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Results	Query	Domains (original links)
Unique	JOURNAL OF ENGINEERING AND MANAGEMENT INDUSTRIAL SYSTEM VOL	-
Unique	Journal of Engineering and Management in Industrial System, 5(2), p80-86	-
Unique	Keywords: Coordination Mechanism, Logistics Outsourcing, Revenue Sharing Contracts, Supply Chain, Supply Contracts	-
Unique	Products are delivered by TPLSP to retailers for the selling season in the market	-
Unique	id Published online at http://Jemis	-
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Unique	All Rights Reserved supply chain [15]	-
Unique	They study a single retailer newsvendor model	-
Unique	Journal of Engineering and Management in Industrial System, 5(2), p80-86	-
Unique	An incentive scheme is proposed to coordinate the supply chain	-
9 results	Under the revenue sharing contract setting, the dairy industry's total profit increased by 12.49%	asu.pure.elsevier.com researchgate.net chinaagrisci.com researchgate.net chinaagrisci.com wanfangdata.com.cn cnki.com.cn airitilibrary.com
Unique	In the supply chain, TPLSP is being responsible for distribution processes to retailers	-
Unique	Collaboration has the characteristics to make sharing of information, risk, and profit [17]	-
Unique	Logistics outsourcing are implemented to perform logistics activity of the supplier	-
Unique	Products will be delivered by TPLSP from manufacturers/ suppliers for selling season in retailers	-
Unique	There are three possible conditions: (1) centralized	-
Unique	and (3) decentralized supply chain under revenue sharing contracts	-

Unique	The retailers' demand distribution is N(µ	-
Unique	Then we denote F as the normal cumulative density function of N(µ	-
Unique	σ), and F -1 as the inverse normal cumulative density function	-
Unique	Journal of Engineering and Management in Industrial System, 5(2), p80-86	-
Unique	Model of logistics outsourcing for suppliers in two-echelon supply chain	-
Unique	to get the optimal solution for the firm itself	-
Unique	Journal of Engineering and Management in Industrial System, 5(2), p80-86	-
Unique	Supply chain under revenue sharing contract	-
Unique	The contract parameters are determined to coordinate all players	-
Unique	Journal of Engineering and Management in Industrial System, 5(2), p80-86	-
Unique	Retailer's expected profit under RS and without RS contract Figure	-
Unique	Supplier's expected profit under RS and without RS contract Figure	-
Unique	TPLSP's expected profit under RS and without RS contract Figure	-
Unique	It shows that the revenue sharing contract is helpful to coordinate the supply chain	-
Unique	Moreover, the incentive and punishment scheme for TPLSP could drive the punctuality of delivery	-
Unique	This scheme could increase logistics outsourcing performance in the supply chain	-
Unique	Journal of Engineering and Management in Industrial System, 5(2), p80-86	-
4,040 results	A Tactical Model for Planning the Production and Distribution of Fresh Produce	link.springer.com sciencedirect.com researchgate.net pubsonline.informs.org pdfs.semanticscholar.org theinternationaljournal.org semanticscholar.org deepdyve.com pubsonline.informs.org aip.scitation.org
1 results	Supply Chain Coordination with Revenue-Sharing Contracts	sciencedirect.com
Unique	Management Science, 51 (1):30–44;2005	-
Unique	[3] Cai X, Chen J, Xiao Y, Xu X, Yu	-
2 results	Fresh-product Supply Chain Management with Logistics Outsourcing	isiarticles.com hindawi.com
Unique	Supply Chain Management: Strategy, Planning, and Operation, Sixth Edition, Pearson Education	-
3 results	Study of revenue sharing contract in virtual enterprises	jemis.ub.ac.id core.ac.uk deepdyve.com
Unique	Journal of Systems Science and Systems Engineering, 15(1):95-113;2006	-
Unique	Supply chain structure and demand risk	-
	Coordinate Supply Chain with Revenue-Sharing Contract under the Presence	

