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ABSTRACT

Background: Organizations in knowledge-intensive industries such as the field of PharmaNutrition benefit from a critical consideration of intangible resources for innovation performance and competitive advantage. Effective management of these resources, however, is complicated due to difficulties in their identification, appropriation, application, and evaluation. As a consequence, knowledge-intensive organizations are at risk of suboptimal exploitation of their most important value drivers.

Methods: The literature on organizational intangible resources was reviewed as part of an ongoing investigation into effective management of intangible resources in the PharmaNutrition-specific context.

Results: Although high-level dimensions of intangible resources are recognized across industries, the identity and relevance of various lower-level components are heterogeneous and dependent on organization's unique situational attributes. Despite the existence of historical, industry-sourced tick-the-box lists presented here, an analysis of industry-specific characteristics of intangible resources and mechanisms to appropriate their value is warranted to enable practitioners to innovate effectively and efficiently.

Conclusions: This editorial aims to put the topics of intangible resources and their appropriability on the agenda, and invites scholars and practitioners to contribute to the advancement of our understanding regarding these topics through an online survey.

1. Introduction

For organizations in knowledge-intensive industries, intangible resources are considered to be critical factors for organizational performance, innovation, and value creation [1–3]. Collectively referred to as the organization's intellectual capital (IC), these intangible resources entail the non-physical, non-monetary means that are available to the organization through its employees, organizational structures, and external relationships [4–7]. The resource-based view of the firm was the first to put emphasis on the importance of these intangible resources, arguing that they represent the main source of sustainable competitive advantage [8,9]. According to the resource-based view, these 'strategic assets' are the only resources that are truly valuable, rare, non-substitutable and imperfectly imitable [10].

Early research on the different components of IC has endorsed the resource-based view of the firm in its notion that intangible resources function as a primary source of competitive advantage and superior performance [11–15]. Since, a growing body of literature stresses that the roles and effects of IC and its different intangible components are complex and heterogeneous, and therefore difficult to predict. Effective management of intangible resources is further complicated due to their hidden and elusive nature, which makes it difficult to identify, appropriate, apply, and evaluate intangible resources in organizational practice. As a consequence, knowledge-intensive organizations, and especially start- and scale-ups, are at risk of suboptimal exploitation of their most important value drivers.

The industry segment between foods and pharmaceuticals (the 'PharmaNutrition' industry) represents an interesting case in terms of the management of intangible resources. Here, successful realization of

innovative products—such as next-generation probiotics or personalized medical nutrition—demands the contribution of knowledge, processes, and technologies from both sides of this food-pharma interface, and therefore effective relationships between people and organizations from different industry backgrounds [16–18]. It follows that organizational performance and survival in this converging industry environment is particularly dependent on effective management of intangibles. Despite this, the PharmaNutrition industry appears to have been focused primarily on tangible and registered intellectual property (IP) resources [19,20]. At the same time, analyses of industry-specific innovation barriers and technological lifecycles have shown that novel approaches to ensure competitive advantage—built upon an appreciation of intangible resources—are necessary to bring the field forward [21–23]. As we have previously shown however, such approaches are not clear-cut; innovation barriers result from a lack of understanding and appreciation, and therefore a lack of proper consideration of intangible resources relevant for stakeholders in the society and market domains, which appear consistently underrepresented in academic innovation literature [24,25]. Technological advances and radical innovations in the sharing of information and resources between the various stakeholders in this process can only partially accommodate for this neglect [26].

It is no surprise that innovation performance is reduced without the critical appreciation of intangible resources, as this critically informs absorptive capacity—i.e., the ability to recognize, assimilate and apply the value of external knowledge for improving the internal knowledge base [27]—of organizations and industry value networks at large [28]. At the same time, we have seen that intangible resources can serve as breakthroughs to the adoption of innovative technologies by market

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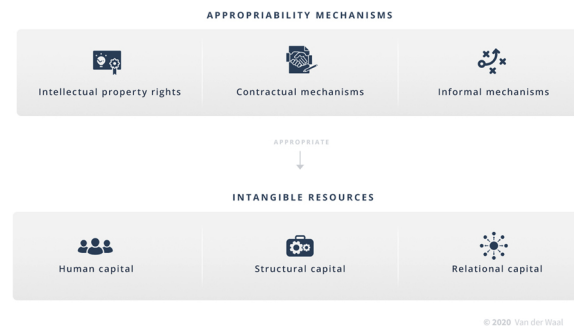


Fig. 1. Appropriability mechanisms and intangible resources can be divided into different types.

Table 1

Industry sourcing of appropriability mechanisms and intangible resources have led to a historical tick-the-box list.

