FINAL REPORT

READY FOR THE NEXT CRISIS

MONITORING & BENCHMARKING SUPPLY CHAIN RESILIENCE

TKI DINALOG
Dutch Institute for Advanced Logistics

SUMMARY

In the face of an increasingly volatile and disruptive environment, organisations have a need to assess and enhance their ability to be better absorb shocks in their supply chains. The project 'Ready for the Next Crisis' developed and empirically validated practival methods and tools to support organisations in doing so.The resiliencescan.org platform, one of the majour results, offers organisations a wholistic and context-specific tool for performaing a self assessment of their supply chain resilience. The tool is the result of a strong collaboration between 16 consortium partners, consisting of academic researchers, consultants and 13 companies.

Background and Assumptions
The project, that started in 2021, was motivated by the urgent need for disruption management in supply chains, highlighted by the occurrences of the Covid-19 pandemic, Brexit, and geopolitical unrest. The project was underpinned by the assumption that a holistic and context-specific approach to supply chain resilience is crucial, as there is no 'one size fits all' solution to managing disruptions in supply chains. The initiative aimed to take an integrated view, linking supply chain resilience to other business goals and addressing physical, financial and information flows, seeking to support managers in evaluating and building supply chain resilience (SCRes) in their organizations.

Logistic day in Venlo

Objective and Approach
The project's objective was to provide organizations with practical, research-based tools to evaluate and improve their SCRes capabilities. The approach involved the creation of a wholistic theorectial framework, based on existing academic literature, augmented by empirical data provided in 37 interviews and 35 surveys. Based on this framework, a prototype tool was developed to enable organisations to asses and monitor SCRes. A Sounding & Validating Board (S&VB) consisting of representatives from 16 diverse organizations was established to provide business insights and ensure the relevance and utility of the developed theoretical framework and tools.

Results
The project has yielded the innovative "Brilliance" platform, available on Resiliencescan.org, enabling organizations to conduct comprehensive self-assessments on their resilience capabilities and receive immediate, actionable feedback. This platform has become a reservoir of valuable data from over 100 organizations, facilitating comparisons and pattern identification across various contexts and industries. The project has also contributed to scholarly publications, academic presentations, and has integrated its findings and tools into educational programs, benefiting students and the academic community at large.

Future Vision
The project envisions the extensive rollout of the Resiliencescan.org website to companies nationally and internationally, as well as aiming to develop new tools and frameworks that cover entire supply networks and ecosystems. The follow-up project, 'Next Gen Supply Chain Resilience – Short-term wins, Long-term gains', aspires to create more value for a larger group of organizations by ensuring that data and learnings from this project are widely available and built upon. Furthermore, more learnings and insights are expected as the scope of the research is extended to whole supply eco systems, context dependancy is taken into account and complex scenarios are evaluated. The focus will also be on automating data collection and reporting processes to facilitate scalability along with the creation of a toolbox for SCRes capability development.

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"WITH THE RESILIENCE SCAN PLATFORM ORGANISATIONS ARE ENABLED TO ASSESS THEIR SUPPLY CHAIN RESILIENCE CAPABILITIES AND BENCHMARK WITH PEERS."

RONALD DE BOER
WINDESHEIM UNIVERSITY OF APPLIED SCIENCES

The project has been made possible by TKI Dinalog and the Topsector Logistics and has been funded by the Ministry of Economic Affairs and Climate Policy (EZK)

MOTIVATION

The occurences of the Covid-19 pandemic, Brexit and geo-political unrest have made it clear to companies that operational excellence and margin improvement cannot be seperated from managing disruptions in their supply chains. Hence, Supply Chain Resilience (SCRes), “the adaptive capability of a supply chain to prepare for unexpected events, respond to disruptions, and recover from them by maintaining continuity of operations at the desired level” (Ponomarov & Holcomb, 2009) has risen to the top of the agenda for most businesses. However, managers struggle to evaluate the SCRes of their organisation, how to build it and how to link this to other business goals, such as sustainability and finance. This gives rise to the need for practical tools that organisations can utilse to measure and improve their SCRes capabilities based on solid theoretical research.

