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Gamification for Sustainable Food Transitions: Supporting Multi-Level Cooperation in Short Food Supply Chains Through GAIN

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Abstract

The food system has become globalized and industrial. As a consequence, food travels long distances to reach consumers and its production is over-reliant on chemicals, leading to high levels of carbon emissions and soil degradation. Short food supply chains (SFSCs) have been advocated as more sustainable alternatives and have been explicitly mentioned by the Dutch government and the EU as a strategy towards achieving sustainability goals. While SFSCs are viable on a small scale, scaling and mainstreaming them has proven difficult due to low margins, high costs, and steep learning curves. Their economic underperformance is particularly glaring when compared to the highly cost-efficient - albeit energy and resource intensive – conventional commercial supply chains. In practice, SFSCs therefore remain isolated success stories, failing to contribute to systemic change in food systems. In efforts to enhance the performance of SFSCs, this paper introduces the GAIN transition model, a novel framework based on gamification which provides a holistic and actionable framework for SFSC actors to coalesce and strategize around a common vision. We illustrate the underlying principles of GAIN and its potential for institutionalizing SFSCs. We find that thus far, GAIN has helped to catalyze action and has proven a useful tool which provides a common language for actors to navigate this complex space. Future research and more dissemination are needed to conclude with more certainty on the quantitative impact of GAIN in terms of enabling and strengthening SFSCs.

Keywords: Short food supply chains; Governance; Multi-actor collaboration; The Netherlands; Gamification

1 Introduction

Short food supply chains (SFSCs) have been advocated as more sustainable alternatives to the current industrial and globalized food systems (). There are several definitions of SFSCs, but achieving increased geographical and social proximity, bridging the gap between food producer and consumer, is the common denominator (Bazzani & Canavari, 2013). The EU's rural develop-

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ment regulation 1305/2013 defines SFSCs as

> supply chains involving a limited number of economic operators, committed to cooperation, local economic development, and close geographical and social relations between food producers, processors and consumers.

Strengthening and enabling SFSCs is broadly motivated by reasons of economic resilience, human health, and environmental sustainability (van der Gaast et al., 2020). Stimulating the local economy is seen as a move towards resilience in the face of an ever more tumultuous global economy, the result of both political and climate instability (Mundler & Laughrea, 2016). Improving citizens' diets by increasing the intake of whole and seasonal foods can also be achieved by promoting SFSCs (). Lastly, short supply chains are associated with the elimination of several resource-intensive processing and transportation steps in the supply chain, thereby reducing food's environmental footprint (Wertheim-Heck et al., 2018). While the carbon dioxide savings associated with SFSCs is still contested in the literature (Loiseau et al., 2020), moving towards having a greater share of food supplied by SFSCs is almost unanimously considered a desirable path towards a more sustainable food system, evidenced by its support from local and national governments as well as international organizations (Paciarotti & Torregiani, 2021).
SFSCs *can* provide food that is healthier, has a lower carbon footprint, and whose procurement stimulates the local rural economy. The *extent to which* SFSCs realize the prescribed benefits depends on a set of complex entanglements of many internal and external factors. As Freitas et al. (2019) (p.2) note:

> despite the success stories that have been reported in the literature (...) many implementations are not satisfactory, considering the benefits that are initially expected.

Performing below potential and coming short of expected outcomes is a frustration to many in the SFSC field. This has created a wave of efforts to better systemize and strategize around SFSC formation. While SFSCs are by-default formed from the bottom-up, in order to have impact on a larger scale and prove a viable alternative to the status quo, independently operating initiatives need to be integrated in an overarching strategy.
Several barriers exist to successful scaling of SFSCs (Jarzebowski et al., 2020). These can be broadly classified into:

- lack of consumer awareness and demand;
- lack of data; and
- lack of collaboration.

