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An Online Innovation Platform to Promote Collaboration and Sustainability in Short Food Supply Chains

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Abstract

A sustainable Short Food Supply Chain (SFSC) requires collaboration among all actors, which nowadays is facilitated by information and communication technologies (ICT). However, not all SFSC stakeholders network with others in this way, and it is not clear what will draw them to ICT interaction. A simple, user-friendly website, the SMARTCHAIN Innovation Platform, evolving since March 2019, may facilitate interaction and cooperation among SFSC stakeholders. This article presents the Platform's development and evaluates its efficacy and impact by analysing data from Google Analytics (GA) and other sources. Primary Platform features promote communication and information sharing: these are the **1)** Innovation Hubs in 9 European countries, **2)** Inventories including 150 SFSC innovations and 50 SFSC initiatives, **3)** Resources databases of Publications and Weblinks, and **4)** Training section. GA showed that visitors to the Platform increased slowly in the 16 months since its start, and the number of page views increased with the amount of time on the Platform. The most visited page of the Platform was the information-providing Innovation Inventory. Most Platform users were in partner countries of the SMARTCHAIN project, but not all Innovation Hubs had high numbers of users. Most users arrived at the Platform by direct link, but LinkedIn was the most important originating social network. Taken together, these data suggest growth potential for an easy-to-use website that provides useful and up-to-date information but little inclination for SFSC stakeholders to use an online Platform for communication.

Keywords: SMARTCHAIN; Agri-food; Innovation platform; Short food supply chain; Local food systems; Sustainability

1 Introduction

The number of short food supply chains (SFSCs) such as farmers' markets, community-supported agriculture and direct farm sales has increased in recent years worldwide, and in particular throughout Europe (Jarzebowski et al., 2020). The SFSCs present a sustainable alternative to large chain supermarkets and offer consumers food that is fresh, has less packaging and whose origin can be traced to a certain producer or area. They offer producers the opportunity to get a fair(er) price for their goods and to organise marketing amongst themselves (Malak-Rawlikowska et al., 2019). A "short supply chain" may be defined as a supply chain

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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 (European Commission, 2013). Yet, according to Paciarotti and Torregiani (2021), until now (2021) there is no consolidated definition of SFSC within the scientific community. Whereas different stakeholders use different definitions, the main attribute of a SFSC is sustainability.

More than a conventional food supply chain, a sustainable SFSC is built upon communication: Producer and consumer communication is paramount and if there are any intermediary stakeholders, e.g., transportation or organisers of farmers' markets, they too should participate in this regular and open communication. In fact, communication and collaboration between SFSC actors and logistics services are counted among the main strategic tools for the development and sustainability of SFSCs (Paciarotti & Torregiani, 2021). Furthermore, market failure of conventional food supply chains is hypothesised to be associated with limited information flow (Jarzebowski et al., 2020). Good collaboration and communication among the SFSC stakeholders may work in both directions as, for example, farmers supply consumers with information and receive their feedback in return. With the necessity of transparent, continuous and multi-faceted communication for SFSC success, modern information and communication technologies (ICT) may have a role to play in enhancing SFSC sustainability by providing new ways of communication and collaboration among the different stakeholders (El Bilali & Allahyari, 2018).

A lack of communication and collaboration among SFSC stakeholders may lead to flaws in the development and effectiveness of a SFSC. While there is no official count, in part due to the small, local and perhaps "unofficial" nature of many SFSCs, word of mouth has it that SFSCs are often isolated geographically and with few obvious networking possibilities. In order to compete with large and well-established supermarket chains, the SFSC faces challenges including effective marketing, providing consumer convenience and hiring specialised employees to implement food supply-related policies. The typical small SFSC producer likely has little opportunity to network with others and profit from shared talents and experiences, and such networking, realised via ICT, has recently emerged on the research agenda (Svenfelt & Zapico, 2016).

Nowadays, technology is infiltrating all venues – the SFSC, even if it is a small, local "mom and pop" supplier must, in order to thrive, adapt to the internet for linking producers to consumers and creating knowledge networks among food producers (Svenfelt & Zapico, 2016). An online communication and collaboration platform, one that is user-friendly with a simple interface and accessible both on a phone and on a computer, may help both the producers and the other stakeholders (mainly consumers) to better profit from their participation in the SFSC. Online platforms have gained immensely in popularity for shopping, especially since the March 2020 onset of the COVID-19 pandemic, and in particular online grocery shopping has flourished and this demands proper investments in infrastructure while keeping in mind consumers' preferences for local food supply chains (Hobbs, 2020).

This article reports on the creation and monitoring of an online platform geared not towards food sales but towards communication and information sharing among small food producers and other stakeholders (policy makers, researchers, etc.) in the SFSC. The Platform was born as a part of the SMARTCHAIN project and initially geared towards project partners, especially the 9 Innovation Hubs and the two case studies in each Hub. The aim was to create an interactive easy-to-use and easy-to-maintain intuitive website that is flexible enough to continue after the project's end. Here we present the creation and evolution, including updates, new material and new approaches, of the website. We further evaluate different engagement patterns of the website through analyses, including number of users and returning users, time spent on the website, number of pages visited, geographical distribution of visitors and registrations that give an unbiased view of the successes and challenges of the Platform.

View the current version of the SMARTCHAIN Platform here: https:

//www.smartchain-platform.eu.

2 Materials and Methods

The SMARTCHAIN Platform was, and continues to be, designed through iterative discussion with project partners and other stakeholders. The Platform is a living website and constantly evolving – both via small additions to existing pages and major reorganisations of structure. The first version of the Platform went live in March 2019, with some basic sections including the Home Page (with social media and contact links) and the following menu bar: News & Events, Innovation Hubs, Innovation Inventory, Training, GAIN Model, Register/Log In. There was one major reorganisation of the Platform, in May 2020, when it became apparent that the quantity of information was more than the current structure could adequately display. The Platform continues to evolve and some of the sections described below may well be further elaborated by the time this article is published. The SMARTCHAIN Platform is installed on the ISEKI-Food Association server where it will be sustained throughout the SMARTCHAIN project lifetime and after the end of the project. Development of the content of the current Platform, and the history of this development, is detailed in the following sections.