Mini Symposium 4th of April 2023 in Zwolle

CHALLENGE

This project aimed to provide practical methods and tools for organizations to help them measure what their level of supply chain resilience (SCRes) is and relatively how well they perform in different areas compared to peers. In order to ensure that the tools developed in this project are rooted in sound academic research, a theoretical framework needed to be developed. As we believe there is no 'one size fits all' way of managing disruptions and interaction as well as trade-off between different flows is essential, the model needs to be contextual as well as holistic (taking into account physical, information and financial flows). This project aimed at gaining more insight in what SCRes capabilities are relevant and what are the current best practices in different business contexts. Furthermore, its ambition was to enable organisations to do a self assesment and benchmark against peers, so that managers can get an understanding of the current status of their supply chain's resilience in terms of capabilities as well as vulnerabilities. In order to do so, the ambition was to develop and empirically validate a context dependent SCRes model supported by a prototype benchmark platform that will help managers to understand enabling factors and make choices in being resilient through a comparison with their current status against best practices.

"COOPERATION BETWEEN ENGAGED MANAGERS, CONSULTANTS, APPLIED AND PURE SCIENTISTS HELPED US TO NICELY BALANCE PRACTICAL APPLICATION THAT ARE ROOTED IN AND LEAD TO NOVEL SCIENTIFIC INSIGHTS."

PROF DR D.P. VAN DONK
UNIVERSITY OF GRONINGEN

PROJECT DESIGN

The project was designed in such a way that knowledge generation is accomplished in parallel with design and implementation/evaluation of a practical solution (inspired by practice oriented design research).The entire procedure is segmented into three key stages: First, the preparation stage centers on constructing a theoretical framework and an initial model, while also pinpointing the issue at hand (diagnosis). Second, the execution stage is primarily concerned with gathering data and crafting the tool (design). Third, the realization and evaluation stage involves the actual implementation and validation of the tool (development). Integral to stages 1 to 3, valorisation and dissemination was added as an additonal phase. Based on this approach, four work packages are defined:

1

PHASE 1 – PREPARATION (THEORETICAL AND NETWORK DEVELOPMENT)

In Phase 1, extensive research was conducted to build a more comprehensive theoretical framework focused on Supply Chain Resilience (SCRes). The review covered resilience capabilities at various system levels and explored their relationship to factors like market context, organizational structure, and industry characteristics. The aim was to develop a framework that is holistic (taking into account aspects like finance, data flows, and sustainability) as well as context specific (as we do not believ a ‘one size fits all’ approach to SCRes would work). A few initial case studies across different supply chains were used to refine the framework. Additionally, a Sounding & Validating Board (S&VB) consisting of representatives from 16 diverse organisations was established to provide business insights. Input and feedback of the S&VB was collected in order to ensure the framework would be relevant and useful to practive. A broader network of companies was also developed for data collection in the next phase. The aim was to include a diverse range of organizations based on initial findings.

2

PHASE 2 – EXECUTION (DATA RETRIEVAL AND TESTING)

Based on groundwork laid in phase 1, a data retrieval model and strategy was formulated, resulting in a survey design and interview protocol. These were used in more extensive case studies in which data was collected through 37 interviews, complemented with 35 surveys. Based on extensive analysis of the data and literature review, a comprehensive list of SCREs best practices was formulated. These served as input to the first draft on the SCRes quick scan (based on a SCRes benchmarking model), which was then validated and further improved via S&VB participation. Although, in this project, the primary target group for the scan was make and process industry organisations, data/feedback was also retrieved from other organisations such as a logistics service provider and even an academic hospital was involved.

3

PHASE 3 – REALISATION & EVALUATION (DATA ANALYSIS AND TOOL BUILDING & REFINING)

In this phase, the prototype SCRes quick scan was transformed into the “Brilliance” (Benchmarking Resilience) platform, a web based platform (resiliencescan.org) enabling organisations to do a self assesment of the supply chain resilience of their organisation and benchmarking the results against others. This prototype platform was tested extensively, and filled with real data and evaluated by the S&VB members. Then, a larger group of organisations were contacted and asked to fill in the resilience scan via the website. Additionally, in collaboration with TKI Dinalog, an event was organised to give some insight in what resilience is and how it can be improved and to introduce the resilience scan to a wider group of people. In this phase, the website went live aiming at 100 organisations perfrorming the self assessment.

