

3rd CIRP Global Web Conference

Quantification and assessment method for a company's product piracy risks

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Abstract

Continuous globalization and consequent knowledge integration lead to drastically increasing risks of product piracy, which require further countermeasures, other than the reactive legal measures currently primarily employed. This paper addresses the risk quantification and assessment problem decision makers in industry, specifically engineering industry, are facing. The method introduced focuses on the identification of product portfolio and value chain risks and allows for the determination of the company specific risk situation. The deduction of combating strategy alternatives is combined with a novel quantitative cost-benefit analysis of protection mechanisms, which enables well-founded anti-counterfeit decision making.

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Selection and peer-review under responsibility of the International Scientific Committee of the "3rd CIRP Global Web Conference" in the person of the Conference Chair Dr. Alessandra Caggiano.

Keywords: Anti-counterfeiting; Product piracy; Risk assessment; Combating strategy; Know-how protection;

1. Introduction

Being one of the oldest phenomena of manhood product piracy nowadays remains as present as ever. Constant internationalization lowers the imitation barriers Michael E. Porter described to be so valuable for competitive advantages [13]. On the one hand, risks for counterfeiters to be detected remain practically negligible for them; on the other hand, risks evolving for individuals, companies in various industries, or a countries economy as a whole, are significant. Originally the focus of counterfeiting literature lay on consumer industries, in recent years, however, especially the engineering industry was in focus due to its specific product cost structures (such as sales of spare parts) allowing great gains for counterfeiters. Product imitations intercept the innovation financing cycle and significantly lower the re-investment into research and development (see Fig. 1).

The rising threat of product piracy is generally advised to be most effectively combated through a mixture of legal, organizational and technical protection mechanisms, whilst only relying on the preferred legal

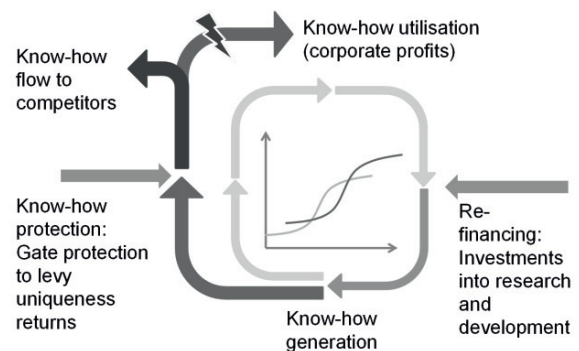


Fig. 1: Impact of imitations on re-investment into R&D according to [12]

measure type is seen as insufficient [1,2,5]. Interlinking individual mechanisms in order to set up a defined know-how protection strategy has been the focus of previous research [10,12], a clear decision and operation guideline was so far missed by affected companies. More than anything they face a piracy risk quantification problem, which is essential for determining the amount of resources they ought to invest into their know-how strategy.

This paper therefore aims to enable company decision makers to quantitatively assess the product piracy risks they face and approximate the risk situation as a whole using internally available product data. This company specific counterfeit risk determination consequently allows the derivation of concrete economically reasonable countermeasures, which are then included in a dynamic an extended know-how strategy including continuous improvement adaptations. The paper therefore focuses on the first three steps of a corporate know-how strategy in depth:

1. Identify the risk situation,
2. Identify appropriate countermeasures;
3. Prioritize fields of action [1].

It furthermore quantitatively complements the iterative protection cycle shown in Fig. 2.

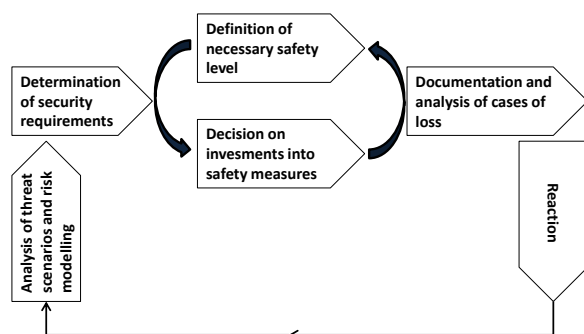


Fig. 2: Iterative cycle of process protection adapted from [14]

2. Fundamentals

Despite its long existence and constantly increasing relevance, the concept of product piracy is not clearly defined in literature and no one uniform terminology exists covering all characteristics of know-how theft. Therefore also for this paper Minagawa et al’s broad definition of counterfeit being all “non-consensual acquisition of technology” is adapted [11, p.455]. Know-how in this context is understood as technology knowledge and refers to the knowledge subcategory, which includes specific competitive advantages [8]. Using this as a basis, imitations are further differentiated according to their functional quality and degree of deception in comparison to the original [16]. Furthermore, the time horizon is seen as a useful indicator in order to differentiate between imitations and originals, with imitations always appearing last [12]. Central to counterfeiting research are the concepts of counterfeiting risks, causes and countermeasures, which are addressed below.

2.1. Counterfeiting risks and causes

Risk management focusing on measuring and controlling risks is vital to any corporate policy. Risks are generally divided into financial risks, such as liquidity or price risks on the one hand and operational risks, which are especially relevant with respect to counterfeit, on the other [6]. Essentially original equipment manufacturers face five counterfeit risk types: loss of competitive advantage due to knowledge lead, reputational loss, decline in sales, loss of market shares and unjustified recourse claims [17]. All these risk types are interdependent and can be aggregated in a final financial risk, specifically a negative effect on the profit of the original manufacturer. Practical experience, however, shows that the gravity of the individual risks so far relies on more or less accurate approximations and cannot be quantified precisely [6]. For this paper following the operational risk definition of the Basel Committee of Banking Supervision risks are seen to arise either due to internal human, process or system failure, or due to external events [3](see Fig. 3).

Counterfeit risks... ...due to internal failure of:				...in consequence
Processes <ul style="list-style-type: none"> ▪ Purchase ▪ Distribution ▪ Production ▪ Outsourcing ▪ Technology licensing ▪ Company collaborations (ie. Joint Ventures) 	People <ul style="list-style-type: none"> ▪ Betrayal of secrets through own employees ▪ Company collaborations (ie. research collaborations) 	Systems <ul style="list-style-type: none"> ▪ Company documents ▪ Company collaborations ▪ Technology licensing ▪ Industrial espionage 	External events <ul style="list-style-type: none"> ▪ Industrial espionage ▪ Espionage through competitors <ul style="list-style-type: none"> – Publications or fair exhibitions – Reverse engineering – Patents 	

Fig. 3: Risk categories according to the definition of operational risks [9]

2.2. Countermeasures

An understanding of reasons and causes for counterfeiting is vital in order to be able to choose appropriate protection mechanisms. Similar to the non-uniform definition of counterfeiting, no uniform categorization of countermeasures is to be found in literature. Generally legal, technical labelling mechanisms, product design, process design and customer commitment measures are depicted [1]. Specifically legal measures are well known to company representatives, but are said to be inefficient and only reactive [8,17]. Furthermore, studies generally show that countermeasures lag behind the actual counterfeiting threat – just about half of the interviewed companies made use of legal agreements, whilst only 7.5% included their external partners into their safety policy using a technical measure [4]. On the one hand the awareness in companies is lacking, on the other hand the

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