2.1 Home Page

The home page of the SMARTCHAIN Innovation Platform was designed to favour interaction and cooperation of stakeholders in the SFSC. It was designed using Drupal 7 as the content management system, to contain a top menu bar, a central text block introducing the SMARTCHAIN project and differentiating the SMARTCHAIN Innovation Platform, a series of SFSC stakeholder icons, an interactive map of SMARTCHAIN partner locations and a bottom bar of general information (newsletter subscription, contact link, project legal identification), including a plug-in allowing choice of language which, when chosen, led to a page of translated text.

Stakeholder icons

Stakeholder groups were defined through iterative discussion and final unanimous agreement of key partners in the SMARTCHAIN project. The stakeholders currently highlighted are:

1. consumers,
2. farmers and cooperatives,
3. industry and retail,
4. policy makers, and
5. technology providers.

In earlier versions of the Home Page, group 3) "industry and retail" was simply labelled as "industry" and later "industry and HoReCa" and group 2) "farmers and cooperatives" evolved from simply "farmers" and then "farmers and producers". Initially, the Platform was designed for different stakeholders to enter specific and targeted pages via an icon representing the stakeholder group, i.e., consumers followed a shopping-basket-style icon to find pages with SFSC information geared towards consumers. Within 13 months of the Platform being live and online, it was apparent that much of the information posted for stakeholders was appropriate for more than one stakeholder group, e.g., the results of a consumer survey on behaviours and attitudes towards SFSCs could be interesting to both "consumers" wanting to know more about SFSCs and to "industry and retail" aiming to increase SFSC sales. This realisation of multiple stakeholder interest in a single bit of information led to a major Platform reorganisation: the stakeholder icons became not points of entry but indications of who the Platform could serve and how, e.g., clicking the consumer icon now shows "We all eat every day, and the 150 million+ households in the EU can benefit from SFSCs. Studies on consumer groups and SFSC initiatives around the world are available on the SMARTCHAIN Platform!" rather than leading to consumer-geared pages. In the new Platform organisation, the information previously on the individual stakeholder pages was reclassified as

1. Publications (videos, presentations, infographics) and

2. Weblinks (websites, organisations).

Databases were developed for these two Resources, as detailed below, and the entry to them was moved to the menu bar.

Menu bar and registration

The current menu bar has 6 categories: Innovation Hubs, Inventories, Resources, Training, GAIN Model, and Register/Login. The methods of developing the content of the first four categories is detailed in the sections below. The GAIN Model is the subject of an independent article in this issue.
Development of the Register page began with an open call to all project participants (approximately 120 persons) asking what information was desired about Platform users. The resulting Registration form contained 10 required fields, including typical such as "Surname" and more unusual such as "Motivation", and 13 optional fields, including for example "Academic degree" and "Stakeholder identification". At the major Platform reorganisation in May 2020, with the desire to increase the number of registrants, the Registration page was simplified to 6 required and 8 optional fields. All completed registrations are reviewed by a website administrator to ensure that the appropriate role (stakeholder, project member, hub member, hub leader, editor) is assigned to the applicant.

Interactive map

The Home Page also contains, since its inception, an Interactive Map linking to the 9 Innovation Hubs of the SMARTCHAIN project (in France, Germany, Greece, Hungary, Italy, the Netherlands, Serbia, Spain and Switzerland). In the first months of the Platform, the 9 country Hub pages contained the same basic description of generic Hub goals and activities extracted from the project proposal and posted in English. Hub Managers updated this text to include specifics about their Hub and translated it to the local language; they also provided a photo and direct contact information for their Hub.
Each SMARTCHAIN Innovation Hub is the home of two case studies of successful, local SFSCs. Through each Hub's page, a user can access the case study pages which contain logos, links to websites and descriptive text. This text was initially available in English and now, through the translation plug-in, in the local Hub language.

2.2 Innovation Hubs

The 9 Innovation Hubs of the SMARTCHAIN Project aim to facilitate cooperation among different SFSC actors within their country. They are located in France, Germany, Greece, Hungary, Italy, the Netherlands, Serbia, Spain and Switzerland. Links to the Hub pages are easily accessible since the first version of the Platform via a drop-down menu and via the Interactive Map. Hub managers were asked to update their pages on the SMARTCHAIN Platform with local information, and a 1-hour online workshop held shortly after the Platform launch gave specific information on how to do this.
Each Hub page links to two SFSC case studies in that country. Here, users can find information about working SFSCs for the most commonly consumed foods in Europe, e.g., fruits and vegetables, meat, dairy and bakery products. Stakeholders in the case studies will also be able to access a Social Innovation Assessment Template (SIAT) organised and implemented by the leaders of the project's work package 3.

2.3 Inventories

Innovation Inventory

The SMARTCHAIN Innovation Inventory was designed to be a novel system for storing, generating, searching, sharing and ultimately utilizing information on SFSC innovations, as well as facilitating communication between innovators and those interested in the innovations. In its early development stage, three main parts of the system were identified:

1. an interactive online portal oriented towards the stakeholders,

2. an inventory (database) of available innovations, solutions and/or recommendations, and

3. an underlying information technology (IT) infrastructure to ensure redundancy, backups, improved fault-tolerance, availability and accessibility of the system.

