



Policy mixes for more vital legume value chains: Evaluation across competing policy frames

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Abstract

Legumes receive increasing attention in sustainability transition research as they can contribute to more sustainable food systems. Previous research has established the need for policies relating to both production and consumption to tackle the marginalisation of legumes in European cropping systems and diets. In this paper, we apply the policy mix framework to food system transition and develop it further into an interpretive policy mix framework to evaluate policy mixes for more vital legume value chains. The interpretive policy mix framework facilitates a better understanding of competing policy frames in designing more consistent, coherent, and comprehensive policy mixes for transitions. The paper analyses three competing policy frames promoted by the food system actors, who are engaged in the development of legume production and consumption in Finland. A comparative analysis of the frames highlights that the policy objectives do not align well; currently, there is no shared understanding among food system actors of what kind of policy mix is needed for more vital legume value chains. The results emphasise networking as a key element in building more coherent policy mixes. The paper shows how the interpretive policy mix framework can support in this endeavour by unveiling conflict lines and possible compromises between the different policy frames.

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1. Introduction

Transition to sustainable food systems poses wicked policy problems that require an appreciation of the complexities involved (Lang, 2021). The role of legumes in the transition to more sustainable food systems is one specific case in point (Balázs et al., 2021a). In Europe the specialisation of the production systems and the reliance on an intensive use of chemical inputs in farming and on imported soy for feed have marginalised legumes in Europe's cropping systems (Magrini et al., 2016; Voisin et al., 2014; Zander et al., 2016). Despite the European Commission's (EC, 2018) attempt to increase the use of legumes within the European Union (EU), the production and consumption of legumes have remained low (Balázs et al., 2021a; Makery, 2019).

A greater inclusion of legumes in crop rotation is essential for building more sustainable food systems. Legumes can play a vital role in diversifying the cropping systems, enhancing soil quality, reducing greenhouse gas emissions from production, and increasing farmland biodiversity (Nemecek et al., 2008; Peoples, 2009). Furthermore, legumes can provide a good source of protein and other macro- and micronutrients to humans (Ferreira et al., 2020; Päivärinta et al., 2020). A greater use of legumes has been recognised essential when shifting towards more healthy and sustainable diets in the Global North (Willet et al., 2019). Many EU countries promote an increased intake of legumes as part of sustainable and healthy diets in their nutrition guidelines (e.g., Helsediktoratet, 2021; MSS, 2019; Health Council of the Netherlands, 2015). The greater use of legumes in crop rotation is supported also by several agricultural policy measures (Balázs et al., 2021b; Voisin et al., 2014). The novel plant-based products have penetrated the food markets in recent years (Lonkila and Kaljonen, 2022; Mylan et al., 2019; Tziva et al., 2020).

Despite these positive developments, the policy landscape supporting the creation of vital legume value chains has stayed fragmented (Balázs et al., 2021a, 2021b; Magrini et al., 2016). The policies guiding legume production and consumption do not align well currently. Agricultural policy measures incentivising the integration of legumes in crop rotation are not concerned with whether the legume harvest is used for feed or food. On the other hand, nutrition policies do not care if the legumes consumed are produced domestically or imported. This hampers the development of vital legume value chains. In Finland, for example, the food industry lacks domestic ingredients for their growing category of plant-based products (Lonkila and Kaljonen, 2022).

More consistent, coherent, and comprehensive policy mixes are needed to develop legume value chains as part of the transition to more sustainable food systems. Studies on governing sustainability transitions have highlighted that any transition requires policy mixes (Rogge and Reichardt, 2016; Rogge et al., 2020) that shield novel technologies and allow niches to grow (Kemp et al., 1998; Smith and Raven, 2012), but also destabilise the current regime and unsustainable practices (Kivimaa and Kern, 2016). The policy measures across the various policy fields -- or food system activities -- need to align to build a coherent policy environment for transition (Rogge and Reichardt, 2016).

In this paper we examine the policy mixes for more vital legume value chains as part of the transition to sustainable food systems. We acknowledge that designing policies that simultaneously address the production and consumption of legumes, the health and environmental benefits of legumes, and the domestic and international markets for legumes is by no means an easy task. Rather the opposite, policy mixes for vital legume value chains need to navigate between multiple policy goals and preferences of the actors across the food system. In this paper we develop the policy mix framework introduced by Rogge and Reichardt (2016) and Kivimaa and Kern (2016) further to incorporate an interpretive analysis of competing policy frames (Entman, 1993; Schön and Rein, 1994). We distinguish three policy frames promoted by food system actors, who are engaged in the development of legume production and consumption in Finland. The three policy frames differ both in their policy objectives and instrument mixes. We show how the interpretive analysis of policy frames can support the identification of conflict lines, but also key nominators between the policy goals and instruments proposed by the food system actors. In this manner, the interpretative policy mix framework can be of value when designing more comprehensive policy mixes for future.



Even though the empirical case focuses on legume value chains in Finland, the study provides valuable insights on how to design more consistent, coherent and comprehensive policy mixes for sustainability transitions. The interpretive policy mix framework developed in this paper allows for evaluating competing policy frames as part of emergent and evolving policy mixes. It thus foregrounds the politics inherent in designing policy mixes and transition governance as the contested and messy nature of the policy process becomes visible (Flanagan et al., 2011; Hajer and Wagenaar, 2003; Meadowcroft, 2009).

2. Interpretive policy mix framework

2.1 Evaluation and design of policy mixes across competing policy frames

The concept of a policy mix has its origin in innovation and economic policy analysis (Mundell, 1962). It was developed to draw attention to a myriad of policies required to support innovations. In sustainability transition studies, the policy mix framework has been developed further to evaluate the combined effect of policies across various policy domains on sustainability transition (Kern et al., 2019).

