

Zusammenfassung

Die Dissertation ist motiviert aus dem anhaltenden Trend der Digitalisierung der Industrie und Gesellschaft. Mit der explosionsartigen Verfügbarkeit digitaler Technologien und Daten ergeben sich viele Implikationen für die Logistik. Die Dissertation untersucht die Rolle von Daten in logistischen Geschäftsmodellen in drei Studien.

Die erste Studie entwickelt eine morphologische Taxonomie basierend auf der Analyse von web-basierten Unternehmensdaten von 125 Start-ups. Start-ups wurden gewählt, weil diese ein hohes Potential haben digitale Geschäftsmodelle zu nutzen. Dementsprechend ist die Ableitung und Klassifizierung von Komponenten digitaler Geschäftsmodelle basierend auf Start-ups von hoher Relevanz. Im zweiten Schritt werden die kategorisierten Start-ups mittels Clusteranalyse untersucht. Daraus entstehen kondensierte Muster die Häufungspunkt von Ausprägungen einzelner Charakteristika der Geschäftsmodelle kodifizieren. Diese Muster werden in der Arbeit Archetypen genannt, die den Anwender darin unterstützen, generalisierte und abstrahierte Typen an digitalen Geschäftsmodellen in der Logistik zu unterscheiden. Das Ergebnis besteht aus fünf Archetypen mit dazugehörigen sub-Archetypen.

Die zweite Studie baut auf den Ergebnissen der ersten Studie auf und untersucht explizit daten-getriebene Geschäftsmodelle. Dahingehend ist die zweite Studie eine Komplementierung der taxonomischen Analyse digitaler Geschäftsmodelle in der Logistik durch die Betrachtung einer tieferen konzeptionellen Ebene, nämlich der der daten-getriebenen Geschäftsmodelle. Im Gegensatz zur ersten Studie sind die daraus entstehenden Dimensionen und Charakteristika weniger generell und scharf auf die Nutzung von Daten in logistischen Geschäftsmodellen zugeschnitten. Diese Daten werden überwiegend zum Angebot von Optimierungsdienstleistungen (z.B. Routenoptimierung) oder Visibilitätsdienstleistungen (z.B. Tracking) genutzt. Das zentrale Ergebnis ist eine morphologische Taxonomie.

Die dritte Studie wechselt den analytisch-deskriptiven Charakter der ersten zwei Studien auf einen präskriptiven Charakter. Damit einhergehend ist das zentrale Meta-Artefakt keine Klassifizierung oder Typen, sondern Gestaltungsprinzipien. Diese Gestaltungsprinzipien sind Kodifizierungen von Gestaltungswissen über Artefakte. Um diese zu entwickeln, wurde eine qualitative Studie basierend auf 15 Experteninterviews durchgeführt. Letztlich, um sicherzustellen, dass die Gestaltungsprinzipien zielgerichtet auf Geschäftsmodelle einzahlen, wurden sie die ontologische Struktur eines gängigen Frameworks für Geschäftsmodelle eingeordnet.

Summary

The Logistics sector is currently going through a disruptive change that originates in the continuous and all-penetrating nature of digitalization. Digital technologies and the corresponding emergence of various data sources force enterprises to adapt and innovate accordingly. Leveraging data is not only relevant for designing new products and services but to stay competitive. The thesis presents three studies that investigate the use of data in logistical business models.

Study I develops two artifacts. As per the goal to gain insights into the field of digital business models in Logistics, the study analyses start-ups. Start-ups are especially suitable for that purpose, as they, contrarily to incumbent firms, often have clearly identifiable business models, which leverage digital technologies and data. A variety of data sources is used to generate a taxonomy of digital business models in Logistics start-ups representing general design dimensions and design characteristics. The taxonomy must be general as it includes a broad range of business models, for instance, *visibility service providers*, *trucking marketplaces*, or *management software providers*. Because of the variety of start-ups, the taxonomy is the foundation to generate ideal business model patterns, so-called *archetypes*. Each archetype is derived through cluster analysis of the underlying database of business models and interpreted to demarcate a distinct range of start-ups that is different from others. Each archetype is the codification of a condensed set of start-ups and a pattern of a specific configuration of digital business models in Logistics start-ups. The study's key contributions are, first, a general taxonomy of digital business models in Logistics start-ups that enables researchers and practitioners to identify their morphological characteristics. Second, the study proposes multiple archetypes organized into *super-* and *sub-archetypes* that are unique patterns of business model configurations. Each archetype provides prescriptive knowledge, as they are configurations, which can be used to develop business models of their type. While that is not a guarantee for successful design, it enables practitioners to consider essential design dimensions and design characteristics for business model design (e.g., to design a trucking marketplace).

Study II complements **Study I** through a specific taxonomy of data-driven business models (as a sub-type of digital business models). While the general taxonomy gives a broad and conceptually comprehensive look onto digital business models in Logistics, the second taxonomy shifts the frame of analysis to the conceptually narrow sub-set data-driven business models. The sub-set of business models are those that offer *data*

services and leverage a variety of data sources. Usually, these business models offer services in *optimization* and *visibility*. Resulting from that shift, the taxonomy develops more atomic design characteristics that are better suited for easy instantiation and finding novel configurations. The interplay and mutual complementation of both taxonomies result in a larger scale picture covering the conceptual depth both on a generic and on a specific level. From this, the study derives an overarching narrative of the use of data in Logistics start-ups.

While both **Study I** and **Study II** rely on *desk research* and the accumulation of information from web-based data sources, **Study III** undergoes a methodological shift. **Study III** shifts the object of investigation to incumbent firms, which poses new challenges for data collection and the study's corresponding design. For example, while it is relatively easy to collect data on start-ups, as they are often very transparent, an incumbent firm's business model is usually not easily identified. Based on the above, the study reports on a qualitative interview study with experts from the field of Logistics. The study includes interviews with experts from industry practice and applied research. Data were collected in 15 semi-structured interviews with the goal to generate prescriptive design knowledge for the successful utilization of data in Logistics. Design principles are formulated to codify the prescriptive design knowledge, make the findings available and instantiable to practitioners, and contribute them to the knowledge base. The study follows a three-part logic. First, it explores contextual information on the setting of the experts in which their knowledge is embedded. Second, the study elicits meta-requirements from the expert interviews and formulates them as *design principles*. These design principles are codified design knowledge that each solves at least one meta-requirement. Lastly, the study contextualizes the design principles to leverage potential benefits and interdependencies between them. In summary, the design principles are not a guarantee for success but should help designers consider central elements of digital business models in Logistics and make successful instantiation more probable.