4

PHASE 4 – VALORISATION AND DISSEMINATION

Valorisation and dissimination is seen not as just a by-product, but an essential, integral part of the project during every phase. Regular meetings with the S&VB were held facilitating input and feedback from members as well as delivering training, sharing learnings and results as well as exchanging best practices between members themselves. Additionaly, scholarly publications as well as presentations at academic conferences were aimed as deliverables of the project. Furthermore, the goal was to involve students in every phase via internships and integration of findings and tools in educational programs. Finally, findings are presented at several workshops and symposia in order to make the learnings useful for a large group of practicioners.

Mini symposium 'How to deal with disruptions in your supply chain?'

"THE RESILIENCE SCAN HELPS US AND MANY ORGANISATIONS TO MAKE THE NEXT STEP IN RESILIENCE: IT GIVES INSIGHT IN WHERE TO START, WHAT THE KEY FOCUS AREAS ARE AND IT GIVES GUIDANCE TO MAKE THE NEXT STEPS."

ALFONS WILLEMSEN
INVOLVATION

RESULTS

The primary objective of the project is successfully achieved, which was to develop and empirically validate a context dependent SCRes model supported by a prototype benchmark platform that supports managers to understand enabling factors and make choices in being resilient through a comparison with their current status against best practices. Scientifically, the project has provided new, empirically grounded insights into the conextual nature of SCRes, based on a holistic approach. The SCRes self assessment is made available via an operational web based platform and over 100 organisations have done the self assessment and have received feedback via a reporting tool. Furthermore, several workshops with management teams of organisations have been held in which the current SCRes capability levels were evaluated against ambitions and follow up actions determined.

As SCRes is organisations ability to absorb shocks and limit negative impact on supply chain performance, improving it will mainly result in cost prevention (i.e. limiting impact of disruptions on turnover, response and recovery cost, etc.) and possibly in additional turnover (as result of e.g. increased marketshare). What the delta of the cost/revenues in case of increased SCRes capability level/awareness is impossible to estimate without making some assumptions, as what the cost/revenue would have been without the interventions/learnings is unknown. However, it is safe to expect a positive value creation due to prevention of rush orders, last minute supplier switching cost, less ad hoc crisis management, less speed transport, reduced working capital need, etc. Direct revenue streams and cost savings for participating companies are a result of new consultancy & training opportunities and reduced recruitment and consultancy cost.

One of the main deliverables of the project is de Resiliencescan.org website. This website offers the opportunity for organisations to perform a self assessment on resilience capabilities, for their own organisation as well as upstream (direct suppliers) and downstream (customers). Over 100 companies filled in this self assessment, resulting in a valuable source of data from a diverse group of organisations of different industries, size and position in the supply chain. This database enables us to make comparisons ('benchmarking') between companies and identify patterns across different contexts. Furthermore, we have taken part in a significant number of workshops and symposia (of which we organised some ourselfes), as key note speaker, leading workshops, etc. Moreover, several (academic and non-academic) articles were published. Finally, a large group of students benefited from the project via internships and adoption of learnings and tools in educational programs.

SOCIATAL OUTCOMES	
CO2 reduction	n/a
Cost reduction	> 0.4 mln €
Avoided transport kilometers	n/a
Modal shift ton kilometers	n/a
Other	n/a

SECTOR RESULTS	
Value creation	> 0.5 mln €
Sustainable jobs created	0.5
Companies reached	100+
SMEs reached	40+
Researchers/students currently working at companies	36

