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# An Initial Approach of Monitoring the Effects on Logistics Performance Initiated by the Practical Realization of Physical Internet in a Specific Region

101 - Physical Internet

## Abstract

The paper presents an initial approach to a system measuring logistics performance in Upper Austria. A special alignment to the 5 sectors of the ALICE concept, whose main objective is the long-term target of initiating the concept of the physical internet, is inherent. The core aspect for the design of the measurement system is the critical part of the selection of adequate metrics. Some insights into this selection process are presented. Within the measurement tool a qualitative questionnaire and a quantitative data analysis are proposed. Further need for research in the field is outlined briefly.

## Keywords:

Physical Internet, Performance Measurement, Logistics Performance

## 1. Introduction

The vision of the Physical Internet can be seen as a long-term target. The Physical Internet concept describes a system in which goods flow through the world in the same way as data does via the internet. Packages are totally anonymous and are routed in the most efficient way to their target, independent from a specific means of transportation. At this point of time the concept of the Physical Internet is more a strategic long-term target than a “SMART” objective in terms of being specific, measurable, achievable, realistic and time-bound (ALICE, 2015; Jemm, 2013). The European Union wants to put this concept in place with a continuous step-by-step improvement by the ALICE concept (Alliance for Logistics Innovation through Collaboration in Europe). This holistic strategy document of the European Union describes the logistical development in 10-yearsteps. The final target is a “Physical Internet” structure by 2050. This strategy is integrated into five main work packages; (i) Sustainable and secure supply chains, (ii) Corridors, hubs and synchro-modality, (iii) Global Supply Network Coordination and Collaboration, (iv) Urban logistics and (v) IS (information systems) for interconnected logistics (ALICE, 2015).

This structure fulfills some of the requirements of the SMARTtarget philosophy, but still lacks a measurement system.

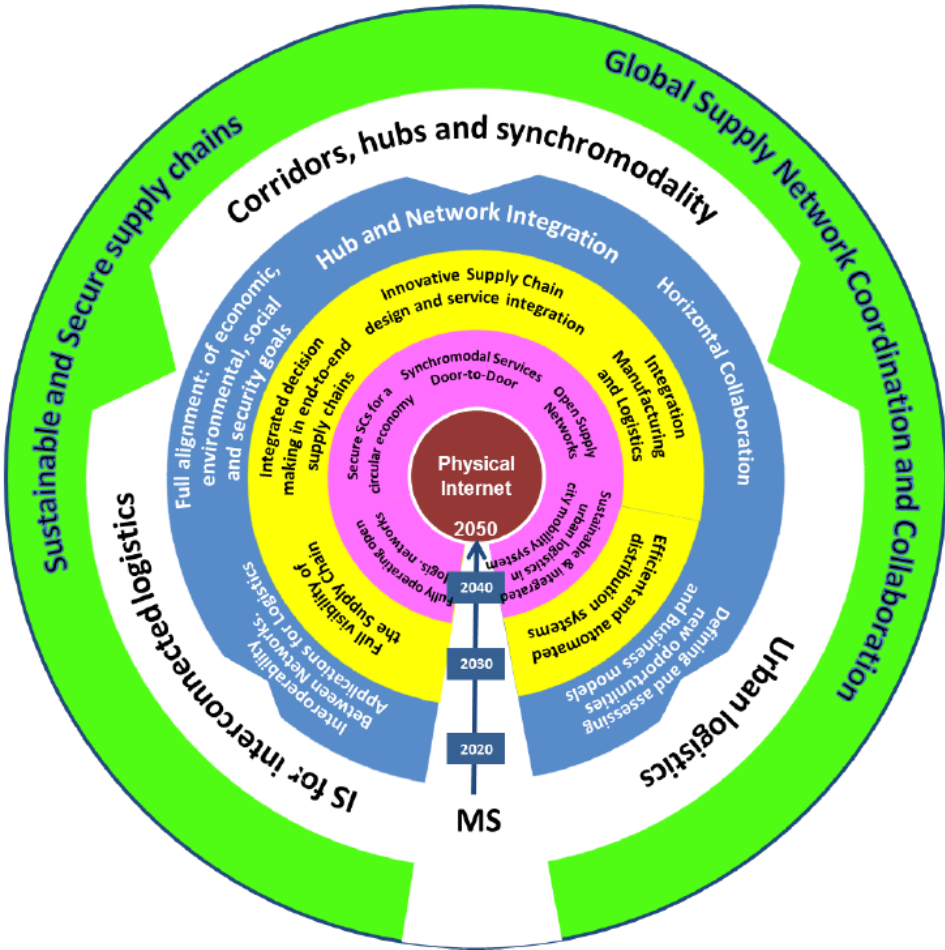


Figure 1: Overview of the Alice framework (ALICE, 2015)

From our point of view a sophisticated measurement tool for the “Status Quo” of the logistic performance on the way to the Physical Internet in a specific region is of paramount importance for a successful implementation of the PI concept.