INDUSTRY-SOURCED AND NON-EXHAUSTIVE OVERVIEW			
APPROPRIABILITY MECHANISMS & INTANGIBLE RESOURCES IN PHARMANUTRITION			
Registered	Contracted	Embedded	
AT COST / TAX	<ul style="list-style-type: none"> Confidential Disclosure Agreement (CDA) Material Transfer Agreement (MTA) 	<ul style="list-style-type: none"> Design & Product technology Shapes and sizes 	<ul style="list-style-type: none"> Sales leads and knowledge
<ul style="list-style-type: none"> Patents 	<ul style="list-style-type: none"> Invention Disclosure Form (IDF) Joint IP on improvements (license) 	<ul style="list-style-type: none"> Plant and production design Technical data sheets 	<ul style="list-style-type: none"> Office management / record keeping
<ul style="list-style-type: none"> Brand name Corporate name 	<ul style="list-style-type: none"> Trade secrets (vendors / suppliers / employees) QA (e.g. ISO certification) 	<ul style="list-style-type: none"> Process technology 	<ul style="list-style-type: none"> Asset management processes Employee education (in-house / proprietary) Customer training (on- & off-site)
<ul style="list-style-type: none"> Corporate logo 	<ul style="list-style-type: none"> QC & control standards (round-robin test) 	<ul style="list-style-type: none"> Formulation & Blending technology 	<ul style="list-style-type: none"> Customer surveys
<ul style="list-style-type: none"> Trademark 	<ul style="list-style-type: none"> Non-compete / Non-circumvent clauses 	<ul style="list-style-type: none"> Processing methods 	<ul style="list-style-type: none"> Marketing training
<ul style="list-style-type: none"> Drawing & Model rights 	<ul style="list-style-type: none"> Medical Foods (FDA; FSMP in EMA) 	<ul style="list-style-type: none"> Product (batch2batch) consistency New and/or updated technology 	<ul style="list-style-type: none"> International research clearing center Pricing policies / fee structures
<ul style="list-style-type: none"> Product & Clinical dossier (FDA / EMA) 	<ul style="list-style-type: none"> Purchasing systems (soft- & hardware) 	<ul style="list-style-type: none"> Secondary research 	<ul style="list-style-type: none"> Customer lists and relations
<ul style="list-style-type: none"> Orphan Drug designation 	<ul style="list-style-type: none"> Employee benefits / retention Employee education (outside) 	<ul style="list-style-type: none"> Internal QC standards Standard operating protocols (SOPs) 	<ul style="list-style-type: none"> Consumer advertising Promotional concepts and products
<ul style="list-style-type: none"> Other t.b.d. 	<ul style="list-style-type: none"> Employee education (outside) 	<ul style="list-style-type: none"> Evaluation data / benchmarks 	<ul style="list-style-type: none"> Worldwide public relations efforts
BY OWNER, AT NO / LOW COST	<ul style="list-style-type: none"> Business licenses (in- & out-) 	<ul style="list-style-type: none"> Proprietary test results Test facilities and research 	<ul style="list-style-type: none"> Ad and graphics review
<ul style="list-style-type: none"> Copyrights (Product; Labelling; Instructions for use; Package; Advertisements) 	<ul style="list-style-type: none"> Packaging technology and sourcing 	<ul style="list-style-type: none"> Manuals / instructions / codes 	<ul style="list-style-type: none"> Environmental / eco manufacturing
<ul style="list-style-type: none"> Databases 	<ul style="list-style-type: none"> Natural Step & FSSD 	<ul style="list-style-type: none"> Regulatory knowledge / experience 	<ul style="list-style-type: none"> Technical training / exchange meetings
<ul style="list-style-type: none"> Trade secrets 	<ul style="list-style-type: none"> Other t.b.d. 	<ul style="list-style-type: none"> Trade relationships 	<ul style="list-style-type: none"> Marketing strategy / umbrella
<ul style="list-style-type: none"> Social media 			<ul style="list-style-type: none"> Other t.b.d.
<ul style="list-style-type: none"> Other t.b.d. 			

actors [29,30]. Indeed, industries that have adopted a strategic approach to intangible resources, like the organoids industry, have combined technological disruptions with incredible market successes [28,31]. Thus, a thorough understanding of how these intangible resources relate to innovation processes and their success criteria in the pharmanutrition industry is needed to contribute to enhanced innovation performance, addressing unmet societal needs with improved efficiency [24,32–34].

2. Managing intangible resources: A closer look at appropriability

There's general agreement on the high-level dimensions of IC being human capital (e.g. employee knowledge and skills), structural capital (e.g. organizational systems and practices), and relational capital (e.g. industry partnerships). Research has however demonstrated that the identity and relevance of the various lower-level IC components are not equal for all types of organizations [10,35–39]. Rather, they are

heterogeneous and dependent on the organization's unique situational attributes [40,41]. It is therefore important to advance understanding of the nature and dynamics of critical intangible resources in the PharmaNutrition-specific context, to inform better management of IC and thereby contribute to enhanced innovation performance.

Besides a picture (leading to a toolbox) of the industry-relevant intangible resources and their relevance in organizational practice, it is necessary that such understanding also covers the concept of appropriability—i.e., the ability of organizations to protect their intangible resources against imitation so that opportunities for both value creation and value capture are improved, and investments in innovation activities may be recouped. Appropriability of IC is complicated by many factors that facilitate the flow of intangible resources in present-day industry environments, including modern information and communication technology and high levels of employee mobility [42]. Yet, various appropriability mechanisms are at an organization's disposal that may be combined to shape an effective 'appropriation regime' [10,38,43–45].

Patents, trademarks, copyrights, and other formal IP rights are well-known examples of such mechanisms, as are non-disclosure agreements, non-competitive agreements, and other types of contracts. However, as indicated in Fig. 1 and Table 1, a variety of other, informal mechanisms exist that appear to have attracted less attention by scholars and practitioners despite their potential efficacy [46]. Moreover, due to the great heterogeneity of the IC concept, an overview of how existing appropriability mechanisms relate to the key components of IC in the PharmaNutrition-specific context remains absent. An analysis of the industry-specific characteristics of IC appropriability is warranted as the absence of such a consolidated overview makes it difficult for practitioners to manage their IC, and thereby to innovate effectively and efficiently.

3. Next steps to advance understanding: an industry survey

This editorial aims to put the topics of IC, intangible resources, and appropriability on the research agenda. We now invite scholars and practitioners in the pharmanutrition industry to contribute to the advancement of understanding with regard to these topics, and have developed an online survey to facilitate this process. This survey can be accessed through the following link, and will run from July to September 2020: <https://tinyurl.com/PhaNu-survey>

Declaration of Competing Interest

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