Rogge and Reichardt (2016), who have been the pioneers in developing the concept within transitions studies, define policy mix as a combination of elements, processes, and characteristics. The elements are at the core of the policy mix framework. They comprise the policy strategy, a combination of policy objectives and the principal plans for achieving them, as well as the policy instruments or instrument mix operationalising the policy strategy. The policy instruments can be distinguished into economic, regulatory, and informational measures (see also Bemelmans-Videc et al., 2003). For a transition to take place, a combination of these instruments is required. Hajer and Wagenaar (2003) underline further networking as an own measure for environmental governance. A novel set of instruments, including behavioural instruments and nudging (Thaler and Sunstein, 2008) have also gained momentum in steering consumption. Rogge and Reichardt underline that the policy processes, by which the combination of policy instruments emerge, interact, and are implemented, are critical for the functioning of the policy mix (see also Edmondson et al., 2019; Flanagan et al., 2011; Kern et al., 2019).

In this paper, our aim is to develop the understanding of policy processes further by integrating the analysis of competing policy frames to the analysis of emergent and evolving policy mixes. Howlett and Rayner (2007) have emphasised that any policy development is constrained by the previous policy choices (see also Diercks, 2019). Therefore, when searching for novel policy mixes, for example, for developing vital legume value chains, there is a need to consider not only the existing policy infrastructure, but also the differing preferences of actors in developing them. In sustainability transitions research the capacity of incumbent companies in making powerful coalitions with policy makers has been acknowledged (Geels, 2014), while niche actors often lack the resources in forming solid policy frames and related coalitions (Rosenbloom et al., 2016). Although struggles between different frames have been identified important for transition processes and contextualising innovations (*ibid.*), they have, to date, been less investigated as part of policy mixes for transition. The aim of this paper is to enhance the understanding of competing policy frames in the design of policy mixes for sustainability transitions.

By policy frame we mean a coherent way of understanding a policy issue (e.g., Schön and Rein, 1994; Hajer and Wagenaar, 2003). We follow Entman (1993) by seeing framing as the selection of certain aspects of reality and making them more salient to promote a particular interpretation of the policy problem, the causal reasoning behind the problem and the proposed solutions to remedy the problem. Policy frames affect the policy process as the actors can form coalitions advancing certain framing of the issue and make some instruments seem more relevant and efficient than others (Schön and Rein, 1994; Entman, 1993).

To detect and understand competing policy frames is critical when assessing the possibilities for consistent, coherent, and comprehensive policy mixes. Consistency, coherence, and comprehensiveness, as Rogge and



Reichardt (2016) argue, is essential for policy mixes to guide and steer sustainability transition. In the context of evolving policy mixes, the evaluation of consistency across the competing policy frames helps to draw conclusions regarding how well the different policy objectives and proposed instruments align. Coherence describes how the different policy goals and instruments across the policy fields, such as agricultural, innovation and nutrition policy, contribute towards the same transition trajectory (see also Huttunen et al., 2014). Finally, the analysis of comprehensiveness allows to evaluate how extensive and exhaustive the goals and instruments mixes proposed by the competing policy frames are.

When analysing the comprehensiveness of a policy mix, it is not enough to focus only on creative policy instruments that shield niches for more sustainable production and consumption patterns. Attention must also be paid to policies destabilising the current dominant regime (Kivimaa and Kern, 2016; Kivimaa et al., 2021). Kivimaa and Kern (2016) suggest that destabilising measures can include the regulation and controlling of the environmental impacts of the existing regime, structural reforms, the reduction of the flow of human and financial resources to the existing regime, the replacement of dominant governance organisations or networks with new ones, and the introduction of new organisational or institutional practices. We need to remember that proposition for destabilising measures is always politically controversial. A detailed scrutiny of the competing policy frames can advance the understanding of the power struggles at play.

In this paper we use this interpretive understanding to evaluate the competing policy frames as part of the emergent and evolving policy mix (Figure 1). We see the framework as useful in elaborating the in/consistencies between the competing policy frames, thereby providing valuable knowledge for designing more consistent, coherent, and comprehensive policy mixes, which take into account the various stakeholder positions and goals in a more inclusive manner. In this manner, the interpretive understanding of policy mixes has also practical relevance for the planning of policy mixes for sustainability transition.

