate performance: Developing a roadmap for future research using a mixed method approach. *IIMB Manag. Rev.* **2019**, *32*, 305–324. [CrossRef]
28. Geng, R.; Mansouri, S.A.; Aktas, E. The relationship between green supply chain management and performance: A meta-analysis of empirical evidences in Asian emerging economies. *Int. J. Prod. Econ.* **2017**, *183*, 245–258. [CrossRef]
29. Birkinshaw, J.; Gibson, C.B. Building an ambidextrous organisation. *Adv. Inst. Manag. Res. Pap.* **2004**, *3*, 1–19. [CrossRef]
30. Semrau, T.; Sigmund, S. Networking ability and the financial performance of new ventures: A mediation analysis among younger and more mature firms. *Strateg. Entrep. J.* **2012**, *6*, 335–354. [CrossRef]
31. Stam, W.; Arzlanian, S.; Elfring, T. Social capital of entrepreneurs and small firm performance: A meta-analysis of contextual and methodological moderators. *J. Bus. Ventur.* **2014**, *29*, 152–173. [CrossRef]
32. Granovetter, M. The strength of weak ties: A network theory revisited. *Sociol. Theory* **1983**, *1*, 201–233. [CrossRef]
33. Tiwana, A. Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity. *Strateg. Manag. J.* **2008**, *29*, 251–272. [CrossRef]
34. Hansen, M.T. The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Adm. Sci. Q.* **1999**, *44*, 82–111. [CrossRef]
35. Lavie, D.; Rosenkopf, L. Balancing exploration and exploitation in alliance formation. *Acad. Manag. J.* **2006**, *49*, 797–818. [CrossRef]
36. Simpson, D.; Samson, D. Developing strategies for green supply chain management. *Decis. Line* **2008**, *39*, 12–15.
37. Mitrega, M.; Forkmann, S.; Ramos, C.; Henneberg, S.C. Networking capability in business relationships—Concept and scale development. *Ind. Mark. Manag.* **2012**, *41*, 739–751. [CrossRef]
38. Andriopoulos, C.; Lewis, M.W. Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organ. Sci.* **2009**, *20*, 696–717. [CrossRef]
39. Holmström, J.; Partanen, J.; Tuomi, J.; Walter, M. Rapid manufacturing in the spare parts supply chain. *J. Manuf. Technol. Manag.* **2010**, *21*, 687–697. [CrossRef]
40. Song, M.; Di Benedetto, C.A. Supplier's involvement and success of radical new product development in new ventures. *J. Oper. Manag.* **2008**, *26*, 1–22. [CrossRef]
41. Schreiner, M.; Kale, P.; Corsten, D. What really is alliance management capability and how does it impact alliance outcomes and success? *Strateg. Manag. J.* **2009**, *30*, 1395–1419. [CrossRef]
42. Dyer, J.H. Effective interim collaboration: How firms minimize transaction costs and maximise transaction value. *Strateg. Manag. J.* **1997**, *18*, 535–556. [CrossRef]
43. Jansen, J.J.; Simsek, Z.; Cao, Q. Ambidexterity and performance in multiunit contexts: Cross-level moderating effects of structural and resource attributes. *Strateg. Manag. J.* **2012**, *33*, 1286–1303. [CrossRef]
44. Fernhaber, S.A.; Patel, P.C. How do young firms manage product portfolio complexity? The role of absorptive capacity and ambidexterity. *Strateg. Manag. J.* **2012**, *33*, 1516–1539. [CrossRef]
45. Lubatkin, M.H.; Simsek, Z.; Ling, Y.; Veiga, J.F. Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration. *J. Manag.* **2006**, *32*, 646–672. [CrossRef]
46. Adler, P.S.; Benner, M.; Brunner, D.J.; MacDuffie, J.P.; Osono, E.; Staats, B.R.; Takeuchi, H.; Tushman, M.L.; Winter, S.; Boyer, K.K.; et al. Perspectives on the productivity dilemma. *J. Oper. Manag.* **2009**, *27*, 99–113.

