Current Order and Inventory Models in Manufacturing Environments: A Review from 2008 to 2018

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Abstract—One of the issues of designing supply chain network is "Supply chain ordering management ". Extra costs are the most important factors in the survival of an organization and have a significant impact on company competitiveness. However, holding inventory, order accepting, and functional risks are factors that have not been studied simultaneously. The purpose of this paper is to provide a review on order and inventory and use of Activity based costing approach in regard to supply chain management and costs managing. This paper selected and reviewed 56 published articles in a decade of 32 important journals related to order and inventory of supply chain manufacturing industries which chosen from the "Science direct and Scopus" databases and in this regard, the applications of the Artificial Neural Network method which called "ANN", ant colony algorithm and queue theory have been proposed. All published articles were categorized based on the author number, The first author name, publication year, problems, factors, type of manufacturing industries, research methods and results and findings. Finally, International Journal of production Economics was ranked the first. Results of this paper acknowledge that order management and inventory control can help decision makers in solving some problems under uncertainties situations of demands in environmental manufacturing industries and this approach have seen increasing interest among previous researchers to use this approach in various steps of supply chain management.

Keywords—order management, inventory control, operational risk, activity-based cost

1 Introduction

The supply chain management is the management of all manufacturing and supplying processes, from raw material to finished customers, that covers the whole value chain from material extraction to product lifetime. Some go further and consider recycling of raw materials in the range of the supply chain management. One of the most important features that can be mentioned in order to manage supply chain orders are: the profitability of orders, long-term orders earnings, increased customer loyalty, long-term cooperation with the company, minimizing the total costs, also it involves forward flows in order to reduce fixed and variable costs and increase customer responsiveness. Applying Dispatch volume limit, increases both the ordering cycle and

the total annual costs. With growing up in the number of replenishment, the cost of the system will enhance. Due to gained costs in order to unnecessary redistribution, a significant leap in costs occurs. Furthermore, by increasing maintenance costs and reducing deficiency cost, the total inventory at the end of the periods is reduced. Haji and et al. studied queueing Inventory System in a Two-level Supply Chain with One-for-One Ordering Policy. In this study, the integrated services system was used in a two-level supply chain in which it was located. Retailer only was a vendor and looking for a stock-based stock policy. Inventory system total cost by retailer is much lower than without a retailer system [4]. Tat and et al. developed Economic-Order-Quantity (EOQ) model with instantaneous deteriorating items for a vendor-managed inventory (VMI) system. In this survey, they studied the EOQ model for deteriorating items in two cases (with and without shortages) to evaluate how VMI affects supply chain. They considered two-level supply chain (single supplier and a single retailer) with one instantaneous deteriorating item. The results show that VMI works better and provides lower costs in all circumstances of traditional supply chain [10]. Zhang and et al. probed in Multi-objective optimization for sustainable supply chain network design considering multiple distribution channels. The Multi Distribution Centre Supply Chain Network (MDCSCN) model is more innovative and pioneered as it meets the latest requirements and outperforms the conventional Supply Chain Network (SCN). Realization of the paradigm changing of traditional SCN to the new one with multiple distribution channels and the complexity of information analysis, can assist management to schedule with importance of optimizing MDCSCN multiple goals by taking into account efficiency and the capacity of facilities and transportation [22]. Kumar and et al. surveyed in developing of a Novel Lot-sizing Model with Variable Lead Time in Supply Chain Environment. The main point of their results is, as the time of purchasing growth, the amount of economic order will rise too [39]. The study of literature shows that there are several types of inventory control models in multi-product environments. The total cost consists of two components:

1. Cost of preparation or ordering costs: includes the cost of adjusting machinery and facility before production in manufacturing sectors. The cost for products provided through the manufacturer consists of the cost of preparing and receiving orders and the cost of transporting goods.
2. Maintenance cost: includes the cost of maintaining the parts in the warehouse.

The cost of ordering items is also composed of two components:

a) the cost of ordering which is independent of the order quantity.
b) Variable order costs that depend on the order of the various products.

Costs are generally classified into four groups:

1. Cost of product unit operations: these costs proportional the number of goods produced, like the cost of machining time, material costs and direct wages.
2. Cost of activities related to production categories: such as management and holding inventory costs, set up of devices, and so on.

3. Cost of specific product-related activities: such as design cost, process engineering, etc.
4. The cost of maintenance activities and management of facilities and equipment: such as rent, utilization, reparation and maintenance costs.

This review paper aims to provide review of current order and inventory models due to costs problems. A wide variety of previous studies reviewed the order management or inventory control in supply chain problems such as inventory control problem of logistical systems but there are several studies that survey in service systems for instance bank as case study. The remainder of this paper is organized as follows. Section 1 provides an overview of literature of current surveys in order and inventory. Section 2 several critical factors of the researches were highlighted. Section 3 of this paper attempted to discuss on the obtain findings and results and Section 4 provides some conclude remarks, limitations of this study, and suggestions for future researches.

2 Literature review

In literature review section, we highlight some important factors that are as follows:

- Extra buffer stock required to eliminate stock out
- Unit cost of time
- Cost of carrying inventory in percentage per year
- Ordering cost in per order
- Demand in lead time
- Number of stock units demanded in time period
- Distribution of demand in lead time
- Procurement lead time
- Minimum stock in any time period
- Number of order per year
- Order quantity
- Economic order quantity
- Re-order point
- Total lead time
- Loss per unit inventory if there is no demand
- Probability of stock out in a cycle (order) [39].
- Set-up cost for supplier to produce component
- Set-up cost for plant to produce product
- Set-up cost for Distribution Centre (DC) to deliver product
- Capacity of plant to design product
- Capacity of supplier to design component
- Unit transportation cost from supplier to plant for component
- Unit transportation cost from plant to DC for product
- Unit purchasing cost of component from supplier

- Unit production cost of product at plant
- Unit cost of throughput
- Maximum production capacity of supplier for component
- Maximum production capacity of plant for product
- Total production capacity of plant
- Minimum throughput
- Quantity of component used in one unit of product
- Service level of supplier
- Service level of plant
- Service level of DC
- Volume of product produced at plant
- Volume of product received at DC
- Volume of component provided by supplier
- Volume of product transferred from plant to DC
- Volume of component transferred from supplier to plant [19].
- Major operation costs share in general operation costs
- Number of identified activity segments
- Share of supply costs in general operation costs [23].