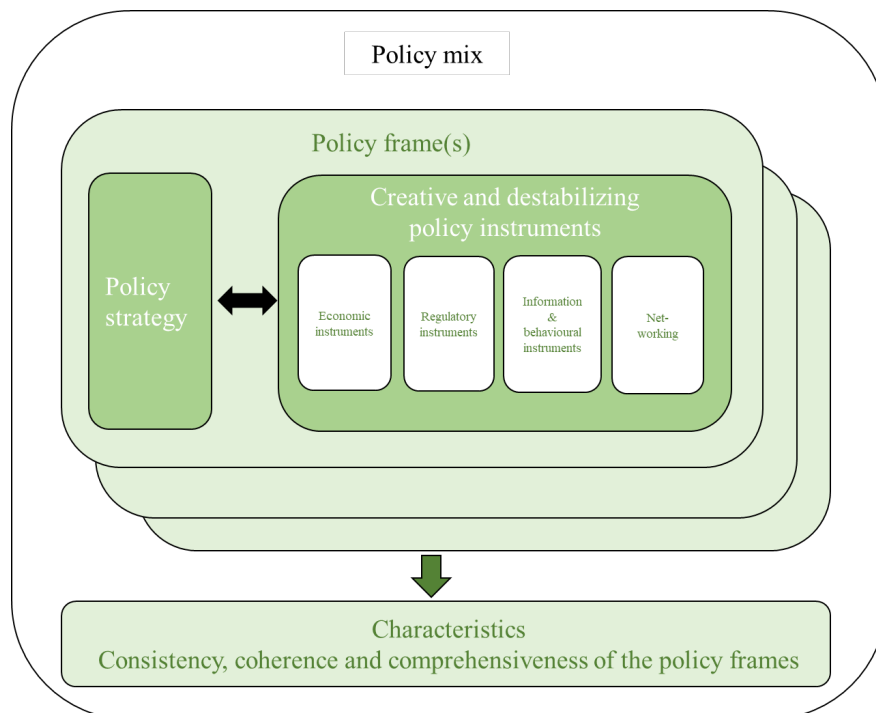


Figure 1 The interpretive policy mix framework

2.2 Policy mixes for more vital legume value chains

To date, most of the studies of policy mixes for sustainability transitions have focused on energy (e.g., Reichardt et al., 2016; Kivimaa et al., 2017) or mobility transitions (e.g., van der Vooren and Brouillat, 2015, Kivimaa and Rogge, 2020). In this study, we widen the use of the conceptual framework to food system tran-



sition. Food systems are, by definition, composed of multiple activities and goals (Ericksen, 2008; Kaljonen et al., 2020; Lang, 2021). A food system encompasses activities from inputs to agriculture and from processing, distribution and retailing to food consumption. The creation of more vital and diverse legume value chains, hence, requires investments, innovations, and actions across all these food system activities.

The complexity of the food system poses a specific challenge for policies governing the transition. In food system research, coherent food policies spanning across all food system activities and related policy domains have been argued for long (Candell and Pereira, 2017; Huan-Niemi et al., 2020; Mason and Lang, 2017). The creation of vital legume value chains clearly presents a similar challenge. Farmers, meat industry, plant-protein start-ups, consumers, and nutritionists, to name a few, may have differing goals for domestic legume value chains as well as competing preferences for policy instruments. Up until now, the policies affecting the production and consumption of legumes have been fragmented in Europe (Balázs et al., 2021b; Magrini et al., 2016). The measures targeted at consumption and production have not been coordinated. Moreover, the various lock-ins in the current food system that hamper the more vital use of legumes in European crop-rotation and in diets, have been insufficiently addressed (Magrini et al. 2016; Zander et al., 2016).

The European Commission (2018) has recognised legumes as vital part of sustainable food systems. More robust self-sufficiency in legumes would help reducing the dependency on imported soy for feed. Moreover, the targets set for the reduction of biodiversity loss and climate impacts of the food system in the new EU Farm to Fork strategy highlight the importance of legumes (EC, 2020). Currently, the most important economic instrument guiding legume production in the EU is the agricultural support system under the Common Agricultural Policy (CAP). The goals for the CAP and the levels of support are negotiated at the EU level, but the member states define the more targeted measures to fit their context according to the subsidiarity principle.

In Finland, legume farming has received support as part of the Greening Measures (crop diversification) and Ecological Focus Areas (N-fixing crops) under pillar one of the CAP.¹ Additionally, CAP's second pillar, the Rural Development Programme, encompasses support to agri-environmental schemes and organic farming, which have relevance for the legume production as well. Farmers further benefit from a protein crop premium paid via Finland's coupled support system.² These support mechanisms have contributed to increasing the interest of farmers in legume production. In 2020, peas and broad beans, the two most common legume varieties cultivated in Finland, were grown on 21 thousand hectares and 13.5 thousand hectares respectively, while in 2010, peas were grown on 6,1 thousand hectares and broad beans on 9,4 thousand hectares (Luke, 2021). The figures are, however, still very low in comparison to grains, such as wheat, barley, or oat.

Legume consumption is so far mainly promoted by informational policy measures. Many European countries have updated their national nutrition guidelines to include sustainability aspects (e.g., CNAUP, 2003; Health Council of the Netherlands, 2015; MMS, 2019; see also Lang, 2021). As opposed to agricultural policy, nutritional policy falls under the jurisdiction of the member states. The Finnish nutrition recommendations (NNC, 2014) follow the ones set on the Nordic level. These are being updated to incorporate sustainability aspects as well (Helsediktoratet, 2021). In Finland, the entire public food sector, including day care, schools, elderly care centres, are recommended to follow the dietary guidelines, which fosters the impact of the informational guidance (Kaljonen et al., 2018). The recommendations and regulations for public procurement can spur domestic legume production and consumption further by increasing the demand and development of domestic products and making them easily accessible for consumers (Balázs et al., 2021a; Kaljonen et al., 2018). Behavioural instruments, nudging and labelling, can play a vital role in promoting legumes in restaurants and retail as well (Kaljonen et al., 2020; Narciso and Fonte, 2021; Magrini et al., 2021).

The EC (2018) has attributed research and innovation an important role in building more self-sufficient plant

1 See for more details Food Authority (2021); MAF (2014).

2 See for more details MAF (2021a).



protein sector in Europe. The EC has funded many research projects to support the creation of vital legume value chains. In Finland, the Ministry of Agriculture and Forestry has accordingly supported the formation of the Protein and the Food and Beyond clusters to support the creation of a novel (plant) protein ecosystem in Finland (VTT, 2020a, 2020b). Such innovation support and networking have indeed been recognised as important for shielding innovations and creating new legume value chains (Bentia, 2021; Tziva et al., 2020). In Finland, however, the food industry is still lacking the domestic ingredients and processing facilities for plant protein fractions to support their growth (Lonkila and Kaljonen, 2022). Hence, better coherence between innovation and agricultural policies is clearly needed.