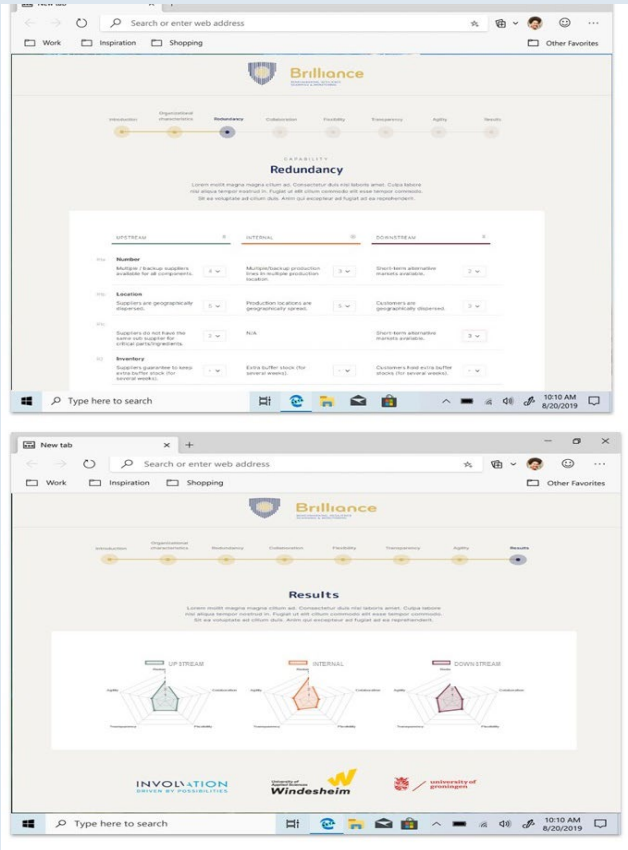
SCIENTIFIC OUTPUT	
Master theses / Bachelor theses	18 / 5
PhD promotions	1
Academic publications	1
Citations academic publicaties	5
Academic seminars, workshops, presentations etc. / Practicioner symposia, worksops, etc	3 / 10+

RESULTS WE ARE PROUD OF

1. RESILIENCESCAN.ORG WEBSITE ENABLING ORGANISATIONS TO PERFORM A SELF-ASSESMENT IN SUPPLY CHAIN RESILIENCE
2. DATABASE OF OVER 100 ORGANISATIONS CONTAINING VALUABLE DATA ABOUT THEIR SCRES CAPABILITIES AND BEST PRACTICES
3. PUBLICATION IN INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGAMENT + 3 CONFERENCE PAPERS
4. 5 PRACTIONAR ORIENTED PUBLICATIONS, PARTICPATION IN 9 SYMPOSIA AS (KEYNOTE) SPEAKER OR WORKSHOP LEADER
5. ORGANISATION OF MINI-SYMPOSIA, (CORPORATE) EVENTS AND WORKSHOPS WHERE RESULTS AND LEARNINGS OF PROJECT WERE SHARED
6. 13 COMPANIES HIGHLY INVOLVED IN WORKSHOPS AND PROVIDING INPUT AND FEEDBACK
7. 23 MASTER AND 13 BACHELOR STUDENT WORKED ON SC RESILIENCE AND WERE EXPOSED TO AND USED STATE-OF-THE KNOWLEDGE ON SC RESILIENCE WHILE DEVELOPING THEIR THESIS/REPORT AND WILL FURTHYER DISSEMINATE THAT KNOWLEDGE IN ORGANISATIONS
8. COOPERATION BETWEEN ENGAGED MANAGERS, CONSULTANTS, APPLIED AND PURE SCIENTISTS HELPED US TO NICELY BALANCE PRACTICAL APPLICATION THAT ARE ROOTED IN AND LEAD TO NOVEL SCIENTIFIC INSIGHTS

RESILIENCESCAN.ORG

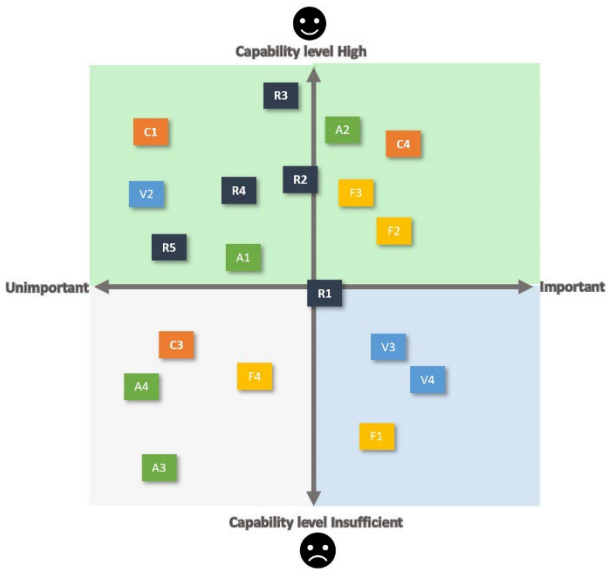
Resiliencescan.org offers a web based SCRES scan for organistions that enables them to perform an integral self-assesment of their resilience capabilities. It includes five capabilities (redundancy, flexibility, colaboration, visibility and agility) for the focal organisation (internal), its direct suppliers (upstream) and direct customers (downstream). After filling in the Brilliance scan tool – which takes between 20-30 minutes – the respondent gets a report of the three profiles (internal, upstream, downstream).