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Unique	Paper presented at the Proceedings of International Conference on Information Science and Engineering;2009	-
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13 results	Lecture Notes in Economics and Mathematical Systems	amazon.com amazon.com kfz-fluck.de en.wikipedia.org tuck.dartmouth.edu en.wikipedia.org pipelineequities.com sirius1.jp
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Unique	Journal of Integrative Agriculture, 12(12):2300-2309;2013	-
86 results	Analysis of A Revenue Sharing Contract in Supply Chain Management	andromeda.rutgers.edu researchgate.net tandfonline.com academicpub.org jemis.ub.ac.id ijsom.com pubsonline.informs.org koreascience.or.kr scholar.google.com hindawi.com
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Unique	Supply Chain Management: An International Journal, 7(5):302-310;2002	-
Unique	2 YEAR 2017 e-ISSN 2477-6025 DOI 10.21776 Cite this Article As Narulidea, W.,	-
Unique	Revenue Sharing Contract As Coordination Mechanism With The	-

	Implementation Of Logistics Outsourcing In Decentralized	
Unique	Semen Indonesia Abstract By making logistics outsourcing decision, companies have been able to improve the	-
Unique	service provider (TPLSP), whose logistics service performance affect the products availability, quality, price, and market	-
Unique	In this research, a model is developed as coordination mechanisms with the implementation of	-
Unique	Revenue sharing contract model is developed in the proposed model to coordinate the supply	-
3 results	logistics service performance, so the risks and the necessary costs could be allocated to all	jemis.ub.ac.id journaltocs.ac.uk jemis.ub.ac.id
Unique	are determined so that all players could obtain higher profit than in a common decentralized	-
Unique	This paper provides new model of coordination mechanism in supply chain with logistics outsourcing	-
Unique	Introduction This study addresses the problem in the supply chain where the distributor supplies	-
Unique	The problems came from the travel distance and the wide market penetration that must	-
Unique	Especially in archipelagic country, such as Indonesia, the challenges are even greater to overcome	-
Unique	In decentralized supply chain, manufacturers control over the interests of TPLSP cannot be done	-
Unique	per the order quantity and manufacturers' distribution plans to maintain market share and products quality	-
Unique	All players have a higher risk when there is no coordination among Corresponding	-
Unique	Incentive alignment needs to be done to improve relationships that are mutually beneficial for	-
Unique	This study develops a coordination mechanism contract model among players with the involvement of	-
Unique	Revenue sharing contract according to Cachon and Lariviere [2] is a common supply chain	-
Unique	Further research is developed by Giannoccaro and Pontrandolfo [10] about revenue sharing contracts model	-
Unique	It study the coordination mechanism of revenue-sharing contract scheme to coordinate three- stage supply	-
Unique	fresh produces to a long distant market where a distributor purchases and sells it to	-
Unique	[22] develop revenue sharing model in China dairy industry supply chain, in which the	-
Unique	2 YEAR 2017 e-ISSN 2477-6025 DOI 10.21776 Cite this Article As Narulidea, W.,	-
	Revenue Sharing Contract As Coordination Mechanism With The	