The latter is particularly problematic as it underpins other significant barriers such as low margins for small scale farmers, high logistical costs, lack of knowledge, and lack of diversity in regional foodsheds. This also however means that collaboration is a powerful leverage point that has the potential to transform.
Indeed Runhaar (2021) (p.1) notes that "food system transitions require regime change" where 'regime' refers to a "semi-coherent set of rules that orient social groups and encompasses markets, technologies, regulations, policies, networks, and cultural expectations". Pertinently, Restrepo et al. (2014), (p.39) relate the need for collaboration to transitioning complex socio-ecological systems noting that

> if the changes needed are beyond the scale of individual control, collective or coordinated actions of multiple actors are required.

The growing recognition of collaboration as a key asset in food system transitions has resulted in multiple efforts to better understand and mobilize collaboration with the explicit aim of enabling actors in alternative food spaces (including SFSCs) to achieve a competitive edge against conventional supply chains. Mittal et al. (2017) have sought to formalize supply chain collaboration through implementing a flexible and affordable inventory tracking system to allow participants to actively share logistics information in real time, Freitas et al. (2019) have published a conceptual framework to help actors choose from a range of types of collaboration with which to

engage in, and Matopoulos et al. (2007) published a framework to be used as "a conceptual landmark for further empirical research" narrowing in on the grower-processor interface. While these and other examples from the literature help solve a part of the puzzle, they are generally limited either by scope or audience: targeting one dynamic in the supply chain or one actor type. Furthermore, these frameworks tend to be more conceptual, of interest for researchers but difficult to absorb and implement by SFSC practitioners themselves.

To further such efforts to mobilize collaboration as a tool for systemic change, we introduce the GAIN transition model (GAIN), a conceptual framework used to enable and enhance collaboration, deemed necessary for the successful implementation, institutionalization and upscaling of SFSCs. GAIN has two unique characteristics: it is based on gamification, embedding within it a distinct understanding of human behavior drivers and it was created by SFSC practitioners, making it tractable in the real-world.

First we outline the underlying theories which validate the model. We subsequently describe the model in detail and illustrate its usefulness and potential by reflecting on its application in the Dutch SFSC context.

2 Theoretical Background

GAIN brings together a variety of theories and concepts. Here we will describe the most important ones.

It is important to note that GAIN was created by SFSC practitioners largely unaware of sustainability transition theories, thus the analysis is somewhat retrospective, embedding this model within Sustainability Transition literature.

2.1 Innovation ecosystems

The conventional food system subscribes to the agribusiness approach (Davis & Goldberg, 1957) where value creation stems from an ever-greater specialization of processes along the supply chain, maximizing the economic efficiency of each step in isolation, decreasing holistic knowledge of the entire process, and increasing dependency on other, often anonymous actors along the supply chain to create a product. In the ecosystem approach, value creation stems from knowledge sharing and increasing symbiosis and mutually beneficial relationships amongst all supply chain actors. As such, the ecosystem approach is distinct in that in emphasizes and welcomes interdependence and relationships as opposed to dependence and isolation.

GAIN provides SFSC actors with strategic insights into the structure of the ecosystem within which they operate as well as guidance and tools for strategic collective system-building. Here, ecosystem is

> a loosely interconnected network of actors (a community), including companies and other entities, coevolving their capabilities around innovation, sharing knowledge, technologies, skills and resources, cooperating and competing (Gomes et al., 2018, p. 39)

whereas strategic collective system building entails

> the strategic activity of networks of entrepreneurs and entrepreneurial managers to build up a supportive environment and infrastructure for their innovative sustainability technology" (Planko, 2018, p. 46).

The key aspect of this concept is the creation of value within a collective ecosystem of businesses, with value creation understood as "the collaborative processes and activities of creating value for customers and other stakeholders" (Ritala et al., 2013) (p. 5). Value creation through strategic collaboration within the ecosystem is the aim of GAIN, with the overarching goal of enabling the development and diffusion of SFSC practices within the agri-food system.