In what follows we examine how the actors involved in the development of legume value chains in Finland would like to see the current mix of policies to be developed further. We evaluate the goals and instruments the different actors are pushing forward and analyse what kind of policy frames they create. We use the interpretive policy mix framework to evaluate the consistency, coherence, and comprehensiveness of the policy strategy and instruments across the policy frames (Figure 2). Besides analysing the in/consistencies between the policy frames, we also evaluate the comprehensiveness of creative and destabilising policy instruments proposed. The destabilising policy instruments are currently largely missing from the policy mix. They are, however, necessary for breaking the current lock-ins in the food system functioning. Such destabilising policy instruments could include, for example, the phasing out or reduction of agricultural subsidies to livestock production, more stringent regulations on fertiliser use, taxing of high-carbon or unhealthy foods, restrictions to advertising or introduction of novel organisational structures and practices.

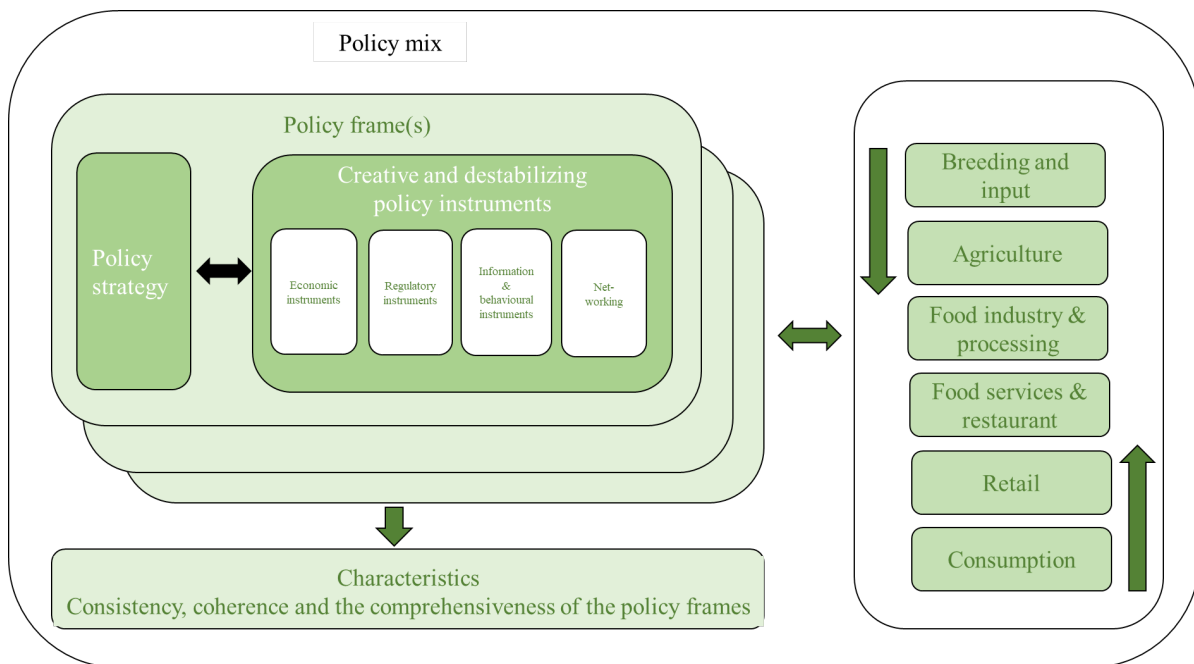


Figure 2. Interpretive policy mix framework for building more vital legume value chains in sustainable food system transition

3. Research data and methods

To identify food system actors' perceptions of how the policy mix for vital legume value chains in Finland should look like, we interviewed 26 persons from 22 different institutions involved in developing legume production and consumption in Finland (Table 1). First, we interviewed actors representing food system activities from input and breeding, agriculture, processing, retail, restaurants and food services, and consumption. We asked them to evaluate the problems hindering the development of legume value chains in Finland, and



to propose public and private policy measures to solve those problems. In the second step, we interviewed employees at the Ministry of Agriculture and Forestry, the Ministry of Environment and the Ministry of Social Affairs and Health. We asked the representatives of the different ministries to evaluate the feasibility and the comprehensiveness of the suggested measures and if there were any critical measures missing from the ones suggested by the food system actors. Besides the interviews, we organised also a workshop to deliberate policy measures to unravel the lock-ins in current legume value chains. Altogether 30 actors across the food system attended the workshop.

Table 1 Food system actors interviewed

Institutions and actors interviewed	Food system activity
Technical Research Centre of Finland (VTT), Protein Cluster	Research
Boreal Plant Breeding Ltd.	Breeding and input
Central Union of Agricultural Producers and Forest Owners (MTK) Luomuliitto ProAgria, advisory services The Finnish Cereal Committee (VYR)	Agriculture
HKScan A-Rehu	Processing (feed and meat)
Gold & Green Verso Pouttu Valio (plant-product line)	Processing (plant-based companies)
Leijona Catering Ylva	Restaurants and food services
S-Group	Retail
Motiva Martat World Wildlife Foundation (WWF) Nutrition Council of Finland (VRN)	Consumption
Ministry of Agriculture and Forestry Ministry of Social Affairs and Health Ministry of the Environment	Public policy, Ministries
Value for legumes workshop, 2 nd Nov. 2020	Across the food system

The data from the first round of interviews was coded with the computer software NVivo and analysed with regards to the measures either demanded or taken by food system actors to strengthen the legume value chain as well as the policy objectives and reasoning behind the measures. We analysed the measures in relation to the instrument type and the food system activity the measure was targeted at. We distinguished the measures further into creative and destabilising ones. Based on this analysis, we differentiated three policy frames with distinct policy objectives and instrument mixes proposed. As policy frames they reflect distinct understanding related to the policy problem, causal interpretation about the reasoning behind the problem and proposed solutions.³

