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BACHELOR'S THESIS EXPOSÉ:
DISTRIBUTED SUSTAINABLE TOURISM INFORMATION

NT_29 WORKSHOP BACHELOR'S THESIS
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Chapter 1_Changes in the tourism industry

More than ten years after the introduction of the peer-to-peer network Bitcoin-Blockchain, the first, initial form of Distributed Ledger Technology (DLT), we see far more sophisticated DLT developments that enable solutions for problems in tourism that have been growing for decades. From the supplier (hotels, transport and other services) perspective, these problems are: Decreases in direct bookings, and increased economic and strategic dependency on powerful Global Distribution Systems (GDS) and Online Travel Agencies (OTA).

As of right now, suppliers carry a burden that is unnecessary, and intermediaries are needed in a different capacity. But still, healthy relationships between supplier and intermediary are possible. We undertake market research in an attempt to prove this thesis.

1.1. Distributed Ledger Technology (DLT) Introduction

A Distributed Database is “a database whose objects (tables, views, columns, and files) reside on more than one system in a network, and can be accessed or updated from any system in the network” (Gartner, 2020).

Common digital databases, incl. Microsoft Excel documents, are used in all industries, mostly stored in a central manner, meaning on one closed-off server. A savings bank account is another example of a digital database, a register in which transactions are stored. Decentral, therefore distributed, databases are different from central databases: Distributed databases don't store data directly but they are the transaction settlement layer for interconnected data sharing, the technological foundation for interconnected data usage¹.

DLT transactions have a high level of integrity, because every new transaction builds on all previous transactions, including the first (Genesis-) transaction. Duplicate payments and the like are immediately noticeable due to the continuous comparison of the history and are not automatically validated or not added to the history.

DLT is not a product or design innovation, nor an artistic innovation. It is a process innovation, a system innovation, and an innovation for society because many use cases for many areas of life are being developed. DLT is a process innovation because data can be stored on one computer server, yet, can be fully utilised by external parties, with permission from the owner of the information. With DLT, we can connect information without central cloud services like Microsoft Azure or

¹ IOTA is one high performing DLT variant, here in connection with the Bosch multi-year partnership regarding the “Swiss Army Knife for IoT”: <https://www.bosch-connectivity.com/newsroom/blog/xdk2mam/>

Amazon Web Services, such that still require users to authenticate. Full open source is a fitting description for DLT.

More information regarding security, functionality and current developments in DLT will be given in the succeeding completion of this work.

1.2. Definition of New Intermediaries: Enabling Direct Booking at large scale

Regarding DLT-possibilities for tourism, no-cost communication of supplier inventory on external websites is thinkable with these well-known intermediary business models: Comprehensive advertising strategies for sustainable businesses and full travel management².

New, innovative intermediaries do not charge commission fees nor have price-parity agreements because DLT-innovation makes this industry practice obsolete at last. Therefore, traditional intermediaries will not be able to sustain traditional, commission-based business models. Together with suppliers, New Intermediaries represent the market pressure for traditional Intermediaries and GDS to change toxic business models.

Speed is another advantage for New intermediaries: Verifying credit card details and finalising transmissions and payment confirmation takes up to 3 work days (Altexsoft, 2019 a)! No more with DLT, where data, value, transactions and verifications between different parties are stored via the very same data highway. This is possible with DLT smart contracts, which New Intermediaries are built upon. Processes connected to bookings and departures via a traditional OTA are much slower than direct bookings the supplier website (Altexsoft, 2019 a). This changes with a New Intermediary that is just as fast as the supplier, because it is the very same database with which supplier and new intermediary are operating.

Traditional Online Travel Agencies (OTA's) start-up businesses experience high market entry barriers like extensive application and training processes in order to access the network of a GDS. (Altexsoft, 2019 b). Do we want a market in which single entities decide who is allowed to enter the market? Independence from such a system is a longterm goal for a new OTA. For these reasons, high performing DLT variants like IOTA³ are developed at the time of writing (<https://chrysalis.iota.org>). IOTA represents "permissionless" networks, a new era of low market entry barriers where new approaches have chances.