In addition, some critical problems that we mention that are as follows:

Investigating internal interrelationships and provide insights into the operational dynamics of single supply chain enterprises. To better focusing risk monitoring and risk management in the automotive industry supply chains on risks in order to enhance decision making in the upstream supply chain [17]. Taking into consideration the uncertainty of demand, cost of production, allocation of the transportation cost, shortage loss, tax rates and limitation of markdown rates [29]. Cost calculation for more accurate cost information than the traditional volume-based costing (VBC). using ABC approach with two stages to allocate and calculate the manufacturing cost which is based on resources expired of process activities [33]. Sustainable supplier selection and order allocation problem under operational and disruption risk [42], considering different shortage situations [45], minimizing the average total inventory cost [48], risk assessment of existing production units considering availability and human safety criteria [50], deciding the logistics service integrator regarding the location of the customer order decoupling point [52], analyzing the benefits of horizontal collaboration related to perishability, from transportation operations and logistics costs in the Inventory Routing Problem (IRP) with multiple suppliers and customers by developing a decision support model that can address these concerns [55], designing a resilient hub network under operational and disruption risks [56].

Furthermore, all published articles were categorized based on the author number, The first author name, publication year, problems, factors, type of manufacturing industries, research methods and results and findings. Some manufacturing industries that are surveyed in articles as a case study or collocated data from them, include bicycle, nylon plastic and refrigerator manufacturing, façade components, carpet manufacturing facility, automotive supply chain, coal mining enterprises, gas industry, locomotives railways, steel and glass company and energy production units. The

methods that are used more than others encompass mathematical model, simulation and heuristic algorithm. Study flowchart for the identification and included of articles that are surveyed is shown in Fig. 1. In addition, more information about articles that are investigated in details is exhibited in Table 1.

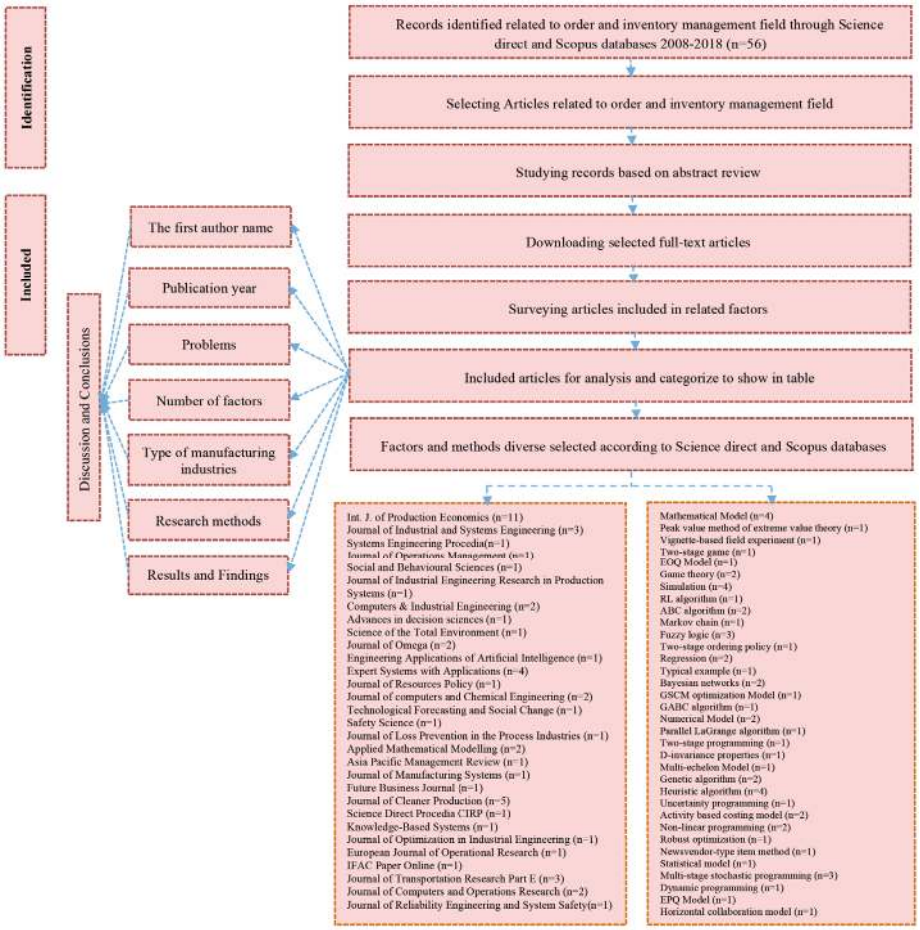

Fig. 1. Study flowchart for the identification and included of articles.