3 In contrast to Entmans (1993) definition of a policy frame, we did not include the interpretations related to morality into our analysis. The policy problem at hand did not evoke much discussion on this in



As a last step, we assessed the picture the three policy frames are painting together regarding consistency, coherence, and comprehensiveness. In the last step the interviews with the ministerial advisors were of crucial importance. Regarding consistency, we examined how consistent the three policy mixes were with each other. We investigated whether the different policy objectives highlighted by the three policy frames can be simultaneously achieved as well as whether the three different instrument mixes work together or contradict each other. By assessing consistency, we discovered conflict lines between the food system actors. The analysis of comprehensiveness gave us tools to assess whether the instruments proposed by the three policy frames address all the lock-ins in the legume value chain or whether there are creative or destabilising measures missing to strengthen the legume value chain. Based on this step-by-step analysis, we draw conclusions about the coherence of the policy process and how the political dimension behind the competing policy frames can be better accounted for in the design of more effective policy mix.

4. Competing policy frames for more vital legume value chains

4.1 Development of profitable and secure legume production

The first policy frame highlights the barriers hindering farmers from cultivating legumes. According to interviewed food system actors representing primary production, feed companies, breeding, and extension, the low profitability of legumes, insecure harvest, the challenging weather conditions in Finland as well as farmers' inexperience in growing legumes are all factors that disincentivise farmers from including legumes in crop rotation. Growing legumes for food is particularly challenging as the harvest quality needs to be much higher than when used for feed.

This policy frame emphasises both public and private measures for making legume production more profitable and secure for farmers (Table 2). Agricultural subsidies are attributed a prominent role in incentivising farmers to cultivate legumes as the subsidies can reduce the profitability gap between legumes and other crops. Particularly, the actors supporting this policy frame call for higher coupled support payment for farmers cultivating leguminous crops. They underline that the support for legume production should be continued under the renewed CAP and suggest that requirements of domestic feed could be integrated also into animal welfare schemes, while fertilisation levels for nitrogen should be coupled with soil quality.

Simply introducing more agricultural subsidies will, however, not be enough to make legume cultivation profitable and secure. Accordingly, actors constructing this policy frame call for more funding for plant breeding to develop legume varieties for the Finnish climate with high and reliable yields, as well as for research on cultivation methods and the use of herbicides. To tackle farmers' lack of knowledge on how to produce legumes, this frame highlights the need to accelerate knowledge exchanges between farmers. Advisory services should also play their part in exchanging knowledge on cultivation methods and on how to reach the necessary crop quality for feed and food. This policy frame further raises the need for domestic ingredient industry, which is currently missing from the Finnish legume chain. Public investments in processing facilities would help to secure a more stable demand and price for Finnish legume producers.

While public policy has an important role to play in the transition towards more secure and profitable legume production, this frame emphasises that the market prices of legumes must be set right. Many actors criticise that the market prices of Finnish legumes are bound to the market price of soya and argue that if farmers would get higher prices for legumes, more farmers would start cultivating legumes. Some of the actors underline contract farming as a solution to low market prices and actively promote collaboration between farmers and the food industry in this regard. With long-term contracts farmers and industry would have better security both in terms of price and supply.

In summary, this policy frame highlights the need for more public spending on the development of legume production conditions to increase the attractiveness and security of legume farming for both feed and food.

the interviews.



Actors constructing this frame however refrain from suggesting that support should be reduced for competing crops or livestock farming. Rather, they leave it to the markets to set the price for legumes right. The actors supporting this frame, including the Farmers Union, refrain from suggesting any policy measures guiding food, or legume, demand (see also Lehtonen et al., 2021).

Table 2 Policy frame for the development of secure and profitable legume production

	Breeding & input	Agriculture	Food industry & processing	Food services & restaurants	Retail	Consumption
Economic instruments	funding for plant breeding; research on plant health & herbicides	funding for research on cultivation methods; research on economic value of legume cultivation; higher coupled support for legumes; using Pillar I & II for supporting legume production (green area, crop rotation, animal welfare scheme, N-level); contract farming	investments in processing facilities	better use of public procurement rules to support domestic plant-proteins		
Regulatory instruments		animal feed self-sufficiency target				
Information & behavioural instruments		advising farmers on crop quality & cultivation methods; knowledge exchange between farmers; better access to data on price development	responsibility commitment to using domestic feed			labelling; food education
Networking	protein cluster; collaboration between farmers and industry					

*) The policy instruments with the most prominent support are marked in bold.

4.2 Let the markets guide legume consumption and production

The second policy frame highlights that the demand for Finnish-grown legumes is currently not met. Despite the slight increase in the production volumes, the food industry is lacking high-quality ingredients. Most of



the broad bean harvest is used for feed. Moreover, the industry processing plant-protein fractions is lacking from the value chain. This policy frame relies on markets to solve these bottlenecks in production, believing that the rising demand eventually will force the production to redirect its practices. This policy frame is put forward by the niche food industry actors, who produce plant-based alternatives to meat and dairy products, and by actors in retail.

This policy frame takes a critical stand on the agricultural subsidy system, deeming it as ineffective and distorting the markets (Table 3). The most radical actor even stated that no agricultural production should be subsidised. Actors constructing this policy frame rather promote contract farming between legume farmers and processing or food industry as well as intensified knowledge exchange and collaboration among all actors along the legume value chain as solutions to the current low level of legume production. They support the attempts to build a more stronger plant protein ecosystem in Finland with the help of Protein and the Food and Beyond clusters (VTT, 2020a, 2020b). They stress that networking amongst the actors is also required to increase their lobbying power within the Finnish food system and in food policy. They also see the establishment of the ingredient industry in Finland as the collective responsibility of actors along the legume value chain rather than that of the state.

