

ISVC Project Proposal
"Mapping Product Group Value Chains"

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0.) Summary

"You only know what you sell if you know what you buy." Today's consumers want to know what they buy, governments increase their fight against IP violations in procured input material, consumers increasingly want to be sure that they do not support business practices that harm people or the environment, and companies fear strategic dependence on unidentified upstream monopolist structures. The request for value chain transparency is often heard and voiced louder each day.

Products (or services) combine a multitude of materials or services, each going through extensive value chains themselves. As Leonard Read explained in his essay "I, Pencil", the creation of products involves countless, often exchangeable organizations such as producers, traders, agents or transporters. Recent mega trends like globalization, focus on core competencies or e-procurement substantially increased the number of value chain members and shortened their duration of membership. Data available today to either governments or companies focuses on direct buyer-supplier transactions. Exercises to draw end-to-end value chains (e.g. life cycle analysis) mainly focus on the sequence of production steps. Considering that suppliers predominantly prefer keeping their suppliers confidential, creating value chain transparency seems to be a mission impossible.

This project proposes a collective approach to generically map value chains on a product group level. These maps base on average bills-of-material and show the sequence of industries based on the buyer-supplier contract relationships, including traders, agents or transporters. For each interface information is gathered upon the quality of the relationship (e.g. dependence, power, duration, trust etc.). For each industry information is gathered upon the dominant business model and the rules of competition. The ultimate deliverable is a large collection of product group-level value chain maps and an organization keeping those up to date. This approach helps companies and regulators to establish value chain transparency at lowest possible efforts.

1.) Project Objectives

1.1) Problem Description and Evaluation

Global value chains have become dominant phenomena for both society and business organizations. On a macro level, global value chains, accounting for a substantial share of the world economy, not only impact national economies but also societies and the environment across distant parts of the globe and at various times. On a micro level, global value chains are the reality for most companies delivering their output to customers and requiring material as input factors, both creating and limiting a company's product quality, product price, production volume, innovation, legal compliance, social impact or environmental impact.

Global value chains are macroeconomic phenomena originating on the basis of numerous independent company-level management decisions on make-or-buy and on collaboration with business partners, influenced by customer expectations, business logics, commercial offerings, or regulation. Global value chains on the macro level comprise of the population of micro level value chains. In contrast to the definition of global value chains as end-to-end chains, current knowledge and data mainly concern buyer-supplier transactions, ignoring the tail beyond. The economic / trade policy perspective on global value chains (macro level) analyzes trade flows between sectors and regions over time. The business perspective (micro level) is predominantly limited to direct supplier and direct customer relations. Usually, companies rely on the sourcing decisions of their direct

suppliers or the sales decisions of their direct customers without own involvement. Consequently, companies have limited knowledge about their upstream or downstream value chains.

The current macro and micro level debates lack important understanding of the nature of micro level value chains. Buyer-supplier relationships vary by e.g. strategic dependence, power imbalance, trust, duration, distance, service requirements, value added, practices in sharing investments or returns, rules in contract negotiations. These factors determine the external factors of the business case for the respective companies being part of a specific value chain.

Applying the methodology of supply chain mapping to generic product group levels can provide transparency about the various actors involved, the sequence of their involvement, the conditions of exchange and thus the specific commercial interactions. Furthermore, the well-established concept of power and dependence in buyer-supplier relationships, explaining managerial decisions in those commercial interactions, might help to explain limitations in global value chains.

This project aims at creating a large collection of product group-level value chain maps and establishing an organization keeping those maps up to date.

1.2) Benefit / Deliverables for Business (Value Chain Members)

Participants obtain generic maps of the value chains they are part of. This allows them to substantially reduced efforts needed for identifying value chain paths that are critical and relevant organizations they indirectly deal with. That way participants receive a solid basis to develop value chain transparency and get aware of critical dependencies on specific sub-suppliers and their respective behavior. Furthermore, by understanding the causes of behavior of upstream value chain members, participants can focus their action on changing those relevant causes for enduring improvement.

1.3) Benefit / Deliverables for Government

Regulators gain a better understanding of global value chains. Only by understanding dependencies and power among value chain members, policy makers can derive regulation limiting targeted behavior of relevant value chain members. Furthermore, regulators can identify concentration at specific steps in global value chains causing strategic dependence on monopolistic structures. These tools can be applied both on national and supranational level.

1.4) Benefit / Deliverables for the Civil Society & Public

The public and civil society benefit from better understanding of how goods and services are created, of which players are involved, and of the practices applied. This provides them with transparency required to take informed decisions when making shopping decisions.

1.5) Benefit / Deliverables for Science

The participating scientists can scientifically publish the generic project results they were part of in the development.