Table 1. Details of researches based on eight categories.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufactur-ing indus-tries	Research methods	Results and findings
[1]	Berling	2008	They consider the problem of choosing the holding cost in inventory models. In the present work, they present a more general model of the cost of holding inventory based on a microeconomic framework.	14	Theory	Numerical model	The suggested method works well in the considered numerical examples (maxi-mum and average cost increase is 1.78% resp. 0.08%). There exist situations where the traditional ap-proach, setting unit h as a percentage of the product value, gives rise to a significant cost increase (415%).
[2]	Charles and Hansen	2008	This study develops a theoretical product cost framework independent of cost assignment concepts.	7	Theory	Cooperative game theory	Cooperative game theory provides rational, non-arbitrary criteria for assigning joint benefits and defines two possible constructs; the set of imputations and the core. Using these two constructs to define accuracy, along with an operational measure of product diversity developed in the study, formal conditions are identified where activity-based costing (ABC) is theoretically closer to the true product cost than functional-based costing (FBC. Their results, therefore, provide a theoretical foundation for ABC.
[3]	Askarany and et al.	2010	Current study first identifies different types of improvements which ABC can offer to SCM and the performance of the organizations, then it examines the extent of association between business size as well as business industry affecting the adoption of ABC in New Zealand (NZ) through using a survey questionnaire and targeting NZ qualified CIMA members.	8	Chartered Institute of Management accountants (Business industry) in New Zealand	Activity-based costing model	To summarize the above statistical tests, the findings of current study support their stated proposition that larger firms are more likely to adopt ABC than smaller firms. However, when the adoption decision was made, there is no significant difference between larger firms and smaller firms in terms of proceed-ing towards a higher level of adoption of ABC (e.g. from activity analysis level to allocation of costs to products level).
[4]	Haji and et al.	2011	Achieving supplier and retailer inventory optimum policy (retailers search for basic stock inventory policy. On the other hand, supplier has to satisfy retailer orders).	13	Theory	Mathematical model	In this study, the integrated services system is used in a two-level supply chain in which it is located. Retailer only is a vendor and is looking for a stock-based stock policy. Inventory system total cost by retailer is much lower than without a retailer system.
[5]	Feng-gea and Ping	2012	This study's aim is the Empirical Analysis of Operational Risk Measurements Based on CVaR (Conditional-Value-at-Risk).	9	Commercial banks in China	Peak Value Method of Extreme Value Theo-ry	The CVaR measurement method can obtain a relatively precise operational loss value, by which economic capital can be allocated accordingly. However, as the capital ratio of most commercial banks in China is relatively low that is to cover expected operational losses by risk reserves, to allocate risk capital on the basis of unexpected operational losses, and to use insurance to lower capital demand, so as to reduce the pressure on capital ratio.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[6]	Schulze and et al.	2012	Several activity-based costing models for inter-firm cost accounting have been proposed. Evaluating these models, a conceptual framework for activity-based costing in a supply chain has been developed. This also forms the basis for a single case study conducted at Europe's largest company for façade components.	3	Europe's larg-est company for facade components	activity-based costing model	The model was tested in a case study. The case study revealed that standardized cost information. An activity-based costing tool implemented at all supply chain members, can support related supply chain decisions. Through standardization of cost information activities, processes can be assessed regarding an effective overall design and an efficient performance. Summing up, the model and case revealed that inter-company cost accounting along the supply chain can foster strategic decisions.
[7]	Hora and Klassen	2013	Firms should improve their own operations by observing problems that occur in others' process-es, significant operational risks appear to be ignored and similar losses recur. They tested the influence of organization-level factors on knowledge acquisition.	12	Managers from two chemical industries	Vignette-based field experiment	They find that both organization-level factors were positively related to the degree of knowledge acquisition. Moreover, operational similarity moderated the influence of market leadership on knowledge acquisition (However, results found no differ-ence in knowledge acquisition of the observing firm based on market leadership when operational similarity is high. These results support the notion that similarity is a critical key criterion triggering knowledge acquisition, regardless of market leader-ship.)
[8]	Alinezhad and et al.	2013	In this survey, the researchers are going to intro-duce a new generation of costing entitled: "Fuzzy time driven activity based costing (FADABC)" to estimate the time more accurately and reduce error coefficient as a cost driver by using fuzzy logic.	8	Theory	Fuzzy logic	Time driven activity based costing system is broadly relying on time estimations and it is principally abstract. If the least error occurs in estimating the key time activities, this system will result in damaging effects which are sometimes broader than the negative effects of not using this system. Thus, we should try to use fuzzy logic in order to minimize errors in time estimations and managers should make decisions with higher assurance levels.
[9]	Wei and et al.	2013	They study a two-stage game problem on pricing, ordering and allocation in a service supply chain, where one supplier sells a product with a fixed capacity to customers via two retailers under wholesale price contracts.	10	Theory	Two-stage game	They find that under the leader of the supplier the competition between the two retailers is eliminated and each retailer just orders its optimal quantity. So, the retailers' behavior in the game is not influenced by the supplier's allocation rule. Furthermore, with pricing power, the supplier can get higher profit but the retailers would not necessarily.
[10]	Tat and et al.	2014	In this research, the problem of a single instanta-neous deteriorating product under VMI policy is studied.	22	Theory	EOQ model development	They developed EOQ model with instantaneous deteriorating items for a vendor-managed inventory (VMI) system. The results show that VMI works better and provides lower costs in all circumstances of traditional supply chain.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[11]	Kazemza-deh and et	2014	They analyze a network design problem for a closed-loop supply chain that integrates the collection of the used products with the distribu-tion of the new products.	14	The carpet manu-facturing facility at Izmir, ,Turkey	Mixed integer nonlinear pro-gramming & Heuristic algo-rithm	They observe that their heuristics perform pretty well in general. They observe that all their heuristics can find the optimal solution in their trials when there are N = 10 customer loca-tions and the percentage deviation of the profits obtained by the heuristics from the upper bound are less than 5% for N = 200 customer zones. They also analyze the effects of the parameters on the system. Their computational study shows that TSVNS gives better results than SAVNS and GAVNS in terms of the profits obtained.
[12]	e and Mellat	2014	This survey investigates the relationship among supply chain visibility (SCV), supply chain risk (SCR), and supply chain cost of new and seasonal products.	14	Theory	Heuristic algo-rithm	The results show that more visibility is desirable, because it increases effi-ciency in a supply chain and decreases both cost and risk.
[13]	Xiao and Chen	2014	This probe develops a game theoretic model of a one-manufacturer and one-retailer supply chain facing an outside integrated chain (manufacturer) to study the price and lead-time competition and investigate coordination of the supply chain, where the make-to-order production mode is employed and consumers are sensitive to retail price and lead time.	10	Theory	Game theory	They find that decentralization of the supply chain increases its lead time while decreases the rival's lead time; and the decentralization increases the retail prices. The existence of the outside competitor raises the lead time. A higher reservation price or brand differentiation increases the retail prices but decreases the lead times. They find that the sequence of decisions affects the validity of the all-unit quantity discount scheme in coordinating the supply chain.
[14]	Molamoham-adi and et al.	2014	This article investigates the effects of the latter policy, two-level trade credit, on a retailer's optimal ordering decisions within the econom-ic order quantity framework and allowable shortages.	14	Theory	Genetic algorithm	Numerical examples demonstrate the profitability of the developed two-level supply chain with backorder. For matching the real world inventory systems, this research extends the model proposed by Teng et al. Comparing the results of this survey with that of Teng et al demonstrates that it can be more profitable when backorder cost is smaller than or equal to a specific value. comparing with the traditional inventory system with backorder, the trade credit, both the model of Teng et al and the one proposed in this survey, would increase the profit of the retailer.
[15]	Bieda and et al.	2014	The purpose of the article is to present the results of application of stochastic approach based on Monte Carlo (MC) simulation for life cycle inventory (LCI) data of Mittal Steel Poland (MSP) complex in Krakow, Poland.	7	Mittal Steel Poland (MSP) com-plex in Kra-kow, Poland	Stochastic approach based on Monte Carlo (MC) simulation	This article is concluded that the stochastic approach is a powerful method for quantifying parameter uncertainty in LCA/ LCI studies and it can be applied to any steel industry. The results obtained from this study can help practitioners and decision-makers in the steel production management.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[16]	Mohammad dust and et al.	2015	This article investigates how organization should design their supply chains (SCs) and use risk mitigation strategies to meet different performance objectives. To do this, they develop two mixed integer nonlinear (MINL).	46	A large automotive SC	Robust optimiza-tion (Two mixed integer nonlinear (MINL))	Considering several risk mitigation strategies opens the hand of the designer to select the least costly combination of these strategies to neutralize the negative effects of the risks. The im-portance of considering several risk mitigation strategies increases when the costs of imposing these strategies are different in the SC's facilities. They show that this approach can be used to simultaneously model disruptions in the SC's both facilities and connecting links by defining a single scenario set.
[17]	Guertler and Spinler	2015	Their article investigates internal interrelationships and provides insights into the operational dynamics of single supply chain enterprises. This survey aims to better focus risk monitoring and risk management in the automotive industry supply chains on the right risks in order to enhance decision making in the upstream supply chain.	16	Automobile industry	System Dynamics Simulation	Their first finding is that supply risk managers need to place greater emphasis on the risks that exist within each single supply chain enterprise. Second, they present a system dynamics model that makes it possible to capture and to further analyze these internal dynamics. Third, they show by means of scenario analysis that a highly interrelated risk is much more likely to tip the system by its occurrence than a weakly interrelated risk.
[18]	Mortaza-vi and et	2015	the challenging issues in supply chain man-agement is the coordination of ordering pro-cesses, especially in dynamic situations.	7	Theory	Reinforcement learn-ing (RL) algorithm and Simulation-based optimization	Result shows that there is only 1% of risk that customers' wait more than 16 h for their order delivery. This result implies that the considered supply chain is quite responsive with high service level. For conditional risk evaluation of the supply chain with a given customer waiting time, the conditional distribution function is needed.
[19]	Zhang and et	2015	Designing multi product chain to responsiveness customer various requirements; recognition of purveyor's priorities is a leading factor. the general decisions are related to the selection of supply chain facilities and the allocation of loading.	24	Bicycle Manufactur-ing Compa-ny	Artificial bee colony algorithm	Their model involves three major supply chain stages, including procurement, production, distribution and their interactions. they develop an approach based on an artificial bee colony (ABC) algorithm. Their result can help system experts of supply chain in general
[20]	Jiang and et al.	2015	The deterioration of the inventory affects decision-making and increases losses. Block replacement and periodic review inventory policies were in this article used to evaluate a joint optimization prob-lem for multi-unit systems in the presence of inventory deterioration.	33	Spare parts of electric locomotives in Slovenian Railways	The deterministic deteriorating invento-ry (DDI) model & stochastic deteriorat-ing inventory (SDI) model	The deterministic deteriorating inventory (DDI) model was used to describe deterio-rating inventory when deteriorating inventory data were available and the stochastic deteriorating inventory (SDI) model was used when they were not. This work proved the existence of the optimal maximum inventory level and gave the unique-ness condition under the DDI model. Results showed the total cost rate to be sensi-tive to the maximum inventory level. In addition, the optimal preventive replace-ment interval was reduced and the optimal maximum inventory level was increased to balance the influence of deteriorating inventory.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[21]	ihan and et	2016	Minimizing whole costs of location, shipping and inventory; Model should be drowning up to deter-mine location and allocate inventory refill proper-ly.	12	Theory	Markov chain and nonlinear mixed integer program-ming	This study extends a mathematical model that integrates the location, allocation, inventory replenishment and routing decisions simultaneously that the proposed algorithm could achieve good-quality solutions within reasonable times.
[22]	Zhang and et al.	2016	Designing network with The least shipping and functional cost, with maximum consumer's cover-age, in order to providing organized services.	14	Theory	Multi-objective modified Artificial bee colony algorithm	This model will reduce economic costs of companies supply chain of and increase flexibility. In addition, it can significantly decrease the computational complexity.
[23]	and Jonek-	2016	This article aims to assess and compare operational risk in coal mining enterprises in Central and Eastern Europe.	34	Coal mining enterprises in Central and Eastern Europe	Fuzzy logic	The main external reason for increasing the level of operational risk in the examined enterprises and in the entire sector in Europe was the lowering demand for coal caused by decarburization and the development of alternative energy sources. This was strengthened by the variability and decrease in coal prices in world markets. Additionally, the examined enterprises are used to government protection and state aid, which reduce vigilance and cause risk ignorance.
[24]	Yousefi Baba-dia and et al.	2016	This probe shows a multi-objectives mixed-integer non-linear programming (MINLP) model for a petrochemical supply chain under uncertainty environments, namely disruption risks and less knowledge of parameters. The aims are to mini-mize the average tardiness to deliver products, total cost and transportation cost.	65	Nylon plastic manufactur-ing	Multi-objectives mixed-integer non-linear program-ming (MINLP) and recy-cling centers	The developed model specifies the optimal locations for new DC, collection center and disposal center and optimal allocation of customer zones to DC for each. A feasible case study in Iran showed the valuable performance of the developed model in modifying the efficiency of petrochemical SCs.
[25]	Zhang and et al.	2016	They propose a two-stage optimization model to charac-terize a retailer's ordering policy in a supply chain with demand and supply uncertainties sequentially realized, where the advance payment could be conducted before the selling season to stable the supplier's capacity.	15	Theory	Two-stage order-ing policy	The results show that in the retailer's optimal decision, the advance payment is increased along with the supply risk and is significantly influenced by the retailing price and the supply rate; the results also give the structure of the supplier's the optimal pricing strategy for the retailer's advance payment.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[26]	Zhao and et al.	2016	This study, First, listed companies improving their social responsibili-ties fulfillment face significantly lower operational risk. Second, listed companies publishing independent social responsibility reports face significantly increased operational risk. Third, high risk companies improving social responsibility fulfillment can significantly reduce their operational risk. Finally, low risk companies improving their social responsibilities fulfillment and publishing independent social responsibility reports experience changes in operational risk.	14	Chinese A-share listed companies from 2007 to 2009	Regression (Statistical analysis)	They show that companies that improve their social responsibilities fulfillment significantly reduce operational risk; the better CSR fulfill-ment, the lower is operational risk. Further, high risk companies improv-ing their social responsibility performance can significantly decrease their operational risk, while the independent social responsibility report leads to significantly increased operational risk.
[27]	and Hauge	2016	Operational planning decisions, have received little attention in risk and safety research in offshore oil and gas industry. The overarching objective of the article is to find out how to provide good risk information for such decisions.	9	Gas industry (Theory) (Firefighting system)	Typical example of an operational planning decision scenario	The discussion starts from description of what good risk information is, followed by a proposal to use Activity consequence risk (ACR), Activity performance risk (APR), and Period risk (PR). The main conclusion is that current practices in the industry lack the accuracy and capability to provide such a risk picture.