47. Ojha, D.; Acharya, C.; Cooper, D. Transformational leadership and supply chain ambidexterity: Mediating role of supply chain organizational learning and moderating role of uncertainty. *Int. J. Prod. Econ.* **2018**, *197*, 215–231. [CrossRef]

48. Walter, A.; Auer, M.; Ritter, T. The impact of network capabilities and entrepreneurial orientation on university spin-off performance. *J. Bus. Ventur.* **2006**, *21*, 541–567. [CrossRef]

49. Anderson, J.C.; Gerbing, D.W. Structural equation modeling in practice: A review and recommended two-step approach. *Psychol. Bull.* **1988**, *103*, 411. [CrossRef]

50. Hulland, J. Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strateg. Manag. J.* **1999**, *20*, 195–204. [CrossRef]

51. Petter, S.; Straub, D.; Rai, A. Specifying formative constructs in information systems research. *MIS Q.* **2007**, *31*, 623–656. [CrossRef]

52. Chin, W.W.; Newsted, P.R. Structural equation modeling analysis with small samples using partial least squares. *Stat. Strateg. Small Sample Res.* **1999**, *1*, 307–341.

53. Hair, J.F., Jr.; Babin, B.J.; Anderson, R.E. *A Global Perspectivie*; Pearson: London, UK, 2010.

54. Chin, W.W. The partial least squares approach to structural equation modeling. *Mod. Methods Bus. Res.* **1998**, *295*, 295–336.

55. Fornell, C.; Larcker, D.F. *Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics*; Sage Publications: Los Angeles, CA, USA, 1981.

56. Hair, J.F., Jr.; Hult, G.T.M.; Ringle, C.; Sarstedt, M. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*; Sage Publications: Los Angeles, CA, USA, 2016.

57. Tenenhaus, M.; Vinzi, V.E.; Chatelin, Y.-M.; Lauro, C. PLS path modeling. *Comput. Stat. Data Anal.* **2005**, *48*, 159–205. [CrossRef]

58. Wetzels, M.; Odekerken-Schröder, G.; Van Oppen, C. Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. *MIS Q.* **2009**, *33*, 177–195. [CrossRef]

59. Purvis, R.L.; Sambamurthy, V.; Zmud, R.W. The assimilation of knowledge platforms in organizations: An empirical investigation. *Organ. Sci.* **2001**, *12*, 117–135. [CrossRef]

60. Chin, W.W.; Marcolin, B.L.; Newsted, P.R. A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Inf. Syst. Res.* **2003**, *14*, 189–217. [CrossRef]

61. Henseler, J.; Fassott, G. Testing moderating effects in PLS path models: An illustration of available procedures. In *Handbook of Partial Least Squares*; Springer: Berlin/Heidelberg, Germany, 2010; pp. 713–735.

62. Gupta, K.; Jabrail, F.H. Effects of degree of deacetylation and cross-linking on physical characteristics, swelling and release behavior of chitosan microspheres. *Carbohydr. Polym.* **2006**, *66*, 43–54. [CrossRef]

63. Eisenhardt, K.M.; Brown, S.L. Time pacing: Competing in markets that won't stand still. *Harv. Bus. Rev.* **1998**, *76*, 59–70.

64. Rothaermel, F.T.; Alexandre, M.T. Ambidexterity in technology sourcing: The moderating role of absorptive capacity. *Organ. Sci.* **2009**, *20*, 759–780. [CrossRef]

65. Gupta, A.K.; Smith, K.G.; Shalley, C.E. The interplay between exploration and exploitation. *Acad. Manag. J.* **2006**, *49*, 693–706. [CrossRef]

66. O'Reilly, C.A., III; Tushman, M.L. Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Res. Organ. Behav.* **2008**, *28*, 185–206. [CrossRef]