² tripactions.com

³ <https://www.iota.org/get-started/what-is-iota>

Where is the difference to Metasearch Engines (MSE), like Skyscanner⁴? Both are Intermediaries, but MSE only provide links (to OTA or Supplier directly). Then, travellers must still decide between OTA and Supplier (Altexsoft, 2019 a). A New Intermediary always serves suppliers and tour operator directly, because it is the same database, the supplier's own database, with which a New Intermediary is operating, thus, the term Direct Booking in this context.

New Intermediaries are heavily supported by Not-for-profit organisations, f.e. IOTA Foundation or Winding Tree: "Expand your reach. Get ahead of competition by getting better rates directly from suppliers."⁵. However, Winding Tree does not have the vision of a friendly GDS, one that provides DLT services to suppliers. Winding Tree does not take into account that these legacy companies may be fit for a different vital function in the industry.

This work aims not to "disintermediate"⁶ existing structures. The very common "disruption"-mentality among DLT ventures is not applied in this work. Rather, we seek to emphasise the nature and importance of each entity.

Chapter 2_Scientific Research: DLT-Application in Tourism

Disintermediation is called the removal of an unhealthy mediator. One main reason why there are many Bitcoin-Enthusiasts is because expensive and slow intermediaries become obsolete. With DLT, distant transactions happen peer-to-peer, thus, money management by banks is no longer needed. How can business models of banks adjust to the possibilities of DLT? Similar questions can be asked regarding intermediaries in other industries, such as tourism.

Direct bookings are much sought after by suppliers for numerous reasons that have roots in ethical and moral questions as well. A DLT Smart Contract in the tourism industry can serve suppliers (hotels and airlines, mainly) with increased direct booking numbers, the major pro-DLT argument from a supplier's perspective. Today, a normal direct booking means that a reservation was made via the supplier's own website, that is, guest data was entered into the supplier's database to process. With DLT Smart Contracts, direct bookings can also have other routes:

⁴ <https://www.skyscanner.de>

⁵ <https://windingtree.com/travel-agencies>

⁶ The word "disintermediation" is not always used specifically, yet, most DLT ventures seek to eliminate middle men without replacement, not seeing further opportunities. One academic example that is following this approach: *Disintermediation in medical tourism through blockchain technology: an analysis using value-focused thinking approach*, by Parekh, J., Jaffer, A., Bhanushali, U. & Shukla, S. (2020), Information Technology & Tourism, Volume 23, pages 69–96 (2021). Retrieved on 29.04.2021 from: <https://link.springer.com>

The application-sought novelty:

Adding to a supplier's own website, a website of an OTA displaying distributed supplier inventory may well be another source for direct bookings. This becomes possible when the OTA website is exploring the supplier's DLT database to aggregate supplier inventory.

2.1. Bachelor's Thesis

"The relevance of Distributed Ledger Technology (DLT) for Travel Suppliers in the context of IATA's current Retailing Programs, such as New Distribution Capability (NDC) and ONE Order."

2.2. Research: Global Distribution Systems (GDS)

It is not easy to find a better large scale DLT use case than adoption by traditional Global Distribution Systems (GDS) in tourism: A momentous point of DLT commercialisation may be reached at a time when GDS embrace DLT into business models. In the following paragraphs we reason why GDS need DLT.

Basically, both GDS and traditional OTA's are intermediaries, middle men for data, whether it be on the B2B business relation level for GDS or on the B2C business relation level for OTA. Already from this perspective, a coming together for a good purpose seems worthwhile. However, this may not happen without external pressure from Suppliers, as described in the following with the ongoing implementation and research regarding the so-called New Distribution Capability (NDC) IT-communication standard for airline Application Programming Interfaces (API):

This research will show whether GDS, the power houses of the travel industry, are willing to proactively seek successful adaption in a changing market, or if they will wait for the supplier market pressure to get so high that they will once again react, as it is the response to IATA's NDC approach.