[28]	Barua and et al.	2016	Their study aims to take proper initiatives to minimize/ remove hazards and risks. This study proposes a risk assessment methodology for dynamic systems based on Bayesian network, which represents the dependencies among variables graphically and captures the changes of variables over time by the dynamic Bayesian network. This study proposes to develop dynamic fault tree for a chemical process system/sub-system.	7	A TANK HOLD-UP PROBLEM (Chemical process)	Bayesian networks	Bayesian network can combine the expert judgment and quantitative knowledge to estimate risk. Also, it demonstrates changes of variables with time through the reasoning process. Application of Bayesian network is very much helpful for the area where the availability of data is limited. Controller failure in this case study is more critical than other equipment/components failures in the system as its failure probability is much higher than others.
[29]	Zhang and et al.	2016	Taking into consideration the uncertainty of demand, cost of production, allocation of the transportation cost, shortage loss, tax rates and limitation of markdown rates, are problems that this survey wants to solve them with an optimization model.	25	Two manufacturer case	GSCM optimization model	The corporations of supply chain should pay great attention to the limitation from the governments on the bounds of markdown rates. The range of the bounds often has a significant impact on the optimal retail prices, transfer prices, order quantities, after-tax profit and allocation of the profit. Demand uncertainty has a significant effect on the optimal retail price than the transfer price. Tax rates, production cost, and losses due to shortages are three Important factors for the optimal decisions of the corporation. In addition, market demand is important too.
[30]	Wang and et al.	2016	They study a decentralized supply chain in which a manufacturer supplies a newsvendor-type item to a retailer in a stock-dependent demand market, considering temporary and permanent inventory shrinkages.	12	Theory	Newsvendor-type item method & Numerical examples	The result shows, in the price-only contract, the inventory shrinkage effect urges the retailer to place more quantity to cover the missing products; the large order. The manufacturer is the winner in this invento-ry shrinkage game. A much cheaper negotiated wholesale price is needed to entice the retailer to discover inventory errors and share with the manufacturer.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[31]	Elsayedn and Wahba	2016	Existing evidence regarding inventory-performance relation-ship is inconclusive. A perspective that this survey stresses in consider-ing this relationship is that it might depend on organizational life cycle stage.	10	The most active firms trading on the Egyp-tian Stock Exchange	Statistical model	The results show that while inventory to sales ratio affects organization perfor-mance negatively in the initial growth stage and the maturity stage, it exerts a positive and significant coefficient on performance in either the rapid growth stage or the revival stage.
[32]	Cui and et al.	2017	The supply chain network design is a strategic decision problem which is aimed to decide number of different facili-ties required to make in the network. facility location prob-lem in close loop supply chain network is important too.	31	Theory	Artificial bee colony genetic algorithm	Results indicate that proposed GABC outperforms standard ABC and GA in different scenarios to give smaller value of the total cost of network and gives more robust results to give smaller variations in the total cost of network due to uncertain variations in the demand, as compared to original ABC and GA.
[33]	Lu and et al.	2017	This article explores cost calculation methodology for more accurate cost information than the traditional volume-based costing (VBC). The survey uses Activity-Based Costing (ABC) approach with two stages to allocate and calculate the manufactur-ing cost which is based on resources expired of process activities.	6	Bicycle parts industry	Activity-Based Costing system & Volume-Based Costing (VBC) (Com-pare)	By comparing the cost information between VBC and ABC approach, the research findings indicate that current VBC approach distorts cost structure because of single cost drive had been chosen, therefore, cross-subsidization among manufacturing cost structure among variant product. Secondly, ABC approach provides more accurate cost information that will help to set the competitive price strategy of the product that is great contribution to increase enterprise's profitability and competitive power.
[34]	Fattahi and et al.	2017	They address a multi-period supply chain (SC) network design where demands of customers depend on facilities serving them based on their delivery lead-times They develop a multi-stage stochastic program, and model disruption's effect on facilities' capacity. The SC responsiveness risk is limited.	27	Iranian glass company	Multi-stage stochastic pro-gramming	Their computational results highlighted the fact that the customer behavior with respect to the delivery lead-time of products has substantial influence on the design decisions of SC networks. In this regard, as the customer's sensitivity to the deliv-ery lead-time of products increases, the facilities that supply these customers should be located closer to them and hence, the design costs of SC increases.
[35]	Pacheco and et al.	2017	The planning of a supply chain (SC) subject to market de-mand uncertainty is challenging in regards to defining update mecha-nisms that deal with demand variations. Also, proposes a new reorder point update procedure for order-up-to-level (OUTL) policies in continuous review systems.	14	Brazilian company	discrete event simulation	The proposed approach is based on absorption inventory, a new concept that modifies both the reorder point and lot size according to demand variations. Result shows that the proposed order policy provides better performance, particularly in terms of bullwhip effect reduction and improved service level.
[36]	Xu and et al.	2017	This survey studies the production and pricing problems in MTO (make-to-order) supply chain containing an upstream manufactur-er who produces two products based on MTO production and a downstream retailer.	10	Theory	Numerical model	They investigate the production and pricing problems in MTO supply chain consisting of two risk-neutral firms, an upstream manufacturer who produces two products based on MTO production and a downstream retailer. They assume that the emission trading prices are exoge-nous. It is possible that the emission trading prices varies with the cap allocated by the govern-ment agencies because the amount of the cap will affect the emission permits' supply and demand in the outside market.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[37]	Nematollahia and et al.	2017	Regarding globalization growing trend and sustaina-bility concerns, the need for paying attention to the issues of corporate social responsibility (CSR) not only applies to individual firms, but also extends to the whole supply chain (SC) networks.	12	Newsvendor setting	Mathematical model	Result shows that numerical experiments indicate that, under some circum-stances, alongside the increment of SC profits, more CSR investment and better CSR performance level will be achieved through the collaborative model than other decision-making structures.
[38]	Li and et al.	2017	In this probe, cluster supply chains are introduced to avoid the operational risk via across-chain coopera-tion. The framework of order selection in cluster supply chain is presented based on four order catego-ries (direct, reserve, across-chain, and rejected order).	10	Industrial firms operating in cluster supply chains context in China (produc-tion flexibility)	Parallel Lagrange algorithm	A parallel LaGrange heuristic algorithm is devised to solve the Mixed-Integer Non-linear Program (MINLP) problem. The result proves the parallel Lagrange heuristic algorithm outper-forms Benders approach, the former can efficiently solve large-scale-data problem instances at relatively short time. The outcomes also reveal that, by designing the different combination of the factor of rejected order and that of a cross-chain order, it can be better trade-off between order due-date and cost while better aligning with the long-term business strategy in cluster supply chains.
[39]	Kumar and et al.	2017	Cost's factors and its impact on segmental emission, dynamic lot-sizing, considering the problem of determining production lot sizes when demand is deterministic.	23	Unit of Power Transformer Manufactur-ing Company in India	Mathematical model based on probable collapse theory	The results indicate that the amount of economic order will increase with time going up. Large changes in standard deviations of demand rates have little effect on EOQ, ROP. With increasing demand speed, they have achieved more favorable optimum points. If the procurement time grow, ROP rise too.
[40]	Govindan and et al.	2017	The aim of this probe is to provide a comprehensive review of studies in the fields of SCND and reverse logistics network design under uncertainty. For this aim, the real-life case studies are divided into five major types, including agricultural, bio-mass/biofuel, gas/hydrogen, pharmaceutical, and oil SCs. (A review)	28	A supply chain for glass industry	Stochastic pro-gramming	The last conclusion that can be drawn from this survey article is while there are many research studies for SCND problem under uncertainty, this research area still needs more studies present-ing realism models based on real-world applica-tions and handling computational aspects to solve large-sized problems.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[41]	Arampantzi and et al.	2017	They study the role of Sustainability in Supply Chain Network Design (SSCND), they propose a new Multi-Objective Mixed Integer Linear Programming (MMILP) model. To solve the proposed model, they employ both goal programming and the ε-constraint method to achieve efficient trade-offs among the three objectives.	66	A large case study of an existing global manufacturer of commercial refrigerators	Linear Programming (MMILP) model	The goal programming method results in both economic and environmental cost improvements, while maintaining social costs under control. The ε-constraint method provides the opportunity to regulate the expenditures related to environmental and social strategies. Despite its high complexity, the case study results validate the ability of the proposed model and method to (re)design high performing sustainable supply chains.
[42]	Vahidi and et al.	2018	This study proposes a novel bi-objective two-stage mixed possibility-stochastic programming model to address sustainable supplier selection and order allocation problem under operational and disruption risk.	20	Automotive company (Iranian and French automobile makers)	Two-stage mixed possibility-stochastic programming	The sustainability and resilience aspects of candidate suppliers were investigated. In this article to shed light on the fact that an aggregated sustainability-resilience objective function would produce better overall results when these two concepts are taken into account. It indicates that there is a possibility to decrease the total supply cost of parts in this firm up to 14% by maintaining the level of sustainability resilience score of suppliers at the current state or even improve the total score up to 30% in comparison with the current state.
[43]	Wanke and et al.	2017	This article proposes a decision-support system that makes use of fuzzy logic to consider inventory carrying, shortage and ordering costs as well as transportation costs.	18	Theory	Fuzzy systems	In this context, the Revised Decision-making System for Stock Allocation model showed good results in relation to the total costs incurred in the allocation of items in simulated distribution systems. In some of the cases that were presented, the total costs involved in the activity were about 8% lower than those of their comparison models.
[44]	Abbou and et al.	2017	This research deals with the inventory controller design for constrained production systems subject to uncertainties on the customer demands. The case study focuses on the inventory regulation problem in production systems where contain perishable finite products.	7	Case study on inventory control problem of logis-tical systems for perishable finite products	D-invariance properties (predictor based feedback structure) & Geometric interpretation	In result of this survey, before investing and choosing the production and storage units, someone has to study the constraints of dimensioning of the production system, under the existence of the control law. The main advantage of the conditions proposed in this work is it permits the analysis of the existence of control laws before their conception and the implementation in the space of parameters permits.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[45]	Li and Wang	2017	They investigate a replenishment and production control problems for a multiple machines and multiple product-types production/inventory system with inventory inaccu-racy. The objective is to minimize the average production cost, including the inventory holding cost and the backlog penalty. In addition, lead time unreliability of machines are considered.	27	Theory	Dynamic programming	The results of the experiments show that the proposed conditional expectation-based policy (i.e., the Robust Policy) usually outperforms the simplified replenishment and production control policy (i.e., the Robust Policy). The results of experiments show that the proposed conditional expectation-based policy outperforms the simplified replenishment and production control policy under the variation of system parame-ters.
[46]	Moser and et al.	2017	In this context, inventory management is increasingly viewed as an essential lever for creating a sustainable competitive advantage. This research explores how seven fundamental characteristics of process indus-tries drive inventory performance.	11	Four process industries and four peer industries (Comp stat North America)	Seemingly Unrelated Regression (SUR) equations model	Their results show that capital intensity, capital costs, transportation costs, delivery time, price volatility, demand uncertainty and gross margin directly affect a compa-ny's degree of freedom in terms of inventory management and illustrate that invento-ry management in process industries follows different dynamics. This study en-hanced the understanding of inventory drivers and gives practitioners a tool to guide future improvement efforts.
[47]	Marand and et al.	2017	This study addresses joint inventory control and pricing decisions for a service-inventory system. In such a system both an on-hand inventory item and a positive service time are required to fulfill customer demands. They compare the solutions of the models both with and without fill-rate and service-reliability constraints and report the main interest-ing managerial insights.	9	Theory	Mathematical formulation	They observe that at a high fill rate, the optimal order quantity can be increasing in the reorder point. Moreover, for an active fill-rate constraint, reducing the mean replenishment lead time results in more customers lost on average. Although the model studied in this research is a simplified version of real world cases, it gives useful managerial insights about more complex systems and can be used as a starting point for more elaborated settings.
[48]	Daia and et al.	2017	This research proposes multi-echelon inventory models with three types of demand. The stakeholders consist of a retailer, a plant and a number of middlemen also, develops and solves three multi-echelon inventory models with partial backlogging and three types of demand, which are ramp-type time dependent demand, reverse type time dependent demand and trapezoidal-type time dependent demand. The objective is to minimize the average total inventory cost for three models.	39	Theory	Multi-echelon inventory with ramp-type demand model	This study extends one-echelon inventory model to multi-echelon inventory model and studies a new type of demand, say reverse ramp-type demand. By studying the results of two sensitivity analyses, the following insights can be derived. They find that most results of these two sensitivi-ty analyses are the same, which indicates that the relationship between parameters and optimal solutions is reliable.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[49]	Taleizadeh and et al.	2018	In this survey, they develop four new sustainable economic production quantity models that consider different shortage situations. They solve four inde-pendent profit maximization problems for four different situations in which shortages are not allowed, and when shortages are allowed, the lost sale, full backordering.	37	Theory	Sustainable Eco-nomic Production Quantity Models	These results show that the sustainable economic production quantity with partial backorder-ing model is a general and more realistic model that can be used in many real cases with a reasona-ble profit amount, compared with the three other proposed models. These new models may be useful for companies seeking environmentally conscious production systems because of their applicable and straightforward computational procedures. The EPQ (SEPQ) models cover all of main shortage situations with regard to both economic and environmental considerations.
[50]	Sykora and et al.	2018	The contribution provides an integrated frame-work for probabil-istic reliability and risk as-sessment of existing energy production units considering availability and human safety criteria.	7	Energy pro-duction units	Bayesian networks	Bayesian networks represent an effective tool for the risk and availability analysis of devices of power station production units. The uncertainty analysis reveals that availability is associated with considerable scatter due to the uncertainty in input failure rates. For important performance indicators, the expert estimates of the failure rates could be enhanced by a more comprehensive search in technical reports.
[51]	Rafie-Majd and et al.	2018	In this article a three-echelon supply chain, consisting of a supplier, a number of distribution centers (DCs), and a number of retailers (cus-tomers) is modeled in form of the integrated inventory- location – routing problem (ILRP).	35	Theory	Mathematical model & Lagrangi-an Relaxation algorithm & heuris-tic algo-rithm	The retailer's demand is stochastic and the transportation fleet is assumed heteroge-neous Lagrangian Relaxation Method is used to solve the resulted model and deter-mine the lower bound; and a heuristic algorithm is provided to feasibilize the result of the Lagrangian Relaxa-tion Algorithm and determine the upper bound. the results suggest that using the Lagrangian Relaxation Algorithm and the heuristic algorithm contributes to saving a considerable time.
[52]	Liu and et al.	2018	They explore how a new inserted order affects the logistics service integrator (LSIs) decision regarding the location of the customer order decoupling point (CODP).	37	Baoyun Logis-tics company	Genetic algorithm	The results show that the CODP moves earlier with the increase of the volume of new order. As the new order's similarity coefficient increases or the new order's completion time requirement is relaxed, the CODP moves later in the LSSC. With a given similarity coefficient or time patience variance related to the new order, the maximum insertion volume decreases and the CODP moves later in the LSSC.
[53]	Kara and Dogan	2018	In this study, they deal with the inventory management system of perishable products under the random demand and deterministic lead time in order to minimize the total cost of a retailer.	4	Theory	Reinforcement Learning & Simu-lation-based opti-mization	The experiments demonstrated that the ordering policy which takes into account the age infor-mation appears to be an acceptable policy and learning with RL provides better results when demand has high variance and products has short lifetimes.