The market-oriented nature of this policy frame is also reflected in the fact that to increase the consumption of plant-based meat and dairy alternatives, they demand public support for only marketing campaigns and consumer education. Actors constructing this frame emphasise that plant-based alternatives to meat and dairy products should be eaten because consumers want to and not because they are forced to do so. Accordingly, they do not actively suggest changes to nutritional guidelines or to public procurement rules promoting plant-based diets. With flexitarians rather than vegetarians or vegans as their main target group (Lonkila and Kaljonen, 2022), they fear that public policy instruments guiding consumers towards eating less meat could cause a negative backlash from consumers.

Since the most important reasons for consumers to switch towards eating more plant proteins are the taste and price of meat and dairy alternatives, especially the plant-protein product companies call for more innovation funding for product development. Interviewees criticise that currently innovation funding is directed only at developing ingredients and processes but not towards developing tasty and inexpensive products. This policy frame also sees a problem in the food law regarding the naming of products (Lähtenmäki-Uutela et al., 2021). Most companies interviewed agreed that they would preferless strict labelling regulation for plant-based products.

This policy frame, in summary, highlights the role of markets and of collaboration between all actors in strengthening the legume value chains. Public funding should be spent only on improving the business environment of plant-based companies to further promote the consumption of plant-based meat and dairy alternatives.

Table 3 Policy frame for market guidance on stronger legume value chains

	Breeding & input	Agriculture	Food industry & processing	Food services & restaurants	Retail	Consumption



Economic instruments		contract farming; phase-out of subsidies	innovation funding; investments in processing facilities; export support	changes in public procurement contracts to support plant-based products		support for marketing campaigns
Regulatory instruments			change in food law regarding the name of meat alternative			
Information & behavioural instruments		re-education programme for livestock farmers		training for cooks	positioning of products; nudging; consumer campaigns	consumer campaigns & education
Networking	development of ecosystem; protein cluster; establishment of research consortium, better information flow between producers, industry and consumers on demand and needs					

*) The policy instruments with the most prominent support are marked in bold.

4.3 Public guidance for sustainable diets

The third policy frame expounds the problem of too low consumption levels of legumes and too high consumption levels of animal products. This policy frame underlines that to transition towards more sustainable and healthy diets, meat and dairy products should be increasingly substituted with plant-based alternatives. Legumes, as protein-rich and nutritious crops, are presented as an important component of more sustainable



and healthy diets. Accordingly, the legumes should eventually become a normal part of Finnish diets.

This policy frame highlights the role of public policies and civic initiatives in guiding people towards more sustainable and healthy diets (Table 4). Actors constructing this frame, including two public agencies, two food service providers, and two civic organisations campaign on the benefits of plant-based diets, serving of vegetarian and vegan food at school canteens, cooperation with the food industry on developing new plant-based products and updating of the nutritional guidelines in favour of plant proteins.

Table 4 Policy frame for stronger public guidance on sustainable and healthy diets

	Breeding & input	Agriculture	Food industry & processing	Food services & restaurants	Retail	Consumption
Economic instruments	funding for plant breeding		innovation funding; investments in processing facilities	school meals in the support of sustainable diets; changes in public procurement contracts and requirements to support sustainable diets		change in lunch voucher and Kelas meal subsidy system; reduced VAT on vegetables
regulatory instruments			restricting advertising of animal products			forced adoption of more sustainable consumption behaviour
Information & behavioural instruments				training for cooks and sharing of recipes		updating nutritional guidelines; consumer campaigns and education
Networking	networking for stronger policies and instrument mix across chain; cooperation in product development					

*) The policy instruments with the most prominent support are marked in bold.

This policy frame supports a myriad of policy measures to change eating behaviour towards eating more legumes both at home and in public canteens. Public procurement is promoted as the main tool to guide people towards eating more sustainably. As public canteens still serve too little legumes and plant-based food, changes in the public procurement contracts and requirements are essential. The product development could be enhanced with public funding as well. The actors pushing forward this policy frame underline that the cooks working at public canteens still lack the knowledge of how to prepare legumes and legume-based products. Hence, more training and capacity building is required to prepare nutritious and tasty plant-based foods. Lunch vouchers are recognised as yet another method of increasing legume consumption. Public and private employers can provide their employees with one lunch voucher a day as a taxable benefit or reduce it from the employees' salaries (Edenred, 2021). If the vegetarian lunch option would be cheaper for someone with a lunch voucher or if only the vegetarian menu could be purchased with a lunch voucher, more consumers might regularly eat vegetarian food. Finally, it is argued that also the Social Insurance Institution (Kela) could promote the consumption of legumes at university canteens by tightening the rules regarding meal subsidy



entitlements.

The actors presenting this policy frame, hence, tend to push forward more stringent regulatory and economic measures guiding consumption. They call for restrictions on advertising of animal products and a lower value-added tax for vegetables, for example. They call also for more active communication between the ministries on the environmental and health benefits of plant-based diets. The regulations should restrict unsustainable consumption habits as recommendations and individual responsibility for changing consumption patterns are relatively ineffective.

In summary, this policy frame calls for public guidance towards more sustainable and healthy diets. Actors constructing this policy frame highlight the slow nature of market-driven change and argue that to speed up the transformation towards more plant-based diets, public measures promoting the inclusion of legumes in human diets are needed.

5. Consistency and comprehensiveness of the policy mix for more vital legume value chains in Finland

The analysis of the policy frames reveals that there is currently no collective vision of a policy mix for more vital legume value chains in Finland. Rather, food system actors pursue different policy goals with distinctively different instrument mixes. The first identified policy frame aims at increasing domestic legume production and calls for measures developing legume cultivation to become more profitable and secure for farmers, while the third policy frame intends to change eating habits to become healthier and more sustainable and puts forward measures to increase sustainable legume consumption. These two policy frames focus on two different ends of the legume value chain and both the pursued goals and suggested instrument mixes do not align. The production-oriented policy frame shows no interest in governing consumption, whereas for the consumption-oriented policy frame, it does not matter whether legumes are sourced domestically or from abroad.