In an ecosystem, in order to design such strategic collaboration, it is important to differentiate between various actor-types based on their function. Actors that are relevant for SFSCs include farmers, food processors, retailers, consumers, banks, policy makers etc. Dedehayir et al. (2018) present an overview of several key roles for actors in an innovation ecosystem. First,

leadership roles, which are indispensable for genesis, ensure ecosystem governance, the creation of partnerships, and the distribution of value. Second, direct value creation roles, which refer to stakeholders that collectively supply, assemble and complement key components, products or services. Third, value creation support roles, which can provide fundamental knowledge or are specialized in forming connections between stakeholders to help formalize the ecosystem. Last, entrepreneurial ecosystem roles, which facilitate and support the creation of ventures in the ecosystem. Knowledge of these actor-types and their associated functions helps coalesce individuals in innovation ecosystems into strategic partnerships, where each knows his or her role and works symbiotically with others to maximize the benefits of their union. The idea of capitalizing on the unique contribution or function of an individual actor for the benefit of the community through strategic partnerships is a key process in the GAIN model.

2.2 Gamification

Gamification is a term used for applying game-like elements in a non-game context. A known example is eBay's bidding and feedback system. Gamification appeals to fundamental human drivers like impatience, curiosity, and eagerness and works to guide human behavior. Indeed, gamification has a lot of overlap with the application of human-focused design principles (Chou, 2014).

The idea of intrinsic motivators, those that are based on intrinsic and fundamental human drivers as opposed to external rewards, are key to understanding the power of applying gamification to non-game contexts. Five such motivators are autonomy ("I control"), mastery ("I improve"), purpose ("I make a difference"), progress ("I achieve"), and social interaction ("I connect with others") (Paharia, 2013). Gamified socio-technical systems can use several techniques that video game designers have used par excellence to induce certain behaviors, hence the origin of the term. Described here are several techniques found in the GAIN model.

First are several common approaches to guiding behavior such as giving users goals to accomplish, engaging them with competition, encouraging them to collaborate in teams, giving them status by leveling up, and enabling them to earn points (Paharia, 2013). Second is the idea of tapping into the potential of collective brain power. There are ample examples that illustrate the power for collecting data and exploring solution space (e.g. citizen science initiatives), conveying knowledge, or changing attitudes and behavior. Schrier (2016) gives a comprehensive overview. In particular, the big data being generated by the SFSC constituents as they interact with each other, and the data-driven motivational techniques of gamification, harness the power to achieve and support collaboration at various levels of organization (local, regional, national, and international). Third is the introduction of levels. GAIN consists of a number of levels, which is a well-known game mechanic, also seen in other settings such as the WordPress model where one starts with free use of the WordPress website hosting, next there are paid features, next co-creation of features, ultimately building your own publication platform using WordPress open-source software.

There are many ways we can look at and analyze gamified socio-technical systems (Schell, 2019). Overall, GAIN can be seen as a combination of two stylized game types:

- the survival game, where participants must team up, go out on a scavenger hunt to collect weapons and
- the strategy game, where decision-making skills and situational awareness are highly valued.

Just as in the actor-archetype argument, it helps to work with game archetypes to engage 'players' or ecosystem actors in deliberate behavior which leads to predictable outcomes, however it is important to emphasize that the GAIN model is not a game but uses game mechanics to trigger desirable human behaviors.

3 The GAIN Transition Model

3.1 Theory of Change

Four major challenges faced by SFSC practitioners in the Netherlands prompted the creation of GAIN, namely:

- getting and coordinating support;
- data sharing and analysis;
- access to markets and consumers;
- infrastructure and logistics.

The inability to overcome these challenges led to low margins, high costs, and steep learning curves making it difficult to scale and become a viable alternative to the current food system. Lack of strategic collaboration is believed to underpin all of the challenges, therefore enabling collaboration is expected improve SFSC actors' ability to overcome them.
GAIN fosters SFSCs by enabling collaboration among all relevant actors-types by:

- providing a clear stepwise framework to instruct on desired actions at various levels of ecosystem maturity, thereby reducing the ambiguity of this complex ecosystem and associated risk of engagement; and
- providing a set of tools for maximizing the benefits of collaboration.