The following research question is the first out of three main research questions that will be operationalised in the follow-up work of this Exposé, NT_31 Project:

2.2.1. General research question towards GDS

"Do Global Distribution Systems (GDS) consider "DLT as a Service" as a successful business model, specifically targeting small and medium-sized (hospitality) businesses?"

The following paragraphs reason the relevance of this research question.

GDS's like Amadeus, Sabre and Travelport supply Intermediaries with data. Why do travellers not have access to GDS information by themselves, but only via intermediaries? Because central technology does not permit this kind of universality and flexibility. Today, however, this is not a matter of feasibility or design anymore, but a matter of data authority bound by for-profit contracts between GDS and Suppliers.

The research of this work is aiming to find what the role of a GDS can be in a commercial-DLT-scenario. This is certain: GDS are today's fundamental IT-infrastructure maintainers for the travel industry. They connect the tourism industry internally with data so that it can be communicated externally by Intermediaries.

The advantage of a GDS is the surety of great search results due to established networks. Because of their current market power, it is likely that we would see GDS networks in a commercially successful variant of DLT. The well-known names of today's GDS would not only provide trust but it would mark travel related go-to networks within a larger "every-kind-of-data"-DLT. In this scenario, all GDS data would flow through a so-called full-node of a GDS, one that is located within the commercially successful DLT network.

GDS data engineers are well qualified to maintain complex IT-structures. GDS process data, operate in this field already, thus, have much resources to facilitate possible "DLT as a Service" (DaaS) products. To offer DaaS, they may need specialised training, something that probably would not be enough for Intermediary employees, whose focus is on B2C mediating. Adding to this, from the DLT-perspective, established GDS brands are more attractive than Intermediaries because they not only promise great scalability for a commercially successful DLT variant but also maintain household names which greatly supports DLT marketing. For these reasons, the DaaS market would probably be dominated by GDS, who then may purchase OTA structures when great demand would invite them to do so, to grow with additional personell and networks.

2.3. Research: Intermediaries

We need to differentiate Intermediaries between traditional OTA and Metasearch Engines (MSE). The latter are such that aggregate summaries of search results from multiple OTA databases by submitting the traveller's query to several OTA search engines (TechTerms, 2021).

All intermediary positions would be much affected by a commercial DLT scenario, thus, the description of New Intermediaries in 1.2. of this work and the description of a possible further consolidation in the tourism industry in 2.2.1. of this work. Nevertheless, the future of intermediaries in a commercial DLT-scenario remains a speculative topic with many factors involved. Therefore, we seek to inquire about awareness regarding possible, substantial changes for intermediary businesses in the future, highlighting risks and chances:

2.3.1. General research question towards Intermediaries

“Do Intermediaries, such as Metasearch Engines and Online Travel Agencies (OTA), see how New Intermediaries, as defined in NT_29 Exposé (1.2.), change toxic traditional commission-based, price-parity business models?”

The following paragraphs further reason the relevance of this research question.

The operationalisation of this research question in the follow-up work of this Exposé, NT_31 Projekt, will have in focus to find whether MSE have looked into DLT. Due to the possibility of achieving much automated processes, DLT could greatly simplify a MSE's operation. The research question stated above therefore mainly serves as the introduction to a MSE's emerging possibilities.

Commission-based business models with price-parity clauses will increasingly be unattractive for suppliers when a technological remedy enters the market and thus New Intermediaries, as laid out in 1.2 of this work, competitively adopt and thereby promote the new option.

Traditional OTA may first need a new identity before resume business activity in a commercial DLT-scenario because of fragile independent trust in the sight of Suppliers due to capitalisation at the costs of Suppliers in the past. At the same time, GDS may need more capacity for new DaaS business models. This scenario may lead to further consolidation in tourism, the acquisition of OTA's by GDS's, as described in 2.2.1. of this work.

Concluding this third research field, it must be clear that today's OTA work and communicate with information flowing through established GDS like Amadeus or Sabre. If DLT becomes commercial, such information can become much more accessible to travellers as well as Suppliers, independently from traditional OTA. Do traditional intermediaries prepare for such a scenario?