The second policy frame trusts the markets to increase both legume production and consumption in Finland and wants to improve the business environment for novel plant-based foods and companies. While this market-oriented policy frame has an interest in increasing both legume production and consumption, it rejects agricultural subsidies and other forms of public support to legume production as well as economic and regulatory guidance of consumption. The frame accepts public support solely for novel food innovations and business ecosystems to support the market growth of legume-based products. The instrument mixes put forward by both the production- and consumption-oriented policy frames are therefore partially inconsistent with the instrument mix called for by the market-oriented frame. Both the production- and consumption-oriented frames underline that achieving their goals of increased legume production and consumption depends heavily on policy support. For the production-oriented frame, agricultural subsidies are indispensable, and public funding for plant breeding and research is necessary to increase the area under legume cultivation. Food system actors behind the consumption-oriented policy frame stress that stronger economic and regulatory public policy instruments are required to shift to sustainable and healthy diets.

In sum, the three policy mixes are currently inconsistent with each other as they pursue different policy goals and promote distinctively different instrument mixes. Theoretically, it is possible to strengthen legume production, to improve the business environment for plant protein companies, and to increase legume consumption simultaneously. However, the incompetence or unwillingness to take the needs of other actor groups along the food system into consideration currently leads to a situation where the different goals do not align. The instrument mixes, which the three policy frames put forward, match poorly and in some cases are even contradictory.

Our interviews with the policy advisors to the Ministry of Social Affairs and Health (MSAH), the Ministry of Agriculture and Forestry (MAF) and the Ministry of Environment (MoE) revealed that they also propose measures with different food system activities in mind and assess the importance of public policy and markets differently. The policy measures put forward by the consumption-oriented policy frame appeal to the policy



goals and measures put forward by the MSAH. The measures put forward by the MSAH continue the long tradition of nutrition and health policy, now with a stronger emphasis on sustainability (Lang, 2021). According to this thinking, all the available public policy instruments are needed to support sustainable and healthy eating patterns and diets. In our interview the representative of the MSAH wanted to add several other instruments still to the ones put forward by the consumption-oriented policy frame. These include, for example, the integration of sustainability criteria into nutritional recommendations (Helsediktoratet, 2021), the introduction of a label that communicates both the healthiness and sustainability of a food product (EC, 2020), and restricting advertising of unhealthy food products to children (Fogelhom et al., 2021). Many of these initiatives are currently under investigation at the Ministry, while the while the taxation of unhealthy and unsustainable foods is considered politically and administratively more challenging.

The instruments proposed by the representatives of the MAF, on the other hand, focused mainly on inputs, agriculture and innovation policies. They agreed with food system actors constructing the production-oriented policy frame that better incentives for integrating legumes into crop rotations should be included in the national strategic plan of the CAP (MAF, 2021b). They, however, also highlighted the need to strengthen domestic production by creating stronger ecosystems for domestic legume-based products and stressed the ministry's continued support for the of the Protein Cluster (VTT, 2020a, 2020b). In accordance with actors constructing the market-oriented policy frame, the representatives of the MAF also argued for public innovation support and expressed their confidence in informational policies and markets to guide consumers towards eating more legumes as part of moderate shifts towards more fish and plant-based diets. These measures are emphasised also in the Ministry's Climate-friendly food programme (MAF, 2020).

In comparison with the representatives of the MSAH and MAF, the interviewed representative of the MoE took a more holistic view on building vital legume value chains in Finland. In the interview, the representative of the MoE considered all food system activities along the legume value chain and argued for policy measures emerging from various policy domains. Like representatives of the MAF, the importance of the public support for food innovations was highlighted. For the plant-based products to become a normal part of people's diets, the state should also ensure that the price of the products and the food environments are set right. In this way, the representative of the MoE supported the policy measures put forward by the consumption-oriented policy frame, but also production frame in underlining the need for extension and education so that growing legumes could become a more salient business path for farmers. Despite such a holistic approach, the policies at hand for MoE are limited and come mainly through more general climate policies (MoE, 2021). This can also partly explain the ability to perceive the issue from a wider perspective and could potentially also translate to facilitating the other sectoral ministries to broaden their perspectives.

Both the ministries' representatives and the food system actors put forward a rather substantial catalogue of creative policy measures which would improve the conditions for both legume production and consumption. Surprisingly, none of the frames, however, argued for stronger support on organic farming systems, of which the legumes are an essential part of. The food system actors as well as the representatives of the ministries were also reluctant in pushing forward any destructive policy measures (see also Tziva et al., 2020). Only the market-oriented policy frame criticised the agricultural subsidies for upholding the current regime and structures. This frame, however, challenged the subsidy system in principle, and was not able to put forward any concrete examples of measures destabilising the system. The consumption-oriented frame suggested restrictions to advertising unhealthy and unsustainable products. Furthermore, the taxing of high-carbon food was also discussed in this context, but it was deemed politically and administratively unfeasible. The creation of novel structures and institutions was supported most prominently within the market frame. Measures that would tackle the intensive use of pesticides and fertilisers and pave the way for a more low-input farming system, such as augmenting support for organic farming or the remuneration of legume ecosystem services, restrictions or taxing the use of inorganic nitrogen fertilisers or taxing of high-carbon food items, were not proposed. Neither were the low price of soya or trade regulations touched upon in the Finnish policy frames.



