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Product quality improvement and air pollutant emission reduction in a mining metal three-stage supply chain under cap-and-trade regulation

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ABSTRACT

In today's competitive market, all industries such as mine industries try to increase their profit and keep their customers. Product quality improvement is the miner's most important key to success in competitive market because the mining metals price depends on their quality level. On the other hand, nowadays the management of air pollutant emissions with harmful environmental and health effects is one of the most pressing problems. This paper studies the decision behaviour and coordination issue of a mining metal three-level supply chain with one supplier (extractor), one mineral processor and one manufacturer in which product quality improvement cost at the processor level is higher than the supplier level and at the level of the manufacturer is more than the processor level. We compare the decentralized and centralized systems and identify the optimal product quality level for each supply chain member by designing a revenue sharing contract for decentralized supply chain under cap-and-trade regulation. Finally, numerical example shows that the designed contract not only provides a win-win condition for all supply chain members and increases whole supply chain profit but also increases the final product quality level and reduces harmful air pollutant emissions.

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Izvirni znanstveni članek

Izboljšanje kakovosti izdelkov in zmanjšanje emisij v tristopenjski dobavni verigi rudarskih kovin v skladu z uredbo o omejevanju in trgovanju

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POVZETEK

Na današnjem konkurenčnem trgu vse industrije, kot tudi rudarska industrija, poskušajo povečati svoj dobiček in zadržati svoje kupce. Izboljšanje kakovosti izdelkov je najpomembnejši ključ do uspeha na konkurenčnem trgu, saj je cena rudarskih kovin odvisna od njihove kakovosti. Po drugi strani je danes upravljanje z emisijami, ki imajo škodljive vplive na okolje in zdravje eden najbolj perečih problemov. Ta članek preučuje odločitveno vedenje in vprašanje usklajevanja tristopenjske dobavne verige za rudarske kovine z enim dobaviteljem (ekstraktorjem), enim predelovalcem mineralov in enim proizvajalcem, pri kateri so stroški izboljšanja kakovosti izdelkov na ravni predelovalca višji od dobaviteljeve ravni in na ravni proizvajalca višji od predelovalčeve ravni. Primerjamo decentralizirane in centralizirane sisteme in določimo optimalno raven kakovosti izdelkov za vsakega člana dobavne verige, tako da oblikujemo pogodbo o delitvi dohodka za decentralizirano dobavno verigo v skladu z uredbo o omejevanju in trgovanju. Numerični primer kaže, da zasnovana pogodba ne zagotavlja le boljših pogojev za vse člane dobavne verige in poveča dobiček celotne dobavne verige, ampak tudi poveča kakovost končnega izdelka in zmanjša emisije škodljivih snovi v zraku.

PODATKI O ČLANKU

Ključne besede:
Rudarske kovine;
Dobavna veriga;
Izboljšanje kakovosti;
Usklajevanje kanalov;
Zmanjšanje emisij;
Uredba o omejevanju in trgovanju

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