2.) Project Content

2.1) Status-quo of Best Practices in Practice

Life Cycle Assessments and Supply Chain Mapping are well-established practices in business that are also applied by regulators and the civil society. Life Cycle Assessments help identifying relevant steps of a product value chain contributing to specific performance factors (e.g. carbon emission). Usually, focus is set on production, transportation and use. Various branded goods or original equipment manufacturers run supply chain mapping projects. Based on the bill of material of the final product they identify the supplier names, and request from upstream value chain partners to do the same. Recent approaches generate data with third-party supplier questionnaires combined with non-disclosure agreements to compute value chains. Problematic for all approaches is the dynamic nature and the complexity of value chains originating from several challenges:

- Extensive bills of material require high efforts for precise assessments of specific input flows.

- Direct contact of buyer with producer may lack because of intermediaries (e.g. exporter, importer, agent, trader). The number of intermediaries can be more than one.
- Intermediaries may re-label material limiting transparency of the original good's value chain.
- Commodities (bulk materials) are often sourced on stock exchange markets limiting buyer's ability to trace the procured commodity's original value chain.
- Multiple sourcing strategies and supplier changes cause numerous suppliers for the same material. The contribution of each supplier on the total supply is challenging to consider.
- Unwillingness of suppliers to disclose information about its value chain because of required efforts, competitive reasons, company policy, protection of intellectual property etc.

National and supranational organizations but also private companies collect and analyze global and national trade data. By applying input/output models on region and sector specific trade data, highly generic approximations of value chains are calculated. Instead of bills of material on product level, these approaches refer to the outbound trade of the various regional sectors selling to a specific sector of a specific region. While the approach gives a good idea on how specific regional sectors trade with one another and on the sequence of specific regional sectors, critique is voiced that these approximations ignore dependencies in the various buyer-supplier relationships found in value chains.

Today's limited understanding of global value chains, ignoring buyer-supplier dependencies, is likely to recommend policy leading to undesired effects. Trade barriers are often imposed with the objective to steer trade to other nations. If a nation punishes imports from a specific country with extra duties but the local economy is dependent on supplies from this country, trade flows remain unchanged - however the extra import duties will harm the nation's own economy by increasing sales prices causing higher cost for the nation's consumers or limiting international competitiveness.

2.2) Status-quo of Knowledge in Science

In engineering sciences, production processes are described in every detail. Yet, the engineering perspective is set only on the sequence of production steps, leaving the distribution of work, the organization of the parties running those production steps, or the business models of those parties unconsidered. In environmental sciences, life cycle assessments and circular economy models identify product group specific production steps analyzing input and output as well as the interrelation between the two. In operations management sciences, logics of coordination between production steps are explained. In logistics sciences, processes are described independently of product groups, focusing on handling requirements and transportation distances. The foundational models of supply chain management well specify the length and complexity of supply chains as well as their interrelatedness in supply networks. Tools have been suggested for supply chain mapping that either base on manual data collection or on mathematical modeling.

In economics, the work predominantly looks at the impact of one nation's imports on the economic performance of another nation. Criteria for economic performance concern GDP, employment, salaries, foreign direct investments, patents etc. Economic dependencies between national economies are mainly derived based on indicators for industry collusion, on trade volumes and on the share of specific nations on the total imports or exports of a specific sector. The analysis of global value chains has only recently received attention.

2.3) Guiding Questions / Knowledge Gap

The main question defines the project theme:

Which industries are involved in the making of a product group, what is the sequence of these industries forming the value chain, and how do these industries work together?

Sub-questions are to be defined by the project board and could be:

- a) What industries are generally involved in the making of a product of a specific product group?
- b) What is the sequence of these industries (value chain steps)?
- c) Where is an industry (value chain step) particularly located?
- d) What criteria define the dependence between two industries (value chain steps)?

- e) What criteria define the power distribution between two industries (value chain steps)?
- f) What criteria define the relationship quality (duration, trust, alignment etc.) between two industries (value chain steps)?
- g) What performance criteria for the commercial interaction are considered most relevant by the interacting industries (e.g. procurement price, quality, innovation, certification etc.)?
- h) What performance criteria are considered most relevant for business success for each industry?
- i) What data sets provide proxies for those criteria?
- j) What can be learned from running existing mapping approaches?

2.4) Limitations

The project puts its focus on a generic product group level. It only considers direct material as well as services rendered on direct material (e.g. trading, contract manufacturing). The project will not identify the identity of specific value chain members and will neither determine how specific companies work nor how their commercial agreements with their respective suppliers or customers are structured. As in reality value chains have the nature of "value networks", simplification and aggregation of the product group value chains are inevitable.