The interactive online portal was made with an interface that is attractive (a photo of each innovation) and functional (a search request field). It was designed to welcome a wide range of communities, both inside and outside of the SMARTCHAIN project.
The inventory of available innovations, on the contrary, was planned for project participants, i.e., the project's hub managers who stored new and edited existing information on the inventories from their case studies. Using the innovation description template, an online web form, hub managers created the main content of the inventory to include innovation description, geographical location, technology readiness level, potential customers, patent information, related documentation, photos, videos, etc. Later, the placement of each innovation in the GAIN model (see separate article in this issue) was added. Currently, the inventory stores 150 descriptions of innovations ranging from agriculture monitoring drones to new types of cheese.
Information stored within the IT infrastructure of the innovation inventory is used to better gauge the relevance of each innovation to various search queries and end-users. All this information was indexed and deposited within an Elasticsearch-based engine that makes them fully searchable either via free-form queries, which do a full-text search, or structured queries, which give more specific match criteria.

Initiative Inventory

The SMARTCHAIN Initiative Inventory was designed to store information about SFSC initiatives throughout Europe. To achieve this, a Drupal "content-type" was created with the following fields: *Title (Text field), *Title in original language (Text field), *Logo (Image field of type JPG, GIF or PNG), *Region (single choice select "EU, CH, DE, HU, ES, NL, EL, BE, IT, UK"), *Stakeholder type (multiple choice select "Consumer, Farmer & Cooperative, Industry & Retail, Policy maker, Technology Provider, Other"), *Description (Text area), *Extract from text (Text area), *Initiative category (multiple choice select "App, Campaign, Catering plan, Cooperative, Distribution, Education, Event, Experience, Expo, Intermediary, Labelling, Network, Online-shopping, Organisation, Placement, Platform, Policy, Programme, Project, Quality scheme, Restaurant guide, Support programme, Tourism, Travel, Vision"), *Website (URL), and *Website additional (URL). All registered users of the SMARTCHAIN Platform may add initiatives to the inventory by completing an online form. New initiatives are reviewed by a website administrator before being published.
The output page of the Initiative Inventory was created using the SQL query builder "Views". When opening the output page, the full result set (sorted alphabetically) is displayed (paged after 26 entries). Only the following fields are displayed on this page: Logo, Title (in English), Region, and Stakeholder type. To see the full entry with all information, a click on either the title or the "Read more..." button takes the user to the dedicated page of the initiative in question. It is possible to filter the results to narrow down the result set. The filters can also be used in combination. For example, it is possible to show only entries for Region "DE" with stakeholder type "Farmer & Cooperative" and category "Campaign". Currently, the inventory stores 50 successful SFSC initiatives throughout Europe, which were collected after interviews with SFSC stakeholders.

2.4 Resources

The Resources Database is comprised of two parts: Publications and Weblinks.

Publications

To store publications, a Drupal "content-type" was created which contains the following fields: *Title (Text field), *Indicator whether the publication originates from the SMARTCHAIN project or not (single choice select "Yes, No"), *Year of publication (Date field that collects Year only), *Stakeholder type (multiple choice

select "Consumer, Farmer & Cooperative, Industry & Retail, Policy maker, Technology Provider, Other"), *Work Package (multiple choice select "WP1 – WP10"), *Short description (Text area), *Author (Text area), and *File upload (allowed file types: JPG, PDF, MP4, M4V, DOC, DOCX, XLS, XLSX, ZIP).
The output page (https://www.smartchain-platform.eu/resources/publications) of the Publications database was created using the SQL query builder "Views". It displays the full result set on one page and shows all entered information. The results can be filtered by the following fields: *From SMARTCHAIN? (single choice select "Yes, No, Any"), *Year, *Stakeholder type (multiple choice select "Consumer, Farmer & Cooperative, Industry & Retail, Policy maker, Technology Provider, Other"), *Author name (Operator: "Contains"), and *Search Terms (Text field). The filters can also be used in combination.

Weblinks

To store the weblinks a Drupal "content-type" was created which contains the following fields: *Title (Text field), *Name in original language (Text field), *Logo (Image field of type JPG, GIF or PNG), *Region (single choice select "EU, CH, DE, HU, ES, NL, EL, BE, IT, UK"), *Stakeholder type (multiple choice select "Consumer, Farmer & Cooperative, Industry & Retail, Policy maker, Technology Provider, Other"), *Website (URL), and *Short description (Text area).
The output page (https://www.smartchain-platform.eu/resources/weblinks) of the Weblinks database was created using the SQL query builder "Views". It displays the full result set on one page and shows all entered information. The results can be filtered by the field "Stakeholder type".

2.5 Training

The Training tab of the Platform leads to the ISEKI-Food Association's Moodle learning platform. Here there are 3 types of training materials: documents from workshops held in autumn 2020 in each of the 9 Hub countries of the SMARTCHAIN project, a video tutorial on how to use the Platform, and an e-learning course on "Best Practices in Innovation".
The workshop documents include presentations on the work of the SMARTCHAIN project, in the local language of each of the 9 Hubs and personalised by Hub managers to be relevant for local activities. Presentations cover inventories of SFSC needs and of SFSC technological innovations, social innovation in SFSCs, consumer behaviours and attitudes towards SFSCs, sustainability concerns of SFSCs, policy and business recommendations for SFSCs, and SFSC communication. There is also a generic version of these presentations available in English. Presentations were made public in February 2021.
The video tutorial on how to use the SMARTCHAIN Platform is under development and will be available in July 2021.
The "Best Practices in Innovation" e-learning course consists of 5 sessions, each with approximately 1 hour of activities. Learning outcomes of the course are:

1. to understand how SFSC innovations apply individually and at local, regional, national/international levels,
2. to apply SFSC innovations from the perspective of technological, social, environmental and other advances, and
3. to benefit from SFSC interactions according to the GAIN model of engagement and collaboration.