Unique	wants to maximize their own	
Unique	$\square\ \square\ )\square\ \square -\square\ \square\ \square\ \square$ (8) The order of decision making is	-
Unique	$\square = \square\ \square\ \square\ \square\ \prod\ \square\ \square = \square\ \square\ \square\ \square\ \square\ \square -((1$	-
Unique	Retailer will determine the optimal order quantity $\square\ \square$ as: $\square\ \square =$	-
Unique	$\square\ ((1-\square\ )\square -\square\ \square\ \square\ )\square\ \square -\square\ \square\ \square$	-
Unique	Model in Decentralized Supply Chain under Revenue Sharing Contract Under revenue sharing contract, retailers	-
Unique	The parameter $(1-\square\ \square\ )$ defines the certain fraction of retailers revenue	-
Unique	T P Min (Q, D(r)) ω r c T c S c R JOURNAL OF	-
Unique	2 YEAR 2017 e-ISSN 2477-6025 DOI 10.21776 Cite this Article As Narulidea, W.,	-
Unique	Revenue Sharing Contract As Coordination Mechanism With The Implementation Of Logistics Outsourcing In Decentralized	-
Unique	$\square\ )]\ \square\ \square\ \square$ (15) while the $\square\ \square = \square\ \square\ \square$	-
Unique	$\square\ ,\square\ ,$ and $\square$ are designed so that the contract can effectively coordinates	-
Unique	$[\square\ \square +\square\ \square +\square\ \square]-(\square\ \square +\square\ \square)$ (20) The order of	-
Unique	$-(((1-\square\ )\square + \square\ \square\ \square) + \square\ \square\ )$	-
Unique	$\square\ \square\square = \square\ -1\ [\square\ \square\ \square -(\square\ +\square\ \square)]\ \square\ \square$	-
Unique	$\square\ \square\ \square\square] + ((1-\square\ )\square + \square\ \square\ \square\ )$	-
Unique	Numerical Experiment Numerical experiments are performed to clarify the proposed model and verify if	-
Unique	As seen in table 2, the numerical experiments use the similar data from the	-
Unique	For the purpose of comparing the expected profit, in this research using different ratio	-
Unique	condition, all players (retailer, supplier, and TPLSP) receive higher profits under the revenue-sharing contract than	-
Unique	The revenue sharing contract could coordinate the supply chain and obtain high supply chain	-
Unique	If we compare all the players expected profit under RS contracts could be higher	-
Unique	2 YEAR 2017 e-ISSN 2477-6025 DOI 10.21776 Cite this Article As Narulidea, W.,	-
Unique	Revenue Sharing Contract As Coordination Mechanism With The Implementation Of Logistics Outsourcing In Decentralized	-
Unique	id/index.php/jemis/article/view/272 Paper Accepted : January, 26 th 2018 Paper Published : March, 7 th 2018	-
Unique	It means that RS contracts model has high desirability level for all supply chain	-
Unique	see from figure 6, the expected supply chain profit under RS contract could be higher	-

Unique	0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 Supply Chain Profit Decentralized	-
Unique	2 YEAR 2017 e-ISSN 2477-6025 DOI 10.21776 Cite this Article As Narulidea, W.,	-
Unique	Revenue Sharing Contract As Coordination Mechanism With The Implementation Of Logistics Outsourcing In Decentralized	-
Unique	id/index.php/jemis/article/view/272 Paper Accepted : January, 26 th 2018 Paper Published : March, 7 th 2018	-
Unique	the risk between players in the supply chain, specifically with the implementation of logistics outsourcing	-
Unique	Moreover, to improve or maintain the performance of the TPLSP, in the model, there	-
Unique	Numerical experiments were conducted to simulate the performance of the model to generate the	-
Unique	the revenue sharing contract model could gain the profit of each player and supply chain	-
Unique	Moreover, the penalty and incentive schemes are applied in the model to improve the	-
Unique	They indicate that the revenue sharing contract model could be implemented in decentralized supply	-
Unique	the same objective to obtain the optimal solution for supply chain and it prevents double	-
Unique	2 YEAR 2017 e-ISSN 2477-6025 DOI 10.21776 Cite this Article As Narulidea, W.,	-
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Unique	id/index.php/jemis/article/view/272 Paper Accepted : January, 26 th 2018 Paper Published : March, 7 th 2018	-
Unique	[21] Putri RDA, Rusdiansyah A, Comparison Analysis Of Spanning Vs Pairwise Revenue Sharing Contract	-
106 results	An Integrated Revenue Sharing and Quantity Discounts Contract for Coordinating A Supply Chain Dealing	sciencedirect.com researchgate.net sciencedirect.com pubsonline.informs.org iitkgp.ac.in pubsonline.informs.org jise.ir jise.ir

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REVENUE SHARING CONTRACT AS COORDINATION MECHANISM WITH THE IMPLEMENTATION OF LOGISTICS OUTSOURCING IN DECENTRALIZED SUPPLY CHAIN