Author No.	The first author name	Publication year	Problems	Number of factors	Type of manufacturing industries	Research methods	Results and findings
[54]	Crawford and et al.	2018	This research provides an overview of the different hybrid life cycle inventory (LCI) methods currently in use in an attempt to pro-vide greater clarity around how each method is applied and their specific strengths and weak-nesses. It is a review from 2010 to 2015.	--	-----	-----	The result of this review shows that there has been increasing methodological work on developing suitable hybrid LCI methods in the past two decades, but their use is still limited in comparison to conventional process LCI. There are a number of reasons for this slow uptake. The first is a lack of standardization in the methods used and second reason is a lack of tools and software allowing the general use of hybrid methods by LCA practitioners. Complex methods such as the PXC method would greatly benefit (from a model) capable of more efficiently integrating process.
[55]	Soysal and et al.	2018	Their interest in this study is to analyze the benefits of horizontal collaboration related to perishability, energy use from transportation operations and logistics costs in the Inventory Routing Problem (IRP) with multiple suppliers and customers by developing a decision support model that can address these concerns.	34	A case study on the distribution operations (One produces figs another produces cherries)	Horizontal collabora-tion model	The results show that horizontal collaboration among the suppliers contributes to the decrease of aggregated total cost and emissions in the logistics system. The obtained gains are sensitive to the changes in parameters such as supplier size or maximum product shelf life.