Resiluiencescan.org website

SUPPLY CHAIN RESILIENCE MANAGEMENT TEAM WORKSHOP

Based on the self-assesment done on resiliencescan.org, we organize workshops with management teams in which they can review the differences between individual responsed from different departments/hierarchical levels and discuss differences between current capability levels versus desired capability levels and define focus areas for a SCRes development road map.



One of the tools offered in the workshop to identify capability growth focus

EXPERIENCES

The core consortium existed of a University (RUG), a consultancy form (Involvation) and a HBO/University of applied sciences (Windesheim), which brought complementary skill and focus to the project. Furthermore, the involvement of 13 companies in the sounding and validating board resulted in input and feedback from a wide range of companies from different industries. The large and divers number of partners required more project management and admin work than initially planned, but the project was completed successfully within the aligned timeline.

OPEN INNOVATION

In order to stimulate innovation and ensure widescale applicability of tools and findings, We intentionaly designed the consortium in such a way that there would be a diverse group of companies and knowledge institutions. Although this required more time and effort to organize and align on common goals, we believe the quality and creativity of the research improved by it. By involving the sounding & validating board in every stage of the project and having an iterative process with feedback loops, we stimulated innovation. There were several modifications to the S&VB as some organisations had to withdraw, while others were interested to join. Due to the organic way the project was organised, this went without any significant disruptions. Initially, the scope of the research was make/process industry. However, during the project an academic hospital was interested to join. We discussed this in the core consortium and decided that the focus of the research would remain the same, but we would allow the hospital to join our meetings and provide feedback. We discovered that this created new learnings in both directions. Our resilience scan has already been used by other research projects and experiences are exchanged.

DINALOG EN TOPSECTOR LOGISTIEK

Parties outside our consortium are very interested in the research and tools. We have been contacted by several universities and parties to collaborate and/or use our tools. Where possible, we agreed to do so.

EFFECT OF CONTEXT ON RESILIENCE – UNIVERSITY OF GRONINGEN

To generate new theoretical and practical insights around SCRes, the MSc thesis projectgroups were instrumental. We guided the groups in (a) the data collection with companies from the consortium and (b) the synthesis of insights to new knowledge. In this process, the companies from the S&VB formed a vital role by forming the empirical context on the one hand and receiving (context)specific feedback on their expierience challenges on the other. We find clear differences in process vs discrete manaufacturing, a different approach in hospitals as compared to production, a linkage with manufacturing strategy of organisations (lean versus agile) or with SC integration. Interestingly, smaller companies benefit in general from similar resilience capabilities, but, as expected have limited resources that hinder them in building some.