The overall course objective is to learn, through SFSC innovations now in use, to grow an individual SFSC initiative and to participate in larger communities of SFSC stakeholders.
The first week of the course introduces the SMARTCHAIN project, innovation and smart specialisation, and the GAIN model. Weeks 2, 3 and 4 provide practical examples of SFSC innovations, presented as a mix of interviews, videos, readings, website visits and infographics, and focused on innovations at the local, the regional and the national/international level of collaboration. Week 5 is a summary and review of participants' progress. In addition to the course material, participants will be required to participate

in the course forum and to use the "Short Food Chain EU Community" page on LinkedIn. The course will be moderated once per year and, at that time, participants may receive a Certificate of Completion if they finish all components of the course within 6 weeks and receive a grade of 75% or better on the final exam. At other times, participants may follow the course on their own.

3 Results and Discussion

Understanding results, i.e., efficacy or impact of a website or platform is a relatively new endeavour. Few European projects have published an analysis of the efficacy of their websites and there is no standard for evaluation (Lazzeretti et al., 2010; Mc Guckin & Crowley, 2012). In fact, most literature on the topic refers to the efficacy of online shopping sites and, while the measures can be useful, the different goals of the websites make direct comparisons of questionable value (Pakkala et al., 2012).

The most common and easiest method for analysing a website is through data on quantitative measures that show, e.g., the number of visitors per day, how long a visitor stayed on the website, etc. These come primarily from Google Analytics (GA) which has 100+ website analytical measures. One can consider where visitors are, the device visitors use (phone, PC) and even the interests that visitors have. A major drawback to the use of GA data is that ad blocking tools, used globally by an average of 27 percent of the internet-connected population in early 2018 (Statista Research Department, 2021), block GA from collecting data. Thus, GA user data underestimates true website visits by close to 30%. Nonetheless, GA data has been used as the primary source to evaluate the impact of European projects (Mc Guckin & Crowley, 2012) and it is useful here too. The content management system, in this case Drupal 7, can also be a source of quantitative data. Here we may know the number of people who are registered users of the website and information about them (sex, education and stakeholder role). Information collected at project meetings, where users were asked directly for their opinions on the website and their suggestions for improvement, provide both quantitative and qualitative data for website evaluation. Finally, for any website to remain relevant it must be continuously updated with new information, thus the sustainability plan for website management is a crucial part of website impact.

3.1 Users and Overall Use

New users and returning users

Number of new users and number of returning users are a primary measure of the success of a website. Here, total users per month, and in the insert graph, returning users per month, from October 2019 through January 2021 are from GA data (Figure 1). Both metrics show an overall trend towards more users with time, as the linear regression shown displays a goodness-of-fit or R^2 of 0.44 and 0.48 for total users and returning users, respectively. This positive correlation between time, or maturity of the website, and users, is moderate and it is too soon to say if this trend will continue. There is little in the literature to allow a comparison of the SMARTCHAIN Platform with others for increase in users over time (Pakkala et al., 2012). The slightly increased trend towards more returning users per month than total users per month suggests that more new users become returning users now than did at the Platform's start. This is an important goal of the Platform on two fronts:

1. returning users suggest satisfaction with Platform content and ease of use at the first visit, and
2. building relationships among SFSC stakeholders requires that users return to the Platform, e.g., to post an innovation from their organisation or find information from a workshop.

The large differences between returning users and total users, e.g., 53 of 806 in January 2021, the month with the biggest difference, is likely exaggerated due to inflation of the total users' figure. Since it is estimated that 50% of all web traffic is from bots (Zeifman, 2017), the true number of new users was likely closer to 325 than to 750 in January 2021. Returning users are highly unlikely to be robotic visits or bots, as bot visits

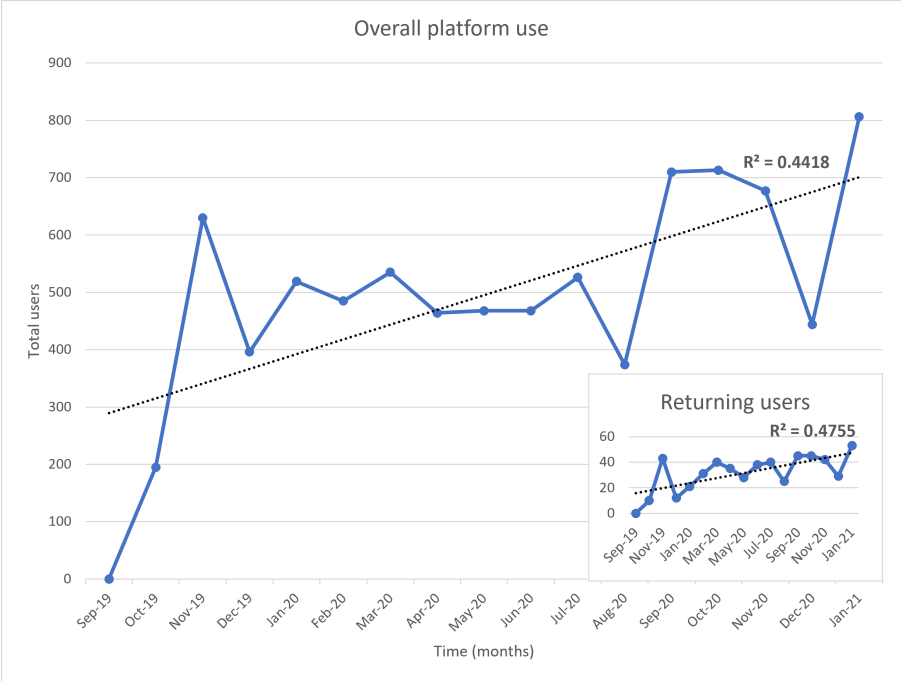

Figure 1: Overall use of the SMARTCHAIN Platform by total and returning users.