Table 2. Distribution of researches based on the name of journals.

No.	The name of Journals	Frequency of Articles are Published	Percentage
1	Systems Engineering Procedia	1	2%
2	Journal of Operations Management	1	2%
3	Social and Behavioral Sciences	1	2%
4	Journal of Industrial Engineering Research in Production Systems	1	2%
5	Advances in decision sciences	1	2%
6	Science of The Total Environment	1	2%
7	Engineering Applications of Artificial Intelligence	1	2%
8	Journal of Resources Policy	1	2%
9	Technological Forecasting and Social Change	1	2%
10	Safety Science	1	2%
11	Journal of Loss Prevention in the Process Industries	1	2%
12	Asia Pacific Management Review	1	2%
13	Journal of Manufacturing Systems	1	2%
14	Future Business Journal	1	2%
15	Science Direct Procedia CIRP	1	2%
16	Knowledge-Based Systems	1	2%
17	Journal of Optimization in Industrial Engineering	1	2%
18	European Journal of Operational Research	1	2%
19	IFAC Paper Online	1	2%
20	Journal of Reliability Engineering and System Safety	1	2%
21	Computers & Industrial Engineering	2	4%
22	Journal of Omega	2	4%
23	Journal of computers and Chemical Engineering	2	4%
24	Applied Mathematical Modelling	2	4%
25	Journal of Computers and Operations Research	2	4%
26	Journal of Industrial and Systems Engineering	3	5%
27	Journal of Transportation Research Part E	3	5%
28	Expert Systems with Applications	4	6%
29	Journal of Cleaner Production	5	9%
30	Int. J. of Production Economics	11	20%
	Total	**56**	**100%**