3.) Project Description

3.1) Knowledge Generation (Research)

The research part of the project comprises of five major steps: (1) calculating product group value chains with input/output models based on various trade data, (2) refining the calculated value chains (e.g. adding intermediaries) in workshops with companies per identified value chain step from final product upstream, (3) reviewing the developed value chain maps with the results created by other mapping approaches, (4) collecting data on interfaces between value chain steps (i.e. power, dependence, buyer-supplier relationship quality), (5) identifying patterns in the data added by the workshops, and (6) deriving a reliable efficient procedure to map product group value chains.

3.2) Pilot Application

In the pilot application of the project, participating organizations apply the new developed mapping procedure in field experiments. Sharing experiences among the users as well as scientific comparison of the different pilots allows optimizing the recommendations developed in the research project part to ensure not only effectiveness and efficiency but also practicability in business environments.

3.3) Solution Development

The solution development part of the project takes the developed recommendations and transforms them into practical solutions for business practice for day-by-day use. This project part creating scalable support might be strongly supported by sector initiatives, government organizations, or even private organizations with the objective to add this service to their commercial portfolio.

3.4) Communication of Results

The final communication part of the project plays an important role in disseminating the developed solutions to the many different parts of society across the world. ISVC collaborates with media experts, journalists, and artists to transform the problem and its proposed solution into the unique language, culture, and mindset of the respective target audience. That way, the project fuels the societal debates legitimizing both problem and proposed solutions.

4.) Project Plan

4.1) Time Plan

The project is planned for an initial duration of two years, and shall be extended upon need. Project part 3.4 (communication of results) is planned to start with the 18th month of the project for one year, and shall also be extended upon need.

4.2) Work Packages

The project parts follow a logical sequence. The project parts start once substantial results have been achieved by the prior project part, and shall run concurrently to allow mutual adaptation.

4.3) Estimated Project Efforts and Costs

The project efforts consist of predominantly labor costs for the academic researchers and artists, some out of pocket expenses (e.g. travel, communication), limited investments (e.g. data), and some service sourcing (e.g. media expertise, data analytics). In project parts 3.1, 3.2, and 3.3 academic researchers, data analysts and representatives of the participating organizations work together under the lead of an academic project manager. Project part 3.4 shall be run by media experts, in collaboration with journalists and artists.

4.4) Funding Plan

The required financial resources shall be covered by the participating organizations and other sources. Government funds and other potential financial sources shall be explored and used whenever possible or available. The labor cost for the participating company representatives or journalists shall be covered by the respective employers. The labor cost for the academic researchers or artists shall be covered by individual grants for the respective person. The service providers shall work on a fixed contract.

4.5) Participant Qualification and Collaboration History

All participating organizations and individuals are required to have a proven track record on either value/supply chain mapping or required methodological capabilities. Successful prior collaboration among the participants is preferred.

4.6) Potential Project Risks and Risk Mitigation

To be evaluated and developed once the project plan and project members are defined.

4.7) Potential for Collaboration (only if needed)

To be evaluated once the project plan and project members are defined.

4.8) Intellectual Property Rights on Project Results (only if needed)

To be evaluated once the project plan and project members are defined.

5.) Project Organization

5.1) Project Governance

The project will be overseen by a project board consisting of one senior representative per project participant under the lead of an ISVC council member. The project board meets at the project start, at the project end, and at least every 12 months. The project board defines project content, monitors and evaluates project progress and success, suggests strategic adjustments, and decides on the project's funding and budget.

5.2) Project Management

The project shall be managed by a senior academic scientist with a specified (realistic) workload. Project management shall make use of state-of-the-art project management practices.

5.3) Project Reporting

The project manager reports the project current status and next steps every six months to the project participants and the project board members.

5.4) Participants

The project shall consist of companies of different sectors, regions and supply chain positions, government organizations, sector initiatives, academics, and other organizations interested in constructive development of recommendations for procurement.

5.5) Advisory Board

An advisory board of experts shall be established. The role of the advisory board is to critically reflect the project approach and results, support the project with constructive recommendations, link the project team with experts in a required domain, and help in disseminating project results.

5.6) Role of Funding Organizations

The funding organizations separate by (a) participating organizations, (b) project financing organizations, and (c) sponsors & donators. All participating organizations (a) have their interests represented in the project board. The project funding organizations (b), supporting the project based on a contract with clear definition of project content and expected results, are only involved in a project board meeting in case the project board intends to substantially alter the project content definition. Donators & sponsors (c) have no role in the project.

5.7) Project Success Evaluation

The project plan defines specific measurable objectives. The project management evaluates completion and fulfillment. The final evaluation is in the responsibility of the project board.