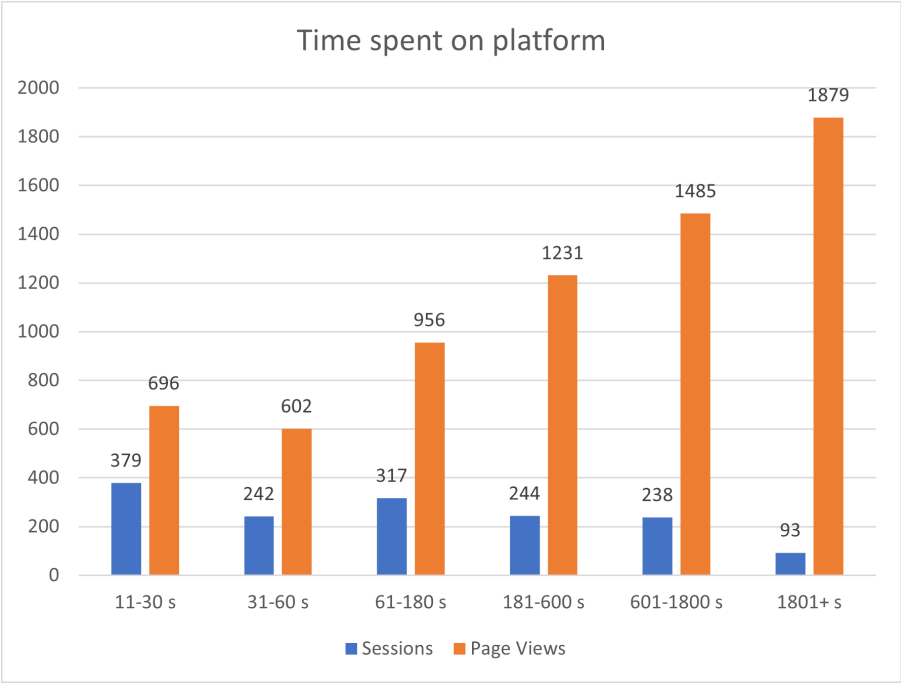

Figure 2: Time spent by users on the SMARTCHAIN Platform.

are from software applications that crawl the web to fetch, analyse and file information from novel web addresses. Thus, a truer picture of the proportion of users that are returning users would be approximately 50 of 325 or 15% in January 2021.
In the first month, September 2019, the data show no active users because GA was not yet in place, so use was not recorded. There is an unusual peak of use in November 2019, 630 total users and 43 returning users. An internal meeting of Platform contributors in mid-October 2019 seems the likely explanation.

Length of time

As important as the number of users of a website is the amount of time a user spends on it. As expected from the previous discussion about robotic visits, most users of the SMARTCHAIN Platform stayed between 0 and 10 seconds, that is 8035 of all 9548 users during the 16 months of website monitoring reported here. This group would include both bots and some who come to the website and quickly decide it is not what they expected.
Looking only at users who stayed at least 10 seconds, an important relationship is revealed (Figure 2). The number of page views increases with the amount of time spent on the Platform. This is a strong indication of engaged users who are actively exploring the website and not long-lasting automated visits or users clicking on the website and leaving it open without using it. In online sales, where most studies on website interaction have been done, an average session duration of 2-3 minutes is considered successful and longer sessions are generally understood to indicate more engaged visits (Spinutech, 2015). Very strong support of a group of active users comes from the last pair of bars in Figure 2, which show close to 100 visits when users stayed on the website for more than 30 minutes.

3.2 Page Preferences

As would be expected, the home page of the SMARTCHAIN Platform is the most visited page, over 4200 visits in the 16-month reporting period. This number is inflated by robotic visits (approx. 50% of web traffic) but does not include ad blocking users (approx. 30% of all users), therefore, it would be fair to estimate the true number of home page visits at 20% less than 4200, or approximately 210 visitors to the home page per month (Figure 3). This is certainly a respectable number of true visitors to the home page of a newly implemented Platform, and it agrees with the 325 visitors in January 2021, the month of highest use, as estimated in Section 3.1.
The Innovation Inventory is the most visited internal page of the SMARTCHAIN Platform with 1559 visits over 16 months. These visits are not likely to be robotic as several clicks are required to reach the page, however, as is true for all analytics the approximately 30% of web users with ad blocking apps are not counted here, making true visits to the Innovation Inventory more likely to be approximately 2025 or 125 visits per month. The Innovation Inventory is a "heavy" page as it contains pictures and information of more than 150 innovations, thus it loads slower than the average page on the Platform. Despite this slow load speed, the page is by far the most appreciated, with close to 60% more visits than the next most-appreciated page, the GAIN Model. Despite the high hopes at the start of the SMARTCHAIN project to use the Innovation Platform as "an essential tool for the interaction and effective communication between the SMARTCHAIN Hubs", the Innovation Hubs Overview page was not among the top 5 pages that users visited. Of course, this does not imply that there was little communication among the Hubs. Implementing a new tool for interaction and communication when there are many already available that users are already comfortable with is not an easy task and perhaps not a worthwhile goal (Khalifa & Liu, 2007).

3.3 Geographic Patterns

The SMARTCHAIN Platform was developed to interest all stakeholders in SFSCs by starting with information for and about partners in the SMARTCHAIN project. The project has 43 partners, 27 of which were intimately involved in providing information for the nascent SMARTCHAIN Platform; these were the lead-