3.2 Description of GAIN Levels

This section describes the entire GAIN model and the dynamics at play on every level. The model (Figure 1) presents four levels of engagement for SFSC-actors with each level presenting unique opportunities to increase the competitiveness and sustainability of short food supply chains. At level 1, the individual participants experience autonomy in their local food supply chain. At level 2, social interaction builds trust and loyalty. At level 3, the 'weapons' or inventory are collected and shared, leading to increased mastery with all participants. Moving from level to level demonstrates progress in upscaling, with the end goal being the institutionalization and mainstreaming of SFSCs whereby they are robust enough to create systemic change.

Level I – Local Start

Level I is the level of individual short chain initiatives. This initial stage is focused on the close network of the actor or stakeholder in the short chain. In the center is a very strong individual or team that determines what happens in their world. At this level, a freemium service is in play. This means that SFSC actors only have to 'register', meaning they have to make themselves known and become part of an active group of SFSC actors. In exchange for 'registering', the SFSC actors get access to a network of others doing similar work.

Level II – Connecting Regionally

On Level II the short chain entrepreneur has already gathered a connected network of SFSC actors and is now interested in alliances consisting of multiple actor types. Here building a chain of trust around a regional food system based on transparency and cultural values is the aim. Participants should seek to provide shared services for collaboration and cross-sectoral value creation based on a common reference point such as the Sustainable Development Goals.
An important activity at level II is mapping regional alliances and supporting them with knowledge in order to encourage collaboration and create a stronger regional SFSC ecosystem. Level II eventually becomes a paid service model when to 'register' your network a number of actions and investments are expected including network analysis, inventory analysis (tools, data, money, range, authority, expertise) and finally the establishment of a governance structure. In essence it requires a little extra effort to map and present what you can bring to the table.

Valley of Death

Most short chain parties act on level II, but the bigger questions of systematically changing the