Winda Narulidea 1) , Artya Lathifah 2) Logistics Engineering Department 1,2) Universitas Internasional Semen Indonesia

Abstract By making logistics outsourcing decision, companies have been able to improve the logistics performance, maintain focus on core business, and minimize distribution cost. However in decentralized condition, there is only limited control of the third party logistics service provider (TPLSP), whose logistics service performance affect the products availability, quality, price, and market share. In this research, a model is developed as coordination mechanisms with the implementation of logistics outsourcing in decentralized supply chain. Revenue sharing contract model is developed in the proposed model to coordinate the supply chain consisting of suppliers, TPLSPs, and retailers. Moreover the incentive and penalty scheme are implemented in accordance to the supply chain logistics service performance, so the risks and the necessary costs could be allocated to all players. To increase the desirability level of the contracts for all players, the contracts parameters are determined so that all players could obtain higher profit than in a common decentralized supply chain conditions, furthermore the win-win condition can be achieved. This paper provides new model of coordination mechanism in supply chain with logistics outsourcing and offers the incentive and penalty scheme into the basic model of revenue sharing contracts.

Keywords: Coordination Mechanism, Logistics Outsourcing, Revenue Sharing Contracts, Supply Chain, Supply Contracts

1. Introduction This study addresses the problem in the supply chain where the distributor supplies the product through third party logistics service provider (TPLSP) to the relatively long distance markets. Products are delivered by TPLSP to retailers for the selling season in the market. The problems came from the travel distance and the wide market penetration that must be covered in the products distribution. Especially in archipelagic country, such as Indonesia, the challenges are even greater to overcome the differences of demographic and socio-economics characteristics form its islands. In decentralized supply chain, manufacturers control over the interests of TPLSP cannot be done completely. There will be problems if carrier drivers from TPLSP do not deliver products as per the order quantity and manufacturers' distribution plans to maintain market share and products quality received by the retailer. All players have a higher risk when there is no coordination among * Corresponding author. Email : winda.narulidea@uisi.ac.id Published online at http://Jemis.ub.ac.id Copyright ©2017 JTI UB Publishing. All Rights Reserved supply chain [15]. Incentive alignment needs to be done to improve relationships that are mutually beneficial for all players in the supply chain. This study develops a coordination mechanism contract model among players with the involvement of logistics outsourcing in the supply chain. Revenue sharing contract according to Cachon and Lariviere [2] is a common supply chain contract model to determine contract parameters to coordinate the supply chain. They study a single retailer newsvendor model. Further research is developed by Giannoccaro and Pontrandolfo [10] about revenue sharing contracts model in multi echelon supply chain. It study the coordination mechanism of revenue-sharing contract scheme to coordinate three- stage supply chain which contains supplier, manufacturer and retailer. Revenue sharing contract could be implemented to specific problem, the Cai et al [3] develop a model to solve the supply chain management problem in which the producer supplies fresh produces to a long distant market where a distributor purchases and sells it to end customers. Qian et al. [22] develop revenue sharing model in China dairy industry supply chain, in which the profit distribution is not balanced: the supermarket's profit>farmer's profit>manufacturer's profit. An incentive scheme is proposed to coordinate the supply chain. Under the revenue sharing contract setting, the dairy industry's total profit increased by 12.49%. Then Sarathi et al. [24] develops an integrated revenue sharing and quantity discounts contract for coordinating a supply chain dealing with short life-cycle products. Li and Wang [16], and Dong and Li [7] are some of the other researches that using revenue sharing contract approach on different aspects such as inventory, competition, risk adverse retailers, etc. Revenue sharing contract model in this research proposed