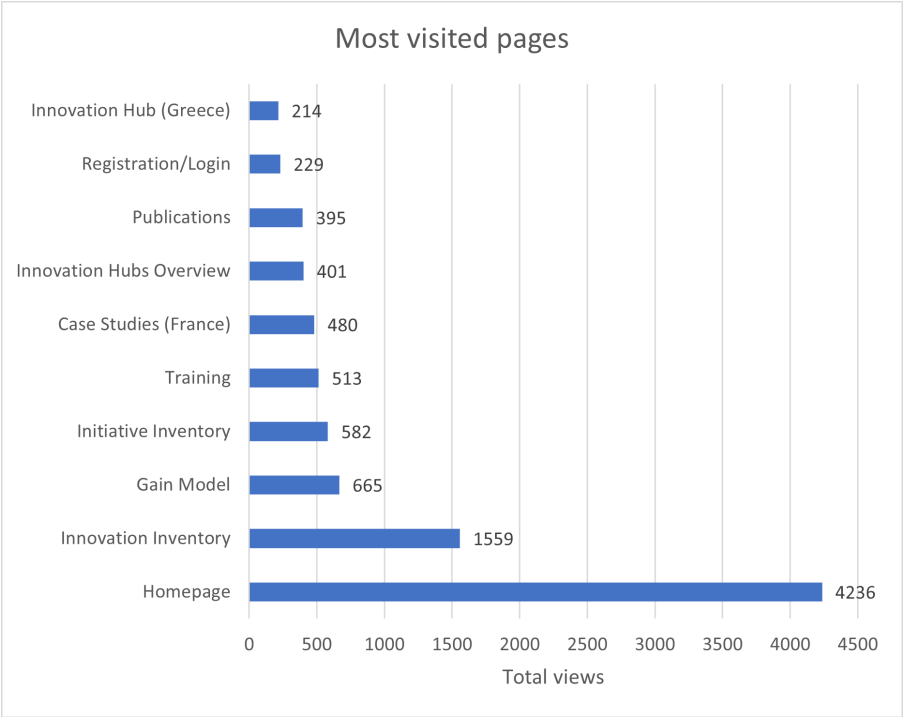

Figure 3: Most visited pages of the SMARTCHAIN Platform.

Table 1: Geographical distribution of SMARTCHAIN Platform users

Country	**Users**	**Pages/ Session**[a]	**Avg. Session Duration (s)**
Netherlands	1090	1.38	60.82
Germany	886	1.92	118.01
Spain	680	1.59	65.36
Italy	674	1.60	80.66
Belgium	606	1.30	31.45
France	522	2.16	129.20
Hungary	436	1.53	47.43
Austria	382	1.59	44.81
Greece	351	2.13	80.57
United States	315	1.46	49.30
United Kingdom	286	1.44	53.61
Serbia	280	3.49	300.66
Switzerland	181	1.35	33.09
Portugal	129	1.28	25.53
India	100	1.24	36.12

[a]Average number of pages viewed during a session.

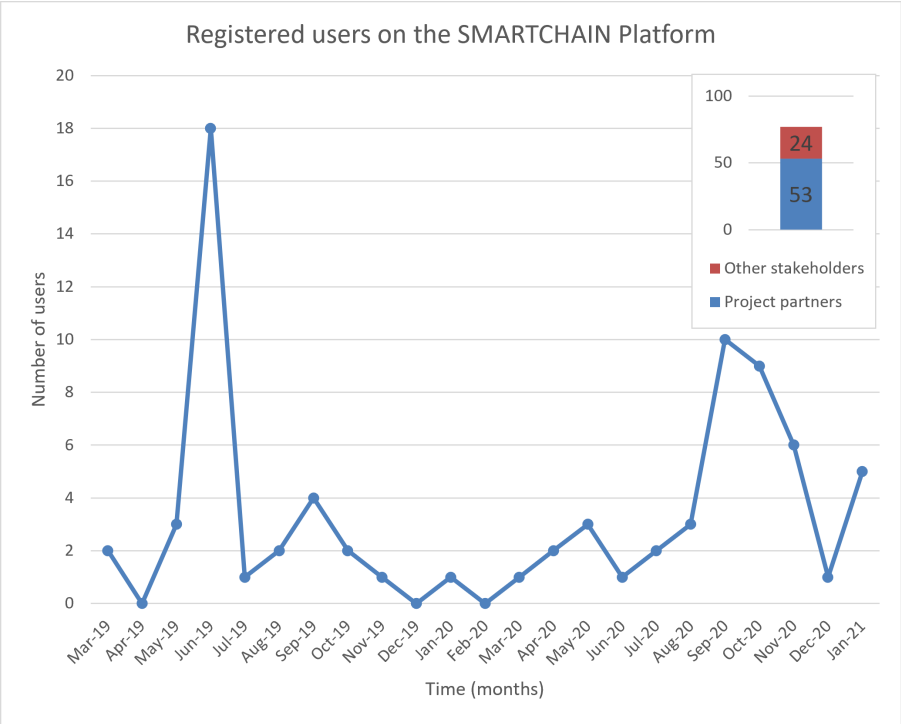

Figure 4: Registered users on the SMARTCHAIN Platform.

ers of the 9 Innovation and Collaboration Hubs and the 2 case studies at each Hub. These partners, and later their colleagues, were the first to be targeted to use the Platform and likely the first visitors of the Platform. In September 2019, shortly after the Platform went live, 49% of partners attending the annual project meeting stated that they had visited the Platform (n=49). By September 2020, 97% had visited the Platform (n=29). Not surprisingly, GA data show that 9 of the 15 countries with the most Platform users are countries with SMARTCHAIN Innovation and Collaboration Hubs (Table 1), namely the Netherlands, Germany, Spain, Italy, France, Hungary, Greece, Serbia and Switzerland, with between 1090 and 181 users in the 16 months of data collection.