Table 3. Distribution of researches based on the countries.

No.	The name of the Country	Percentage
1	Spain	1%
2	Italy	1%
3	Poland	1%
4	Norway	1%
5	Ecuador	1%

6	Netherland	1%
7	Australia	1%
8	Denmark	1%
9	Minnesota	1%
10	New Zealand	1%
11	France	3%
12	Turkey	3%
13	Switzerland	3%
14	Sweden	3%
15	India	3%
16	Germany	4%
17	Brazil	4%
18	Malaysia	4%
19	UK	4%
20	US	14%
21	Iran	17%
22	China	24%
	Total	**100%**

Table 4. Distribution of researches based on the methods.

No.	The name of methods	Methods frequency	Methods percentage
1	Peak value method of extreme value theory	1	2%
2	Vignette-based field experiment	1	2%
3	Two-stage game	1	2%
4	EOQ Model	1	2%
5	RL algorithm	1	2%
6	Markov chain	1	2%
7	Two-stage ordering policy	1	2%
8	Typical example	1	2%
9	GSCM optimization Model	1	2%
10	GABC algorithm	1	2%
11	Parallel LaGrange algorithm	1	2%
12	Two-stage programming	1	2%
13	D-invariance properties	1	2%
14	Multi-echelon Model	1	2%
15	Uncertainty programming	1	2%
16	Robust optimization	1	2%
17	Newsvendor-type item method	1	2%
18	Statistical model	1	2%
19	Dynamic programming	1	2%
20	EPQ Model	1	2%
21	Horizontal collaboration model	1	2%
22	Game theory	2	4%

23	ABC algorithm	2	4%
24	Regression	2	4%
25	Bayesian networks	2	4%
26	Numerical Model	2	4%
27	Genetic algorithm	2	4%
28	Activity based costing model	2	4%
29	Fuzzy logic	3	5%
30	Non-linear programming	3	5%
31	Multi-stage stochastic programming	3	5%
32	Mathematical Model	4	7%
33	Simulation	4	7%
34	Heuristic algorithm	4	7%
	Total	**56**	**100%**

Table 5. Distribution of researches based on the regions

The name of the regions	Number	Percentage
Australia	2	8%
Asia	4	17%
America	7	29%
Europe	11	46%
Total	24	100%