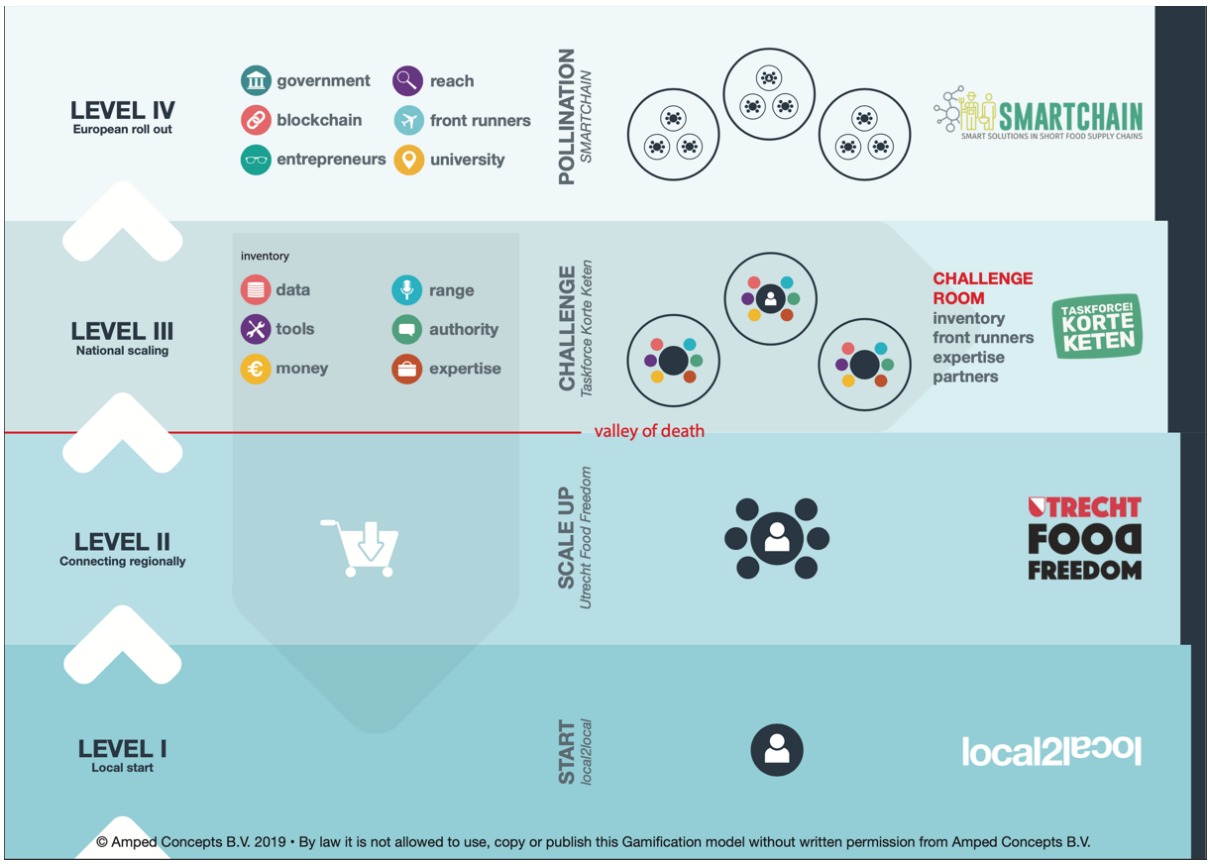

Figure 1: The GAIN Transition Model

food system are not addressed here. This is because of the Valley of Death which refers to common barriers to scaling SFSCs that are difficult to overcome without collaborating at scale. As a short chain entrepreneur, if you make the leap to level III and really think about the necessary changes to the food system, then you will not be able to take up the challenge by yourself.

Level III – National Scaling

Level III is the cooperation level with the aim of creating an 'innovation ecosystem' of smart cities. Here data come together, analyses are made of the overall picture, and insights can be gained about the missing parts. Active data can also be made available here for the various level I and level II initiatives.

Interregional collaborations aligned on a certain governance structure are also key. The implementing organization links up with other committed Level II parties and works from the analyzed networks, making use of the expertise from the ecosystem analysis and classified inventory. Level III connects what is already there and helps realize what is lacking based on common needs.

Challenge Room

The Challenge Room is a separate component within level III. Here a variety of participating actors identify a problem and make their resources and strengths known to devise a strategy to solve it. At this point each actor-type continues in their own path armed with the tools and strategies that were developed. Trust and trans-

parency are key for the Challenge Room to bear fruit, and thus the selection of participating actors influences to a great extent the outcome of this process. If a party is not willing to agree to these rules, then they are not welcome within the challenge room.

Inventory

The inventory is the arsenal at disposition to take on SFSC challenges. These come in the form of data, tools, money, range, authority, and expertise. The inventory should identify the tools that each stakeholder brings to the table and is willing to share in order to achieve a common goal. One cannot take on the challenge of scaling SFSCs individually. You must work together, and the inventory showcases the collective power of a given consortium.

Level IV – European Roll Out

Level IV concerns connecting on the EU Level, integrating the goals and projects with EU mandates. This is where learnings are cross-pollinated and adapted to other national contexts. Knowledge is further exchanged with other European projects on the basis of a shared structure, eventually influencing European Union policy to create an enabling environment for short food supply chains. Here SFSC practitioners present themselves as a strong consortium with solutions.

4 Results

Within the Dutch context, the primary intended benefits of GAIN are:

- enable collaboration between actors and stakeholders on multiple levels (local, regional, interregional, international);
- consolidate a network of hundreds of e-commerce platforms for local products to enable sharing added value models, data, networks, expertise, reach, etc.;
- boost social engagement and empower networks to re-establish the connection between consumers and farmers;
- apply blockchain technology for value-based business models; and
- structure a community-empowered campaign strategy to transition from 'early adopter' to 'early majority' by creating demand driven markets.