The Netherlands had the most users, but with a lower-than-average number of pages viewed per session, namely 1.38. On the other hand, Serbia had the highest average number of pages viewed per session, 3.49, but was among the lower third in number of users at 280. Serbia had a noticeably long average duration of sessions, over 5 minutes (300 seconds), more than double the second country (France). This is likely due to the long amounts of time spent on the website by the developers of the back end of the Innovation Inventory, the Institute of Physics located in Belgrade, Serbia, but does not explain the high number of pages as Innovation Inventory developers likely stayed on the Innovation Inventory page. Serbia also has a SMARTCHAIN Innovation Hub and 2 case studies and these participants likely also contributed to the time spent on the Platform. Noticeably, the top 15 countries with more than 1 minute average time on the Platform are countries with Innovation Hubs and case studies. Only Hungary and Switzerland have a Hub and case studies but less than 1 minute average time on the Platform. It would be interesting to find out what might be different about these two locations, e.g., smaller, local businesses as case studies that are less internet-

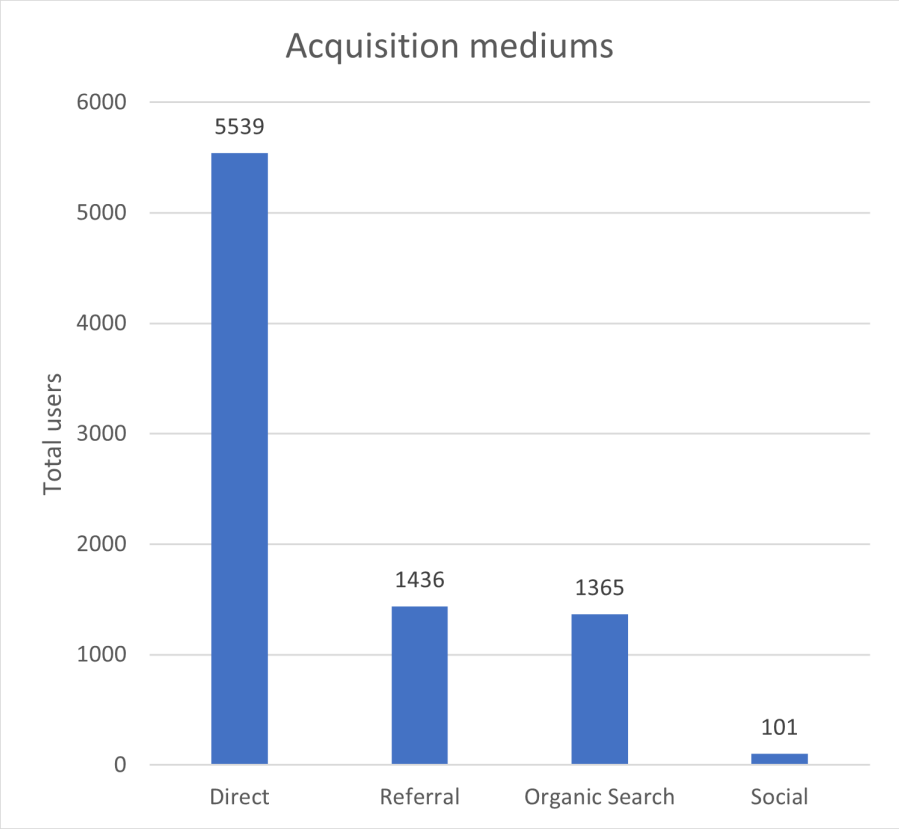

Figure 5: Origin of the users of the SMARTCHAIN Platform.

connected.

Further support for the hypothesis that most users of the SMARTCHAIN Platform are project partners comes from data on registered users. There are 77 registered users of the SMARTCHAIN Platform and nearly two thirds of them are project partners (Figure 4). As is typical for a website, registered users enjoy fuller access and expanded website features, here for example, they may upload innovations and/or initiatives. In exchange they must complete a short registration form providing some personal data. There were two peaks in registration during the lifetime of the Innovation Platform, in June 2019 when 18 users registered and in September 2020 when 10 users registered. The September 2020 peak coincides with a SMARTCHAIN project meeting where the Innovation Platform was presented and registration encouraged. The origin of the June 2019 peak is not clear.

3.4 Interaction with Social Media

How users find the Innovation Platform is one indication of the interaction of users in the SFSC community with the Platform. By far, the largest group of users, approximately 63%, arrive directly (Figure 5). Direct arrivals are users who have saved the website in favourites or typed the website URL directly – this group also includes robot visits and, as referenced earlier (Section 3.1.1.), it is likely fair to say that 50% of direct users are robotic. The next most common ways to find the Innovation Platform are through a referral or an organic search, with approximately 17% of users arriving this way. A referral user is one who arrives from another website, likely

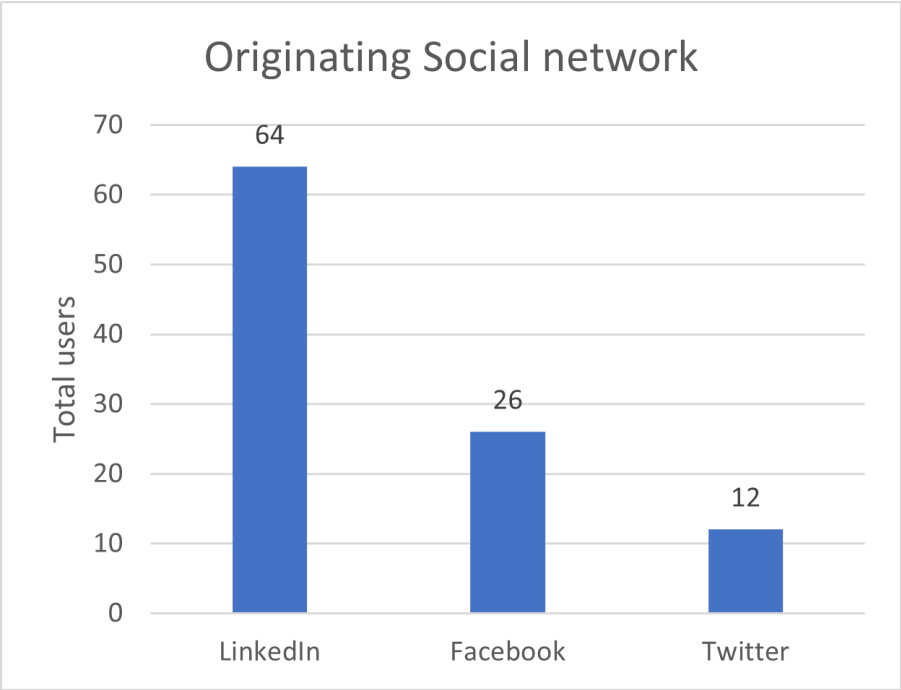

Figure 6: Originating social networks of the users of the SMARTCHAIN Platform.

from the SMARTCHAIN project webpage, and an organic search user is one who uses a Google or Bing search engine to get to the Platform. The smallest group is the one that arrives from Social Media; even considering that half of direct users are robotic and 30% of users are uncounted due to ad blocking software, the social media users do not surpass 3% of all users.