for supply chain coordination with the logistics outsourcing as third party between supplier and retailer. In the supply chain, TPLSP is being responsible for distribution processes to retailers. Collaboration has the characteristics to make sharing of information, risk, and profit [17]. According Simatupang [25], information sharing and incentive alignment is a method of coordination that can affect the performance of the supply chain. The impact of poor coordination is the high inventory costs, long delivery times, high transportation costs, high levels of loss and damage, and poor customer service [15]. Therefore, in this research the model apply incentive and punishment scheme in accordance with the logistics performance of TPLSP. The values of the parameters in the model are determined to increase each player profit in the supply chain and the win-win conditions can be achieved. 2. Model In the model, the supply chain system consists of three participants: manufacturers as the suppliers, TPLSP, and retailers as seen in Figure 1. Logistics outsourcing are implemented to perform logistics activity of the supplier. Products will be delivered by TPLSP from manufacturers/ suppliers for selling season in retailers. There are three possible conditions: (1) centralized; (2) decentralized; and (3) decentralized supply chain under revenue sharing contracts. In centralized condition, all roles of supply chain are owned and controlled under the same firm, while in decentralized condition all parties could be from varies firms that collaborated in the supply chain. In the last condition, revenue sharing contracts are implemented for all players in decentralized supply chain. The retailers' demand distribution is N(μ;σ). Then we denote F as the normal cumulative density function of N(μ;σ), and F -1 as the inverse normal cumulative density function. In this model, information of the demand distribution assumed to be known by all of players in supply chain. Table 1. Notation for Formulation Model Notation Description □ unit selling price □ (□) demand level of end customer ∏ □ total supply chain profit in centralized condition ∏ □ −□ total suppliers/ manufacturers profit in decentralized condition ∏ □ −□ total retailers profit in decentralized condition ∏ □ −□ total TPLSP profit in decentralized condition ∏ □ −□□ total suppliers/ manufacturers profit in decentralized condition under revenue sharing contracts ∏ □ −□□ total retailers profit in decentralized condition under revenue sharing contracts ∏ □ −□□ total TPLSP profit in decentralized condition under revenue sharing contracts □ □ optimal order quantity in centralized condition □ □ optimal order quantity in decentralized condition □ □□ order quantity under revenue sharing contract □ wholesale price at supplier □ □ understocking cost □ □ overstocking cost □ □ the marginal cost of suppliers □ □ the marginal cost of retailers □ □ the marginal cost of TPLSP □ quoted logistics services price provided by TPLSP □ □ negotiated penalty cost under- ordered quantity received on time θ ratio of under-ordered quantity received on time (0 ≤ θ ≤1) N(θμ;θσ) normal distribution function □ □ contract parameter (1-□ □) determine the proportion of supplier revenue to be shared to TPLSP □ □ contract parameter (1-□ □) determine the proportion of retailer revenue to be shared to supplier

82 Figure 1. Model of logistics outsourcing for suppliers in two-echelon supply chain. 2.1. Model in Centralized Supply Chain The condition of centralized supply chain defines the ideal condition, which all the parties throughout the supply chain are under the same firms, so the whole decision makings are in the same objective; to get the optimal solution for the firm itself. In the centralized supply chain, the supply chain expected profit is given by: ∏ h = □ min[□ □ , □ (□)] − (□ □ + □ □ + □ □)□ □ (1) The optimal order quantity is characterized by a balance between understock cost and overstock cost. The understock and overstock cost is given as follows: □ □ = □ − (□ □ + □ □ + □ □) (2) □ □ = □ □ + □ □ + □ □ (3) (3) So the optimal order quantity is as shown below: □ □ = □ −1 □ □ □ □ +□ □ = □ −1 □ −(□ □ + □ □ + □ □) □ (4) 2.1. Model in Decentralized Supply Chain Meanwhile under the decentralized condition, all the players make their own decision respectively. The supply chain performance become suboptimal, because each player wants to maximize their own profit, so the double marginalization occurred in the supply chain. The expected profit of retailer is given below: ∏ □ □ = □ min[□ , □ (□)] − (□ + □ □)□ (5) The understock cost is calculated as □ □ = □ − (□ + □ □) and the overstock cost □ □ = (□ + □ □), so that the optimal order quantity is given as follow: □ □ = □ −1 □ □ □ □ +□ □ = □ −1 [□ −(□ +□ □)] □ (6) For supplier, the expected profit is given as follows: ∏ □ □ = □ □ □ −((1 − □)□ − □ □ □ + □ □)□ □ (7) Likewise, for the TPLSP, the expected profit is given: ∏ □ □ = ((1 − □)□ − □ □ □)□ □ −□ □ □ □ (8) The order of decision making is described below: a. Supplier will determine the wholesale price □ □ to maximize their own profit as: □ = □□□ □ ∏ □ □ = □□□ □ □ □ □ −((1 − □)□ − □ □ □ + □ □)□ □ (9) b. Retailer will determine the optimal order quantity □ □ as: □ □ = □ −1 [□ −(□ +□ □)] □ (10) c. The TPLSP will determine the logistics services price □ to maximize their own profit and can be modeled as: □ = □□□ □ ∏ □ □ (11) = □□□ □ ((1 − □)□ − □ □ □)□ □ −□ □ □ □ (11) 2.2. Model in Decentralized Supply Chain under