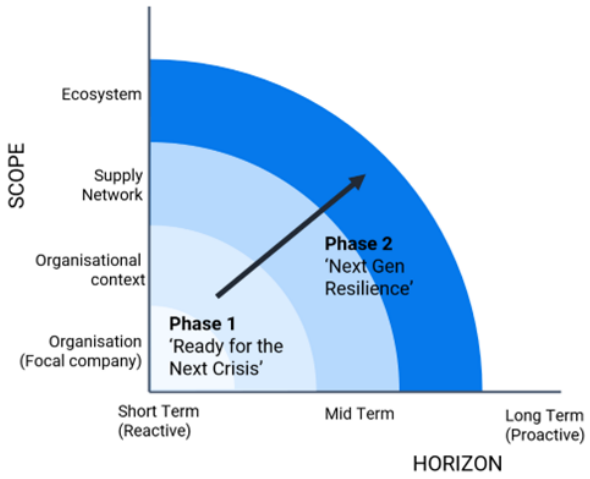
MANAGEMENT TEAM WORKSHOP - AUTOMOTIVE

At Scania Logistics NL, a supply chain resilience self assesment was done by having 12 employees from different departments and managerial levels fill in the resilience scan. Results were analyzed and visualised via a dashboard developed by an intern at Involvation. During a workshop with the management team of Scania Logistics NL, a discussion of the main variations between departments provided insight in perception and opportunities. Next, the team worked to review the current assessed resilience capability profile and got to an alignment on what capability areas they wanted to improve over the next years.

Resilience scan review workshop with MT

FUTURE VISION

The resiliencescan.org website is now roled out and availble to all companies nationaly and internationaly. We are still advertising for this website and new results are coming in on a regular basis. With the follow up project 'Next Gen Supply Chain Resilience – Short-term wins, Long-term gains' we aim to develop new tools and frameworks for a larger range of companies (including SMEs), covering whole supply networks and ecosytems. By this we ensure that data and learnings from this project are made available and built on to create more value for a larger group of organisations.



Scope of the follow up project "Next Gen Supply Chain Resilience"

FOLLOW UP ACTIVITIES

A key takeaway from this project is that establishing a dedicated group of companies within the sounding and validating board is highly effective for obtaining feedback and stimulating the generation of ideas in the creation of new tools. However, scaling up the use and implementation is limited. For this reason, in the consortium for the follow up project, we included Evofenedex. This association has a large network of over 10,000 members. Furthermore, it has special interest groups, representing specific functions such as supply chain managers or export managers. We expect this will help us to collect data from a larger number of companies much more efficiently and can accelerate dissimination and valorization. Another improvement is that we will include PhD students to be able to spend more focused time on academic research and writing as well as automate some of the data collection and reporting processes as they currently require much manual labour which hinders scaling up.

PROJECT PARTNERS

The project started of with a group of eight partners. However, during the preparation and execution of the project, more partners joined, resulting in a consortium of **16** partners. Below, we list all partners that were involved in the project. The consortium represented shippers from different industries (automotive, bicycles, chemicals, consultancy, cosmetics/retail, food & beverages, healthcare, energy & building and logistic services), representing different sizes of organisations (from SME to large corporations). The core consortium existed of three parties: Windesheim, University of Groningen and Involvation. In this way, two universities (one academic and one of applied sciences/HBO) and a consultancy firm worked together in close colaboration, enduring the right combination of academic rigor, practical relevance and application/valorisation.

PRIVATE PARTNERS

INVOLVATION

Involvation, a consultancy firm with 20 years of experience, specializes enhancing supply chain management, with a focus on S&OP/IBP processes. We've collaborated with various organizations globally, emphasizing the need for bespoke solutions rather than a one-size-fits-approach. We view supply chain resilience (SCRes) as fundamental, nc just a trend. With a broad industry client base, our seasoned consultant emphasize practical, customized solutions grounded in solid theory.

AVEBE

The cooperative Royal Avebe U.A. (abbreviation of 'Aardappelmeel Verkoop Bureau') is an international Dutch starch manufacturer located in the north of the Netherlands and produces starch products based on potato starch and potato protein for use in food, animal feed, paper, construction, textiles and adhesives. About 2260 farmers are members of Avebe

BIDFOOD

Bidfood is a wholesale food supplier for the food service market and is active in the Netherlands for approximately 25,000 customers. Our online marketplace bidfood.nl connects chefs and entrepreneurs in hospitality to a complete range of international and local products. Easily ordered and delivered right into their kitchens. Our focus is aimed at food professionals in the hotel, restaurant and cafe business, as well as the healthcare sector.

BOSCH

Bosch Thermotechnology offers clients in utilities and industry the most complete range of solutions for heating and hot water, from a capacity of 25kW to as much as 38,000kW. With more than 100,000 systems installed in over 140 countries, their products can be found in almost every industry. Bosch supports not only with the right products but also with a comprehensive programme of services carried out by our own service organisation from Deventer. The specialisms of this Industrial machinery manufacturer is thermal engineering, heating and renewable energy for industry & utilities.