4.1 Real-world Uptake of the GAIN Transition Model

GAIN was developed by the founders of Local2Local (L2L)[1], a SFSC company located in the Utrecht region. Local2local started in 2014 by setting up a pop-up store for locally sourced goods and after many re-iterations, is now operating an online wholesale shop for local goods, with targeted sales to the wholesale market, catering companies, and healthcare institutions. Local2Local started by working with 20 farmers. It managed logistics and delivered to consumers in the region, all on a very small scale. It was only after 5 years of operating that the company managed to break even (a success in and of itself for many SFSC initiatives). At this point, L2L was managing relationships with over 300 farmers. In 2020 the company experienced a surge in demand and was able to turn a profit with the increased volume of sales. While the demand was in large part due to the Covid crisis, L2L's ability to adapt to such a surge in demand was in large part thanks to their surpassing level 2 of GAIN (Valley of Death), being an active member in various communities and organizations with access to a shared inventory. The demand for and interest in local food continues to grow; buyers have committed 20 million euros in revenue in the coming 3 years and the company is in the process of extending farmer networks, onboarding new producers onto their web shop, both in the Netherlands and abroad.
Today L2L is the leading SFSC-company in the province of Utrecht (Level I). It has brought together SFSC actors in the regional alliance Utrecht Food Freedom (Level II) and is currently seeking strategic partnerships with five other provinces. It is a founding member of the national Task Force Korte Keten (Level III) and is

[1] Check local2local.nl for more insight on the organization and ongoing projects.

the Dutch case study for the European Commission's SMARTCHAIN H2020 Consortium (Level IV). We will describe in more detail the various events that took place at each level, in essence a timeline of how Local2Local progressed from Level I to Level IV, a success journey which informed the GAIN model itself, and which the model hopes to catalyze for other SFSC initiatives.

Level I – Local2Local

Local2Local acts as an intermediary between farmers in given regions and multiple market channels, adjusting to constantly changing supply and demand. For many years it functioned within a small network of farmer and buyers. However, by staying within Level I, namely where an initiative is successful with a strong community, but operating in isolation, Local2Local struggled to really extend the successes of its operation beyond its immediate environment. Furthermore, Local2Local faced very real challenges – logistical costs, HACCP compliance, financial support – and needed to collaborate with a variety of actors to work towards solving these. To transition to the next level, Local2Local invested a lot of time and money in networking and creating regional alliances.
New collaborations evolved through establishing a stronger connection between consumers and farmers. Here, facilitating the storytelling and branding of local producers, conducting various marketing practices through events, local product tastings, food trucks, product development, farmer markets, weekly local vegetable subscriptions etc. were key activities. Over the years, these community-building and sales activities have evolved to become strategies and smart technologies for a SFSC service that is scalable.

Level II – Utrecht Food Freedom

The facilitation of collaboration among regional SFSC actors is fundamental in Level II. Local2Local established such regional alliances by organizing several multi-actor events. For example, the organization worked with the Utrecht Science Park to try to address logistical issues and formed a strategic partnership with Stichting Reinaerde, a day care center supporting disabled people, to hire them in transportation and packaging, a way to both reduce costs and give meaningful employment to those at the margins of society. These early collaborations at the Utrecht Science Park generated various projects including weekly local vegetable boxes, harvest support events at farms, student excursions, and projects with local farmers. This evolved in the establishment of a student community offering students in sustainability, geo- and agri-sciences, media, and the arts the opportunity to work at local farms, acquire skills and insights on food production and exchange their knowledge with farmers. After collaborations are facilitated, they need to be enshrined. Parties need to formally come together, create a vision, and set up a consortium-forming event where the parties involved sign the shared vision. In the case of the Utrecht region the Food-y-fort (www.food-y-fort.nl) event was an important step towards alignment. After several events, Operation Food Freedom (www.operationfoodfreedom.nl) was established. Involved parties drew up a shared vision and signed for agreement. This concept later developed into a regional implementation, Utrecht Food Freedom (www.utrechtfoodfreedom.nl)
Building on Utrecht Food Freedom, Local2Local has been able to extend strategic partnerships beyond the Utrecht region. In collaboration with FlevoFood and the Amsterdam Metropole Region, Local2Local is working to supply Amsterdam with more local food. This has led to a regional alliance between the provinces of Flevoland, Utrecht, and Noord-Holland. In the next GAIN level, collaborations among multiple regional alliances are facilitated on a national scale.