One explanation for the small number of users arriving from social media is the late implementation of a direct social media link to the Innovation Platform through LinkedIn. It was not until June 2020 that the LinkedIn group "Short Food Chain EU Community" was formed. This group began via the SMARTCHAIN project with the aims of fostering interaction and collaboration among SFSCs, same as the Innovation Platform, and of growing member networks by GAIN model implementation (see article by Fredericks et al. in this issue). The LinkedIn group sent members to the Innovation Platform via lively posts about Platform happenings. The LinkedIn group has grown to over 250 members, and more than 60% of social media-inspired visits to the Innovation Platform now originate from LinkedIn (Figure 6). Facebook on the other hand, which has had a direct link to the Platform since the Platform inception, is responsible for 26% of social media-inspired Platform visits and Twitter for less than 12%. LinkedIn, generally regarded as a tool for professionals, may be primarily sending researchers to the Innovation Platform and further data analysis would be necessary to reveal who LinkedIn group members are. Importantly, the Platform should reach not only researchers, but also producers and other stakeholders and this suggests that while LinkedIn seems an effective gateway to the Platform it should not be considered the only nor the best.

3.5 Platform Sustainability

It is well-known that many of the activities, including websites, of European projects are neglected and lose relevance once the project is over. The SMARTCHAIN Innovation Platform

Figure 7: Word cloud of qualitative data analysis of the question "What would you like to see on the SMARTCHAIN Innovation Platform?".

aimed to avoid such an ending by

- regular interaction with project partners to identify features of interest, and
- for a longer-term sustainability, by including use of the Platform in project proposals where the key Platform developers were partners.

At the 1- and 2-year project meetings in September 2019 and September 2020, respectively, project partners were asked to take 3 minutes to anonymously write, via an interactive software, what they would like to see on the SMARTCHAIN Innovation Platform for it to be more usable and more relevant. Using a discourse analysis tool in the qualitative data analysis software NVIVO 12, the 42 responses produced a word cloud (Figure 7) indicating that "communicated", "interactive", "groups", "content" and "information" were the primary categories of responses. "Content" and "Information" likely refer to the same desire, that the Platform is a useful website. When the question "Which improvement to the SMARTCHAIN Innovation Platform do you think is most important?" was posed to participants in the year-2 project meeting, over 50% (n=27) said "content" and 11% said "interaction" (data not shown). Understandably this is a small sample, but it is nevertheless representative of a large European project with diverse stakeholders and could, perhaps, provoke a second thought to what is often a primary goal of websites: interaction.

The SMARTCHAIN Innovation Platform will change its name and move its focus to Innovative Food when its management moves to the newly funded EU projects, FAIRCHAIN and CO-FRESH, once the SMARTCHAIN project is over (August 2021). Other projects funded under the same and similar calls (RUR-06 and RUR-07) have already agreed to participate in the evolving Innovation Platform; these are the projects Ploutos, FoodRUs, and LowInFood. The driving force to join together and use the same Platform appeared to be

1. to avoid "re-inventing the wheel" by making a Platform to share project results from scratch which will then, essentially, compete with the platforms of similar projects,
2. to benefit from a Platform which already has a core group of users, and
3. to share the responsibility of keeping a Platform fresh and interesting to continuously attract stakeholder interest. The key partners of these projects have already discussed

including the use and growth of the Innovation Platform in future proposals.

The content of the current Platform will be integrated with new project outcomes, including the removal of content not widely used and not transferable to new projects, e.g., the Innovation Hubs, and the improvement and enlargement of the most popular content, e.g., the Innovation and Initiative Inventories. From FAIRCHAIN, the Platform focus will be broadened to include not only short but also intermediate and non-traditional agri-food value chains, and from CO-FRESH, the idea of redesigning the agri-food chain. From other projects a focus on reducing food waste, food system circularity and data-driven food systems will further expand the original SMARTCHAIN Innovation Platform and contribute to its, perhaps very long-term, growth.

4 Conclusions

To our knowledge, this is the first paper to detail the creation and evolution of a website aiming to be an interactive and collaborative Innovation Platform for SFSC stakeholders. The growing use of internet in all aspects of daily life makes a strong case for a website dedicated to agri-food, a place where stakeholders will turn for the latest information on food chain innovation. The slow but steady growth of the SMARTCHAIN Innovation Platform, to an average of approximately 210 visits per month, and the peak visits of 325 in the most recent month (January 2021), together suggest that the Innovation Platform is filling a need in the SFSC community.

The data here support the use of GA, especially when combined with direct inquiries to users, as an effective method of analysing website success and planning improvements. GA provides a wide variety of analytical choices, making it likely that website developers cannot easily compare their websites. It could be useful to define a standard set of GA measures so that comparisons of websites and their features could be easily accomplished. The direct inquiries used here allowed a more direct evolution of the website towards user needs, e.g., to provide more content and simplify registration, and this source of data is one that should not be overlooked in website evaluation. Although the sample is small, the desire for content and information rather than interaction may be a point to consider in the design of future websites and updates of current ones, including this one. Interaction is a key word these days, but is perhaps best left to already existing, and successful, methods such as emails, text messages and the myriad of social media accounts available, while focussing websites on providing, and allowing users to share, innovative information.

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