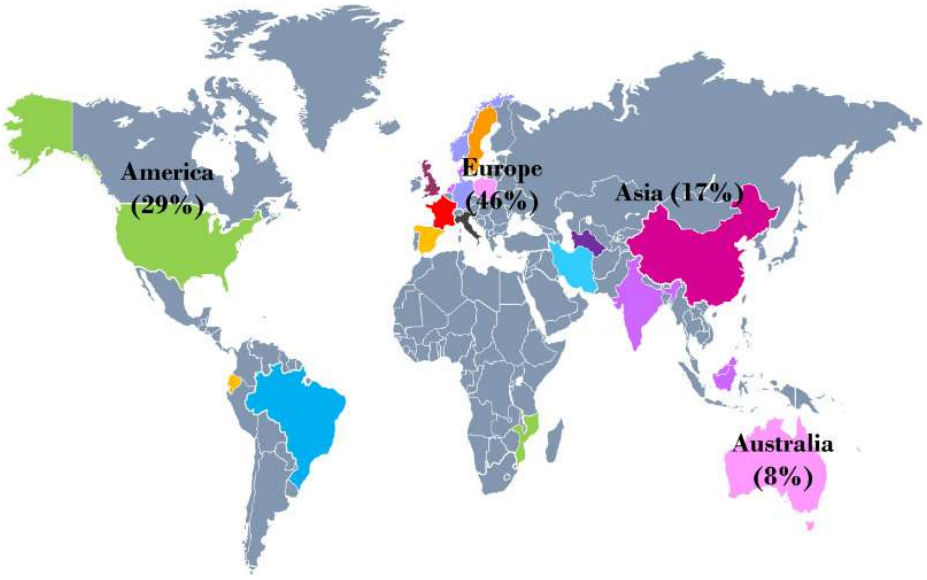

Fig. 2. Distribution of researches based on regions.

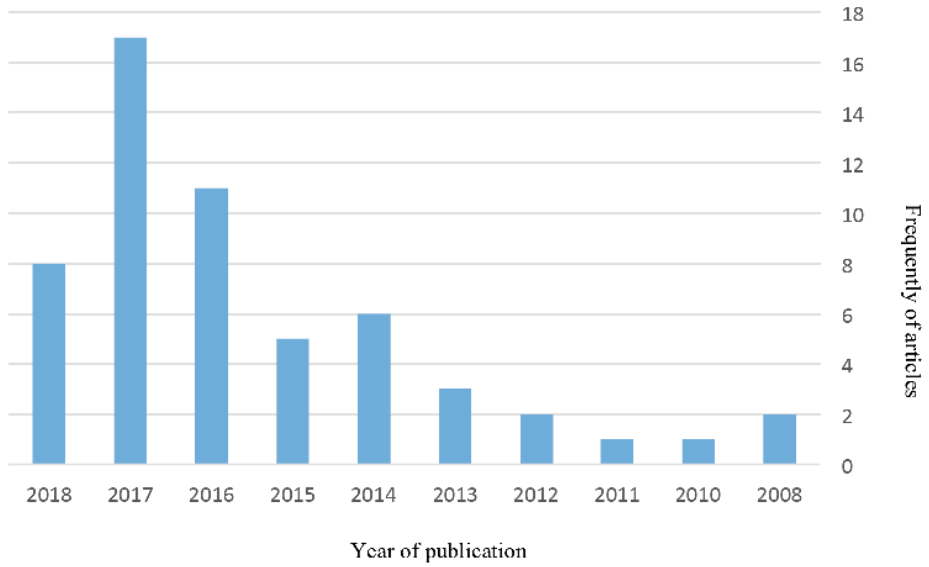

Fig. 3. Distribution of researches based on year of publication.

3 Discussion

Order management and inventory control also their costs are problems that often puzzles managers and researchers. An enormous range of factors include re-ordering point, operational risk, lead time, demand and pricing risk, product innovation, reduced collection demands and documentary credits alongside order management and inventory control. Pricing risk, product innovation, reduced collection demands and documentary credits are critical factors that have not studied yet. In this paper, as a result of distribution of researches based on the countries which the highest contribution was from China (see Table 3). Europe continent has had the largest participation in this field (see Table 5 and Fig. 2). Regarding to journals distribution, International Journal of Production Economics was ranked as the first journal as exposed in Table 2. Some manufacturing industries that are surveyed in articles as a case study or collocated data from them, comprise bicycle, nylon plastic and refrigerator manufacturing, façade components, the carpet manufacturing facility, automotive supply chain, coal mining enterprises, gas industry, steel and glass company, locomotives railways and energy production units but other manufacturing industries which have not checked out yet such as smartphone plant, clothing producers, paint factory, furniture manufacturing and so on. Likewise, the methods that are used more than others consist mathematical model, simulation and heuristic algorithm that the applications of artificial neural network, ant colony algorithm and queue theory, still have not probed (Table 4). Distribution of researches based on year of publication, maximum number of articles which were published is in 2017 by 17 articles as well as, minimum number of articles which were published is in 2010 by an article (Fig. 3).

4 Conclusion & Recommendation

This review paper aimed to review previous studies that applied order management and inventory control during 2008 until 2018 in 32 international scholarly journals which are indexed in Science direct and Scopus databases. In addition, this review paper classifies published articles into 8 main areas: the author number, The first author name, publication year, problems, factors, type of manufacturing industries, research methods and results and findings. As a result of probing 56 articles, 6 articles have implemented ABC approaches, nevertheless, the need for further research is felt in setting of inventory and order of the means of production that not considered synchronously. Moreover, a number of factors for instance product innovation, reduced collection demands and documentary credits are important too that have not surveyed yet. Based on review findings, research methods for instance the applications of artificial neural networks, ant colony algorithm and queue theory have not studied also, we recommended them for future researches. This review paper classified the selected articles into 8 fields of order management and inventory control, it is suggested that future researches can review and classify articles in different areas and sub-areas. This review paper checks out articles that are published in Science direct and Scopus databases, thus, future review researches can peruse other databases. In addition; our review paper only focused on English scholarly journals rather than other languages, therefore; future review surveys can consider and focus on other languages. Because of the importance and necessity of researching in order and inventory, it is recommended that in the fields of operational risk, the collection of demands and documentary credits along with ABC approach come to future studies. It is also suggested that a combination model of these four items will be presented. These fields mentioned above are critical to answer the needs and orders of all customers as well as the survival of an organization, which if ignored, the organization will face with a lack of funds and, in consequence, a bankruptcy and elimination of the competition cycle completely will come about. Moreover, it is recommended that further researches will be done in the fields mentioned with different state of multi-product, single-product or perishable products and green supply chain, also their costs or the closed-loop supply chain with two forward and backward flows to help managers in costs managing of their supply and demand and organization's survival.

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