APEM journal

Advances in Production Engineering & Management
Volume 12 | Number 2 | June 2017 | pp 115–126
https://doi.org/10.14743/apem2017.2.244

ISSN 1854-6250
Journal home: apem-journal.org
Original scientific paper

An inventory model with METRIC approach in location-routing-inventory problem

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ABSTRACT

In this paper, the stochastic location-routing-inventory problem is considered in which retailers' demands and lead-times are stochastic. Demand quantities follow Poisson distribution and lead-times are functions of the shortage quantity. It is also assumed that both retailers and distributors hold inventory and follow (S-1, S) inventory policy. According to these assumptions, we use METRIC (i.e., Multi-Echelon Technique for Recoverable Item Control) approach to model the problem. For this purpose, a mixed integer stochastic programming model is developed based on extending the basic location-inventory-routing model by adding METRIC stochastic relations into the model. Since solving the model with the exact method is very difficult, the Meta-heuristics are used in solving process. Specially, to empower the solution process, a hybrid method consists of simulated annealing and genetic algorithm is developed. The output results along with sensitivity analysis represent the capability of the model in taking to account the METRIC concepts in this type of supply chain problems. Meanwhile, the performance of developed hybrid Meta-heuristic method was checked and approved.

ARTICLE INFO

Keywords:
Location-inventory-routing
Supply chain
Integrated supply chain management
METRIC approach
Genetic algorithm
Simulated annealing

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Article history:
Received 25 December 2016
Revised 21 April 2017
Accepted 25 April 2017

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APEM journal

Advances in Production Engineering & Management
Letnik 12 | Številka 2 | Junij 2017 | Strani 115–126
https://doi.org/10.14743/apem2017.2.244

ISSN 1854-6250
Spletna stran: apem-journal.org
Izvirni znanstveni članek

Inventarni model s pristopom METRIC za reševanje problema lokacija-inventar-dostava

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POVZETEK

V prispevku je obravnavan stohastičen problem lokacija-inventar-dostava, pri katerem so zahteve trgovcev in dobavni časi stohastični. Zahtevane količine so določene s Poissonovo razporeditvijo, dobavni časi pa so funkcija pomanjkanja količin. Privzeto je, da trgovci in distributerji zasledujejo isto inventarno politiko (S-1, S). V skladu s temi omejitvami za modeliranje problema smo uporabili pristop METRIC (več lokacijsko tehniko za nadzor nad artikli). Razvit je bil mešani celoštevilski stohastični model, ki v osnovni model lokacija-inventar-dostava vključi stohastične relacije metode METRIC. Ker je reševanje modela s točnimi metodami zelo težavno, je bil v delu uporabljen metahevrističen pristop. Razvita je bila hibridna metoda, sestavljena iz metode simuliranega ohlajanja in genetskega algoritma. Dobljeni rezultati in občutljivostna analiza so potrdili uporabnost modela z upoštevanjem konceptov METRIC pri reševanju takega tipa problemov dobavnih verig. Hkrati je bila preverjena in potrjena tudi učinkovitost razvite hibridne metahevristične metode.

PODATKI O ČLANKU

Ključne besede:
Lokacija-inventar-dostava
Dobavna veriga
Integrirano upravljanje dobavne verige
METRIC pristop
Genetski algoritem
Simulirano ohlajane

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Zgodovina članka:
Prejet 25. decembra 2016
Popravljen 21. aprila 2017
Sprejet 25. aprila 2017