Level III – Task Force Korte Keten

To get to Level III from Level II one must pass the Valley of Death. This is where most SFSC initiatives fail to scale further, remaining as an alternative, still experimental idea as opposed to infiltrating the mainstream. As such, Level III hosts many features that are meant to really boost SFSC performance but also requires a lot more trust and collaboration among involved actors.

Level III is also the level where the GAIN model becomes a real important resource, it is the common language and set of rules that actors can follow as they try to make it through the Valley of Death. The dissemination of GAIN started by presenting it to the Transition Coalition Food Network, a coalition of frontrunners within the agri, food, nature, and health sectors working on sustainable solutions for the food system. This presentation led to a national stakeholder event of SFSC frontrunners where six SFSC leaders established an overarching workforce named the Taskforce Korte Keten (TKK) or Taskforce Short Chains (www.taskforcekorteketen.nl) which in turn has adopted the GAIN model as its guiding document. TKK was later designated by the Dutch Ministry of Agriculture as a leading organization for guiding the transition for circular agriculture.
TKK forms a unique collaboration that aims to support and strengthen the regional dynamics of short food chains by sharing knowledge and working all along the supply chain. With input obtained from the short chain actors in the different regions, TKK created three challenge rooms: logistics, data, and multichannel marketing. TKK facilitates a co-creative process within these challenge rooms, drawing from the available inventory of participating actors. Eventually, a national governance structure was also set up for TKK to align with level IV consortia and programs, being the work packages and themes in existing European research programs.

Level IV – SMARTCHAIN H2020

The introduction of GAIN on a European level started when Local2Local became the Dutch hub manager for the European Commission's SMARTCHAIN H2020 Consortium. The GAIN model was presented as a tool for collaborative short food supply chains.

5 Discussion

The GAIN method, emphasizing community, relationship, collaboration and data sharing has been instrumental to quickly identify shared challenges, opportunities, and sustainable ambitions. It resonates across disciplines and scales, it has been embraced by the Dutch Ministry of Agriculture as a supplementary framework for policy makers in the Amsterdam region seeking to strengthen SFSCs, it is being used by the SMARTCHAIN Consortium on the EU level as a tool for assessing progress towards SFSCs (www.smartchain-platform.eu/en/gain-model) and is embraced by farmers who are keen on working effectively towards a food system which includes the local producer as a key actor. It prescribes a role for all relevant actors, making it an extremely useful tool for much-needed cross-sectional collaboration, a common language for turning a long-term vision into practical interventions. Here we reflect on the impact of GAIN and future priorities.

5.1 Reflections from Engaging with GAIN

Food system transition specialist

In the case of a food transition specialist, GAIN worked to strengthen his conviction about the need to collaborate strategically and shifted the way he looks at the playing field. As somebody who acts as a connector, a networker, GAIN has helped him to tailor knowledge and advice to players on each level, and to inform players operating at their distinct level of the realities at the other levels. It helps the people he works with gain the bigger picture of their ecosystem. He claims that he can contribute more effectively to the transition by having a clearer picture of the way each level functions, and what the people at each level should be doing to succeed. He adds: "In concrete terms, this means that I can give farmers from Texel access to markets far beyond their own reach."
More specifically, GAIN has changed the way he views the role of data in the transition, emphasizing the importance of data ownership by farmers and citizens, rather than the big players in the system; access and control over data become very important through the lens of GAIN.
One of the major limitations he sees is that GAIN starts on the assumption of trust, without really giving tools to achieve this trust. He says, "What I have not discovered within GAIN is a

method or model for achieving this trust." He suggests that adding the Theory U - which seeks to better understand how individuals and communities can continually renew and reinvent, become more resilient through flexibility and openness, as we face an uncertain and turbulent future (Scharmer, 2018) - would provide a very good process in conjunction with GAIN to connect that missing link.