CORBION

Corbion is a sustainable ingredients company dedicated to preserving what matters, specializing in lactic acid, lactic acid derivatives, food preservation solutions, functional blends, and algae ingredients. We champion preservation in all forms, from food and food production to health and the planet, using our deep application and product knowledge to propel nature's ingenuity through science. With more than a century of experience, we continue working side-by-side with our customers to make our cutting-edge technologies work for them. Leveraging our advanced capabilities in fermentation and preservation technology, we help differentiate products in diverse markets that include food, home & personal care, animal nutrition, pharmaceuticals, electronics, medical devices, and bioplastics.

DSV

DSV Panalpina A/S is a Danish transport and logistics company offering transport services globally by road, air, sea and train. DSV has offices in more than 90 countries and an international network of partners and agents. On a daily basis, 20,000 trucks are moving goods to every destination in Europe. In the Netherlands. DSV has over 750,000 m2 of warehouse space, and over 2,500 employees working in 20 locations

KRUITBOSCH

Since Kruitbosch was founded in 1955, our family business in Zwolle developed into wholesaler for bicycles and accessories and a retail partner for specialist bicycle shops. Kruitbosch carries a broad range of brand parts and accessories for all types of bikes and users.

PERFETTI VAN MELLE

Perfetti Van Melle Group is an Italian-Dutch company of confectionery and gum. It was formed in 2001 with the merger of Perfetti group of Italy and the Van Melle of the Netherlands. Perfetti Van Melle is the headquartered in Lainate, Italy and Breda, The Netherlands. Perfetti Van Melle is the third largest confectionery manufacturer in the world after Mondelēz International and Mars, Incorporated. It employs 17,000 people via 30 subsidiary companies and distributes its products in over 159 countries.

RITUALS

Rituals Cosmetics Enterprise B.V. is a Dutch cosmetics company with 800 shops in 27 countries. The Company offers range of hair and body sprays, lotions, gifts, clothing, facial creams, travel accessories, and baby and mother care products. Rituals Cosmetics Enterprise serves customers in Europe.

SAMSUNG

Established in 2012, Samsung SDS Smart Logistics (part of the Korean multinational Samsung Group) is one of the fastest growing logistics service providers in the world and specializes in innovative logistics services by developing and applying optimized solutions and providing SCM consultancy to customers based on their own Cello platform.

SCANIA

ɔcania is a major Swedish manufacturer of commercial vehicles — pecifically heavy lorries, trucks and buses. It also manufactures diesel ngines for heavy vehicles as well as marine and general industrial pplications. Scania Logistics is responsible for leading logistics flows ll over the world. With multiple logistic hubs in the Netherlands (Hasselt nd Zwolle) and logistic centres in Sweden and Brazil they control ɔcania's supply chain in a sustainable, flexible and profitable way.

SWINKELS FAMILY BREWERS

Royal Swinkels Family Brewers is a Dutch family-owned company based in North Brabant and active in the beer, soft drinks and malt sectors. The group sells beer under several brand names, including Bavaria, Swinckels', La Trappe, Palm, Hollandia, Rodenbach and Steenbrugge. It is headquartered in Lieshout and has branches in more than 10 countries. Swinkels Family Brewers is the second largest brewing company in the Netherlands and one of the largest malt producers in Europe. One-third of its turnover comes from its own country and two-thirds from more than 130 countries outside the Netherlands.

TEIJIN ARAMID

aramid fibers serving industries such as automotive, aerospace, and ballistic protection. Their key products, including Twaron®, Teijinconex®, and Technora®, are noted for both performance and innovative industry applications. Emphasizing both expertise and sustainability, Teijin Aramid pursues a circular economy approach, balancing product excellence with carbon neutrality, and leveraging renewable resources and advanced recycling methods in their manufacturing processes.

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TKI DINALOG
Graaf Engelbertlaan 75
4837 DS Breda

info@dinalog.nl
www.dinalog.nl
+31 (0)76 531 53 00

Topsector Logistiek

TKI Dinalog is een
uitvoeringsorganisatie van
de Topsector Logistiek