Revenue Sharing Contract Under revenue sharing contract, retailers will share certain fraction of their revenue to the suppliers. The parameter $(1 − \square\square)$ defines the certain fraction of retailers revenue shared to suppliers. So the expected profit of retailers is given below: $\prod \square\square\square = \square\square\square$ (12) Likewise the suppliers will share certain fraction of their revenue to the TPLSP, so that the expected profit of suppliers is given as: $\prod \square\square\square = \square\square[(1 − \square\square)(\square\square\square\square[\square,\square(\square)]) + \square\square] − (((1 − \square)\square + \square\square\square) + \square\square)\square$ (13) Meanwhile for the TPLSP the expected profit is given as: $\prod \square\square\square = (1 − \square\square)[(1 − \square\square)(\square\square\square\square[\square,\square(\square)]) + \square\square] + ((1 − \square)\square + \square\square\square)\square − \square\square(\square)$ (14) Supplie r Retailer TPLSP Q ρ T P Min (Q, D(r)) ω r c T c S c R

83 If each player try to maximize their own profits, so the equation of optimal order quantity as follows: $\square\square\square\square = \square^{-1}[\square\square\square − (\square + \square\square)]\square\square\square$ (15) while the $\square\square = \square\square\square − (\square + \square\square)$; $\square\square = \square + \square\square$. Figure 2. Supply chain under revenue sharing contract. To obtain coordination in the supply chain, the contract parameters $\square\square$, $\square\square$, $\square$, and $\square$ are designed so that the contract can effectively coordinates all the players. To get the order quantity as $\square\square\square\square = \square\square$, so we obtain the equations as follow: $\square^{-1}[\square\square\square − (\square + \square\square)]\square\square\square = \square^{-1}\square − (\square\square + \square\square + \square\square)\square[\square\square\square − (\square + \square\square)]\square\square\square = \square − (\square\square + \square\square + \square\square)\square$ (16) $\square = (\square\square + \square\square + \square\square)\square\square − \square\square$ (17) $\square = (\square\square + \square\square + \square\square)(\square\square + \square\square)(1 − \square\square) − \square\square$ (18) Contract parameter $\square\square$ and $\square\square$ range between 0 to 1, so we can obtain the equations as follow: $\square\square > \square\square\square\square + \square\square + \square\square$ (19) $\square\square > 1 (1 − \square\square)(\square\square + \square\square)[\square\square + \square\square + \square\square] − (\square\square + \square\square)$ (20) The order of decision making is described below: a. Distributor will determine the wholesale price $\square$ to maximize their own profit as: $\square = \square\square\square\square \prod \square\square\square\square = \square\square\square\square\square\square\square[(1 − \square\square)(\square\square\square\square[\square\square\square,\square(\square)]) + \square\square\square\square] − (((1 − \square)\square + \square\square\square) + \square\square)\square\square\square$ (21) b. Retailer will determine the optimal order quantity $\square\square\square$ as: $\square\square\square\square = \square\square\square = \square^{-1}[\square\square\square − (\square + \square\square)]\square\square\square$ (22) c. The TPLSP will determine the logistics services price $\square$ to maximize their own profit as: $\square = \square\square\square\square \prod \square\square\square\square = \square\square\square\square (1 − \square\square)[(1 − \square\square)(\square\square\square\square[\square\square\square,\square(\square)]) + \square\square\square\square] + ((1 − \square)\square + \square\square\square)\square\square − \square\square(\square\square\square)$ (23) 3. Numerical Experiment Numerical experiments are performed to clarify the proposed model and verify if the model could obtain win–win condition in supply chain. The contract parameters are determined to coordinate all