The emergent three policy frames illustrate how the Finnish food system actors pursue the strengthening of the legume value chain from rather narrow perspectives, considering the food system activities they are only themselves engaged in. They fail to go across the policy domains and assess the role of legumes as part of more systemic sustainability transition of the food system (see also Lonkila and Kaljonen, 2021). The benefits of the inclusion of legumes in agriculture and human diets are still considered separately.

6. Discussion and conclusions

The interpretive policy mix framework developed in this paper helps to understand the political and contested nature of policy mixes for sustainability transitions. It facilitates the understanding of why the design of consistent, comprehensive, and coherent policy mixes may be difficult when designing novel means for sustainability transition and what kinds of barriers need to be overcome to create policies for sustainability transition.

Policy analysts have established that there is no one single policy field where changes would lead to increased legume production and consumption in Europe (e.g., Balázs et al., 2021a, 2021b; Schiavo and Aubert, 2020; Topp et al., 2014). Our analysis of the different policy frames in Finland echoes this finding. To strengthen the Finnish legume value chains, changes in policy fields targeting agricultural production, nutrition and health, innovation and food markets as well as climate and environment are being pushed forward by different food system actors. The three policy frames identified anchor into different policy fields under the jurisdiction of different ministries of agriculture, health, and environment. As outlined above, the instruments put forward across the three policy frames are fragmented and, on some points, even contradictory. Food system actors tend to promote policy measures that would benefit the activities they are themselves engaged in, without considering other food system activities or the needs of other food system actors in developing legume value chains. Consequently, the suggested policy instruments do not form a consistent whole that would help creating more vital legume production and consumption simultaneously.

This fragmentation hampers the transition towards sustainable food systems. On the one hand, more powerful food system actors, namely actors relying upon the production-oriented policy frame, have more possibilities and strength to lobby policy makers than the less powerful actors, such as consumer organisations or environmental NGOs. Hence, policy changes for enhancing production conditions for plant-protein feed are likely to be more impactful than those of enhancing legumes as part of diets. This may fragment the policy landscape even further. On the other hand, food system actors engaging in the development of legume value chains are often niche actors who need to stand up to regime actors, including the meat and dairy industry. The disintegration of the food system actors involved in developing legume value chains into three different groups which pursue three different goals may weaken the actors' bargaining power within the food system. This study therefore highlights the need for networking between the different food system actors. Developing spaces for networking may also foster cooperation between actors in ways that go beyond their views on public policy measures. It is important that public administration allows for actors to come together and find common ground also in order to develop market solutions for more vital legume chains.

Spaces where food system actors can learn about each other's needs are required to overcome their vested interests and negotiate compromises. Networking is important for the food system actors along the legume value chain to find one voice. Public administration, which has a responsibility to act on the environmental and climate impacts of the current food system, needs to facilitate this exchange between food system actors involved in developing the legume value chain.

The interpretive analysis of policy mixes can help this endeavour by highlighting the points of conflict, but also the possible compromises among the different food system actors and policy fields. The analysis across the Finnish legume value chain reveals how some of the policy measures promoted in both market- and consumption-oriented policy frames could be aligned for more consistency. While companies producing plant-based meat and dairy alternatives are generally against more stringent public regulation, they are more than



willing to support policies that only indirectly lead to an increased legume consumption. Policy measures such as trainings for cooks, measures promoting the use of plant-based food products by food services, and an active communication on the environmental and health benefits of legumes would promote legume consumption more subtly and would have an impact on the demand for plant-based products. A broader compromise could even be possible between the production- and consumption-oriented policy frames. While both actor groups supporting these frames fail to recognize the needs of the other, they do not deny the need to increase legume consumption or the profitability of legume production respectively. Again, this highlights the need for networking for actors to gain knowledge of and become sensitive to the potential of other food system activities in promoting more vital legume value chains.

Finally, the analysis of competing policy frames does further highlight the challenges involved for policy makers in planning policy mixes coherently across policy fields. Policy makers need to recognise and understand the potential to develop legume value chains within different policy fields and across food system activities. The results of this study call for better collaboration between ministries in developing legume value chains and sustainable food systems. The ministries need to develop a collective understanding of how agricultural, health, environmental, and innovation policies can be aligned for stronger use of legumes in sustainable food systems. Policy makers need to become better aware of the different policy frames for more vital legume value chains and the related interests represented by the different food system actors. Instead of focusing only on stakeholders close to their own policy field, the policy officials should broaden their perspectives to accommodate the interests of other stakeholders engaged in other food system activities.

Accordingly, ministries need to commit to developing the legume value chains jointly by simultaneously improving conditions for legume production and consumption and destabilising the unsustainable production and consumption practices. To establish legumes as a central element in European cropping system and diets, the current agricultural subsidy system that maintains livestock production and high levels of meat and dairy consumption needs to be questioned. As explained above, the Finnish food system actors, however, refrained from fundamentally questioning the existing subsidy structure, partly because of political realities. Considering the marginalised position of legumes and the urgent need to reduce the environmental and climate impacts of the food system, policy planners and makers should, however, include destructive policy measures in the policy mixes. Therefore, further elaboration of what kind of destructive policy instruments are required in building effective and efficient policy mixes for strengthened legume value chains is critically needed.

Kivimaa and Rogge (2020) highlight that for transformative change to happen, support from civil servants and ministers for more permanent changes in the policy mix is crucial. This study on the policy mixes for vital legume value chains further emphasises networking as a key element in building more coherent policy mixes. The interpretive policy mix framework can support the designing of more consistent, coherent and comprehensive policy mixes by unveiling conflict lines and possible compromises between actors and highlighting weak points in current policy mixes and administrative efforts in guiding sustainability transitions. It allows for zooming in on the political process by which a policy mix is formed and facilitates a better understanding of different perceptions of the ideal policy mix. By so doing it renders visible the politics inherent in evolving policy mixes.

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