**2. State-of-the-art research**

Measuring performance means knowing the actual status of the investigated system - which is essential for further improvement. As a macro-economic study conducted by Brunner et al. (2015) reveals, the performance of logistics is a crucial factor of the overall performance of Austria’s economy. Logistics has a direct and an indirect impact on macroeconomic indicators. Brunner et al. (2015) pointed out that an investment in logistics has a substantial impact on the level of employment. From our point of view, logistics means the sustainable management and optimization of internal and external resource and information flows. The measurement of the logistical performance in a specific region is essential for continuous improvement, especially within the strongly integrative field of the Physical Internet.

Existing indicators, especially the Logistics Performance Index (LPI) of the World-Bank, are struggling with their significance in “smaller” countries in which the number of respondents is relatively low (Ojala / Celebi, 2015). Austria is an example of such a relatively small state with no direct seaport links where the significance of the indicator is not satisfactory.

The specific region in which our research takes place is the federal state of Upper Austria with more than 1.4 million inhabitants. Its economy is marked by major industries such as steel production, chemical industry as well as mechanical engineering, construction and automotive industry. In Upper Austria increased efforts for the implementation of the Physical Internet concept will be enforced by the federal government<sup>1</sup>.

### 3. Scope and developing process of measuring regional logistic performance

In view of the forthcoming entry of the PI concept to the region, the need for a specific measurement system is obvious. The specific scopes and objectives of a convenient regional logistics indicator for Upper Austria as they are seen by logistics experts are listed below:

- A graphic representation of the logistic performance in Upper Austria should be developed. The publications should be easy to read for a target group of practitioners with a lesser emphasis on a presentation in a scientific manner.
- As a specific outcome “recommendations for further action” which are going to improve logistic performance in the region are expected.
- A regular repetition of measurement must be possible and economically feasible.

With a view to developing a measurement tool for achieving these objectives, the following process has been created. For this purpose, a brief literature review investigating the current status of research in the field of developing performance measurement processes was the main source for information (e.g. Abrahamsson / Aronsson, 1999 or Gunasekaran, 2001). Based on that information, the following process results:



Figure 2: Developing Process

In the following paragraphs, the process steps will be presented and briefly discussed.

### 4. Selection of Indicators

First of all, a number of “logistic-related” existing indicators were selected. Essential for the selection was a significance of the indices to the topic of logistics as well as being recognized by the scientific community.

The following indices were selected by logistic scientists at our institute:

- Logistic Performance Indicator - World-Bank (Arvis et.al., 2014)
- Global Connectedness Index - DHL (Ghemawat et.al, 2014)

<sup>1</sup> [http://www.ooe2020.at/303\\_DEU\\_HTML.php](http://www.ooe2020.at/303_DEU_HTML.php), 27.01.2016

- Connectness Index – McKinsey (Manyika et.al, 2014)
- *Logistikimmobilienreport* (logistic specific facility report) - Fraunhofer (Nehm et.al. 2013)
- *Logistiklandkarte* (Logistics map) – Fraunhofer (Nehm et.al. 2013)
- Resilience Index - FM Global (Oxford Metrica, 2014)

## 5. Analysis of underlying factors and metrics – Prioritize and aligning metrics

The individual metrics of each indicator were listed and, if necessary, translated. To create a distinct structure, the metrics were consulted and aligned to the 5 work packages of the ALICE framework (ALICE, 2015). Therefore, a specific measurement for every sector of the ALICE framework can be attempted. As a matter of course, an alignment of these factors to the particular circumstances, and to a local scale, such as cutting out/omitting metrics like the threats caused by international terrorism, were necessary. The resulting “longlist” of metrics was rated by 5 experts in the form of a brief questionnaire.

## 6. Measurement of metrics

A number of “hard factors” such as the available bandwidth for data connections, which can be assessed by desk research, were selected. To increase its predictive accuracy, a qualitative questionnaire was created. Apart from general questions, the main question was about how the person who was interviewed rates the overall logistical performance of his/her region. Furthermore, the interviewed person has to select possible improvement suggestions out of a given list of improvement potentials. Of course there was the possibility for the asked person to come up with individual suggestions as well.

## 7. Visualization and further indications of research

For now a prototype for the visualization of the data has been created. The primary component of the visualization is a map which represents the logistical performance of the five ALICE sections in form of a colored scale. It is planned to re-evaluate the current status of each of the 5 sectors periodically, so it should be possible to display the ongoing improvement towards the Physical Internet in Upper Austria.

At the current status of research, much work remains to be done to meet the target of setting up an ongoing monitoring process. These further steps which are needed for a recurring monitoring tool will be a part of currently planned research projects in which Upper Austria is designated to be a model region for the concept of the Physical Internet.

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