Founding chairman of the Milk Supply Association in Scotland

In the chairman's words: "Most food supply chains are based on a least cost ethos. I found myself perpetually in a race to the bottom. When I discovered the concept of GAIN it was a light bulb moment." What it did for Mr. Christie was create a logical system to help build a new supply chain, one which he never saw feasible before. It is a supply chain that is both economically viable but also moves the food system in the right direction in terms of reducing environmental impacts. GAIN put things in perspective, it gave clarity to the frustrations of working as an individual to no avail and paved a more facetious path for actually creating supply chain change. He said "if I followed GAIN I could in fact build a new transformational supply chain by working with other motivated actors in our industry" implying an interpretation of GAIN as guidebook, a set of steps taken to achieve a predictable end goal.

5.2 Limitations & Suggestions for Future Research

The GAIN model presents a simplified and stylized version of reality, and thus does not address all issues faced by SFSCs nor does it presume to. Nonetheless, the application of GAIN has contributed to the mobilization of actors and fostering collaboration as a precondition for the functioning and upscaling of SFSCs. Looking to the future, several challenges and limitations need to be addressed in future research and continued improvement of the model:

- **Overcoming competition** within ecosystems, enabling even more collaboration. GAIN is a first step, but there is a lot of resistance among relevant actors and a lot of work needs to go into further communicating the benefits of collaborations and convincing them to join the effort of building collaborative SFSCs.

- **Free Riders**. What are the incentives within the GAIN levels to share information and to try as hard as the rest? What is the incentive to participate and the reward for sharing valuable inventory elements such as data, knowledge, or reach? How will this input be valued? How do we go about tokenization? What is the incentive to share my data within the ecosystem, what are the mechanics behind this?

- The **rules of collaboration** must be better defined such that actors have a clear idea of how to progress up each level. This is of course a work in practice and will emerge from real experiences of players. With time, a best-practice handbook can be made.

- **Healthy competition** needs to be addressed. While GAIN stresses collaboration, within the levels there must be a form of competition to bring out the best in each level and thus stimulate the further development of the entire system across levels.

- The **extent to which we take the game 'literally'** is still to be determined: is this just a framework for people to structure thoughts and actions, or are there going to be literal points that actors can gain or lose depending on their behavior and contributions? For example: you can get experience points per inventory type, before participating in a challenge room you have to have 3 of the 6 inventory types, you must constantly keep your points at a certain level in order to be motivated to keep performing, etc.

- **Disseminating and implementing GAIN** is a time intensive process. It requires a skilled communicator to explain the logic and deliver the vision, and it often takes a while for all the aspects of GAIN to sink into the audience.

6 Conclusion

Despite their promise of contributing to a more sustainable food system, SFSCs play a very minor role in the production and consumption of food. There are various barriers to their implementation and upscaling. In this paper, we focused on one specific barrier, namely a lack of collaboration among farmers, traders, consumers, banks, policy makers etc. Such collaboration is needed in order to establish durable relationships and to create a favorable institutional context for SFSCs.

We presented GAIN as a stepwise approach to organize and structure such collaboration and to gradually upscale collaboration from the local to the national scale. Gamification elements were used to facilitate the interaction process. The dissemination of GAIN in the Dutch context made clear how the use of the model can look in practice and what it can achieve, and what not. Whereas the steps within GAIN can be replicated elsewhere, its achievements will probably differ from place to place. Also, additional tools will be needed to overcome other barriers, such as a lack of consumer awareness and demand. Nevertheless, the experiences in the Netherlands are promising. We therefore encourage practitioners elsewhere to disseminate GAIN to foster SFSCs, while we suggest researchers conduct follow-up research along the lines touched upon above in order to further enhance the usefulness of GAIN and to get a better understanding of critical success conditions.

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