2.4. Research: Suppliers

With NDC developments thus far, excl. DLT, suppliers profit from NDC-ready GDS. Recognising this, GDS aggregate NDC data as well, a move towards suppliers⁷. Yet, suppliers want full independence, and embracing DLT could put an end to for-profit aggregation of NDC data by GDS, because New Intermediaries and Associates are emerging, as described in section 1.2 of this work, with full support from Suppliers. For example, major transport corporations like Lufthansa and the KLM Group became partners with Winding Tree⁸, a DLT travel network operating on Blockchain, an early DLT variant.

With this situation at hand, that is, suppliers genuinely interest in DLT possibilities, what are the options for suppliers of all sizes and subbranches to promote their independence?

2.4.1. General research question towards Suppliers

“Will IATA, a leader for suppliers in tourism, consider to enrich its NDC-program with DLT?”

With the example of International Air Transport Association (IATA), one of the greatest supplier associations in the travel industry, we reason a priori why it makes sense that Travel Suppliers explore DLT solutions.

Dependency on GDS is rather uncomfortable for suppliers, which was made clear with the disrupting introduction of an IT-communication standard called New Distribution Capability (NDC) in 2012. With NDC, the International Air Transport Association (IATA) tries to “break the oligopoly of GDS’s that formed over time” (Altexsoft, 2019 b). NDC aims to replace an older communication protocol specifically used by GDS. Suppliers like Lufthansa were lead to add a drastic surcharge on GDS-bookings specifically to demotivate going through this channel (May, 2015).

DLT may represent the breakthrough for the NDC initiative⁹. The latter alone is able to connect peer-to-peer, but not on a shared, high scale level. NDC without DLT is a complicated commercial landscape where formerly was a relatively lean distribution chain (Strauss, 2018). Thus, NDC still seeks improvement today. NDC with DLT could mean to have all the advantages NDC has brought,

⁷ https://www.youtube.com/watch?v=LJ_T_-XxUfE

⁸ windingtree.com

⁹ <https://www.iata.org/ndc/>

but with only one shared communication protocol, a very efficient and cost-free data highway, one that is feeless for single transactions and infinitely scalable¹⁰.

“We believe the market is ready for this change. ... Somebody’s got to do it.” (Jainchill, J., 2015)
- J. Bischof, Lufthansa

What suppliers seek is independence from traditional intermediary mammoths, as they are called. While suppliers and GDS are slowly working and adjusting to facilitate NDC, there is another option opening up for independence-seeking suppliers. With DLT, bookings safely happen directly inside a supplier database, and access to it is provided by a normal internet connection without the need of technological mediation of a GDS. How will technological adoption unfold?

Chapter 3_Succeeding work: Reflection on Statistical Methods and Operationalisation

In the follow-up work of this Exposé, NT_31 Projekt, we present how specific research methods help to conduct necessary, appropriate market research to answer the three main research questions identified in this work. The final result of NT_31 Projekt will be a completed research question operationalisation for interviews, which we use for eventual data collection and analysis. This will form the concluding work of this study program: NT_32 Bachelor’s Thesis.

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¹⁰ AMA IOTA Talks with Dominik Schiener - 18.05.2021: <https://www.youtube.com/watch?v=jbuSlnLK2T4>

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List of Abbreviations

- DLT = Distributed Ledger Technology
- DaaS = DLT as a Service
- GDS = Global Distribution System
- IATA = International Air Transport Association
- MSE = Metasearch Engine
- NDC = New Distribution Capability, by IATA
- OTA = Online Travel Agency

Declaration of Academic Integrity

I, Dennis Schönke, hereby declare that the work presented here is our own work, which was completed without the use of any aids other than those listed. Any material from other sources or works by others has been duly acknowledged and listed in the reference section. Sentences or parts of sentences that are quoted verbatim are marked as quotations; The identification of other references related to the statement and scope of the work has been cited. The work presented here has not been published or submitted elsewhere for evaluation in the same or a similar form.

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