players. As seen in table 2, the numerical experiments use the similar data from the basic model by Giannoccaro and Pontrandolfo [9]. For the purpose of comparing the expected profit, in this research using different ratio of under- ordered quantity received on time $(0 ≤ θ ≤ 1)$. Table 2. Problem Data Variable Value $\square\square 1 \square\square 2 \square\square 4 \square 2(P + c S) = 16 \square 2\square\square = 4 \square\square 2$ price r 30 demand D(r) Normal distribution, μ=100, σ=30 We can conclude from the numerical experiments results in figure 3, 4, and 5 that in the decentralized supply chain condition, all players (retailer, supplier, and TPLSP) receive higher profits under the revenue-sharing contract than without using the RS contract. The revenue sharing contract could coordinate the supply chain and obtain high supply chain performance, which indicate by high expected profit. If we compare all the players expected profit under RS contracts could be higher than 84 the expected profit without RS contracts. It means that RS contracts model has high desirability level for all supply chain players, which obtain higher profit than decentralized condition without RS contracts. Figure 3. Retailer's expected profit under RS and without RS contract Figure 4. Supplier's expected profit under RS and without RS contract Figure 5. TPLSP's expected profit under RS and without RS contract Figure 6. Supply chain's expected profit under RS and without RS contract Not only from desirability level among all players in supply chain to collaborate into the contracts, even if we see from figure 6, the expected supply chain profit under RS contract could be higher than the ideal condition of centralized supply chain. It shows that the revenue sharing contract is helpful to coordinate the supply chain. Moreover, the incentive and punishment scheme for TPLSP could drive the punctuality of delivery. This scheme could increase logistics outsourcing performance in the supply chain. In the supplier and retailer's perspective, better coordination in supply chain could obtain high profit, due to its benefit to improve the effectiveness and 0 200 400 600 800 1000 1200 Decentralized (without Revenue Sharing Contracts) Revenue Sharing Contracts 0 200 400 600 800 1000 1200 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 Supplier Profit Decentralized (without Revenue Sharing Contracts) Revenue Sharing Contracts 0 200 400 600 800 TPLSP Profit Decentralized (without Revenue Sharing Contracts) Revenue

Sharing Contracts 0 500 1000 1500 2000 2500 3000 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 Supply Chain Profit Decentralized (without Revenue Sharing Contracts) Revenue Sharing Contracts Centralized

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responsiveness to fulfil the customer demand.

4. Conclusion

Revenue sharing contracts model were developed to allocate the profit and to share the risk between players in the supply chain, specifically with the implementation of logistics outsourcing strategy in the supply chain. Moreover, to improve or maintain the performance of the TPLSP, in the model, there are penalty and incentive schemes in accordance to TPLSP performance. Numerical experiments were conducted to simulate the performance of the model to generate the expected profit of each player and the supply chain profit. From the expected profits obtained from numerical experiment, they show that the implementation of the revenue sharing contract model could gain the profit of each player and supply chain profit as a whole system. Moreover, the penalty and incentive schemes are applied in the model to improve the logistics outsourcing performance. They indicate that the revenue sharing contract model could be implemented in decentralized supply chain to coordinate the logistics outsourcing. With this coordination mechanism model, each player in the supply chain could act with the same objective to obtain the optimal solution for supply chain and it prevents double marginalization practice.

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