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Stakeholder Mapping for the Dutch Potato Industry

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Executive summary

Climate change is expected to lead to increased occurrences of droughts, floods, and rising sea levels, which may result in soil and water salinisation, thereby affecting agricultural productivity and food and water security. To address this challenge, it will be necessary to adapt food systems by incorporating saline agricultural practices. One potential solution is the cultivation of salt-tolerant potato varieties, which have the potential to sustain global food security in areas affected by increasing salinisation. This report proposes a methodology for the process of stakeholder mapping for case studies of the (saline) food systems and applies it to the Dutch potato sector. This methodology can be transferred to other contexts and on other crops.

This report employs a stakeholder analysis approach to identify and classify key actors in the Dutch potato industry, in order to understand the relationships and power dynamics between them. This study provides new insights into the barriers and opportunities facilitating change in farming practices related to saline agriculture. The applied methodology was adapted from existing methodologies (Lelea et al., 2014; Raum, 2018) and tailored to the specific context of the national potato industry in the Netherlands.

The Dutch potato industry holds a strong global position, but stakeholders show less concern about salinisation than researchers outside of the industry. There is a lack of internal consensus about leadership and a feeling of lack of agency amongst stakeholders, making industry change difficult. According to the findings, a significant portion of stakeholders participate in various segments of the value chain, but there is a gap between the interest and influence of different stakeholder groups in the industry. Government institutions are seen as having high influence but low interest, while civil society actors are considered to have high interest but low influence. Additionally, farmers are perceived to have frictionous relationships with retail, because of pricing power, and national government institutions due to opposing goals. Multiple stakeholder types have stated that at this point in time, innovations regarding salt-tolerant potato varieties are primarily interesting for export to countries with arid climates. Salinity is not a high priority on the agendas of farmers, as the current nitrogen crisis in the Netherlands is threatening the farmers' existence.

To address and overcome some of these challenges, stakeholders need to engage in open and honest dialogue, build trust and respect, and commit to working together. Creating an inclusive and transparent process will enable all stakeholders to have a voice and contribute to the industry's evolution, which is crucial for sustainable development. The study suggests that awareness raising should increase the perceived severity of the salinisation issue to identify salinisation as a parallel problem that is also a threat to the viability of the food systems including potatoes. Challenges are exacerbated by a general feeling of lack of agency among stakeholders. Without clear leadership it is difficult to know who to target to facilitate change. Mutual understanding needs to increase in order to innovate the industry and henceforth move the industry forward to ensure its resilience and adaptive capacities to climate change.

Authors



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IVM

The Institute for Environmental Studies (IVM) at Vrije Universiteit Amsterdam, contributes to sustainable development and cares for the environment through scientific research and teaching. A unique feature of the institute is our capacity to cut through the complexity of natural-societal systems through novel interdisciplinary approaches.

Being the oldest environmental research institute in The Netherlands (est. 1971), IVM is currently one of the world's leading institutes in sustainability science. With 130 employees (staff, PhDs, and Postdocs), IVM has been rated with the highest scores on scientific excellence, and each year we receive over 120 MSc students and we host over 50 PhD students in our teaching programmes.

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SALAD project

SALAD (Saline Agriculture for ADaptation) is a transcontinental, innovative research project in the field of food systems and climate. It addresses the research area of food security under climate change through saline agriculture, aligning vision, research and practice among European and African countries focusing on saline agriculture upscaling. The project involves both basic and applied transdisciplinary (biophysical, social, cultural, economic and environmental) research. It includes a consortium of four countries from the EU: Belgium, Germany, Italy, Netherlands, and two from Africa: Egypt, and Morocco. SALAD focuses on promoting innovative technology deployment and improving climate resilience through saline agricultural practices.

Projected climate change and sea-level rise scenarios for 2050 predict a significant decrease of crop yield over the decades to come, in particular in low lying coastal areas as well as irrigated (dry land) agricultural areas around the Mediterranean and the North Sea. Climate change effects such as more frequent floods and droughts will increase the salinity in agricultural soils, affecting food systems overstretched by an increasing global population. According to the FAO's reports, progressing salinisation is one of the major drivers of soil degradation in Europe as well as Near East and North Africa, exerting increasing pressure on conventional farming which is based on freshwater resources (FAO, 2015).

SALAD aims at improving the resilience of food production in saline and potentially saline agricultural areas in the Mediterranean and North Sea regions by:

- 1) supporting the development and sustainable use of innovative salt-tolerant crops,
- 2) identifying and further developing crop cultivation suited to saline conditions,
- 3) exploring and testing innovative market development techniques and instruments to upscale several crop/food chains across the EU and Africa,
- 4) exchanging knowledge and transferring practical and adaptive solutions.

SALAD focuses on implementing climate-smart agricultural solutions through the upscaling of saline agriculture to change the behavior, strategies and agricultural practices along the value chain raising awareness for climate change impacts and adaptation possibilities to salinisation among stakeholders.

By adopting a novel and innovative approach, first, we investigate soil-water-plant interactions for the selected crops (WP1). Second, we conduct production pilots and experiments to examine prospects for horizontal upscaling production from farm to regional scale for four different crops under saline conditions: New Zealand spinach, potatoes, quinoa and tomatoes (WP2). Third, we engage a wide range of stakeholders and analyze knowledge transfers (diagonal upscaling, WP3). Fourth, we conduct a market

analysis to investigate opportunities and constraints for vertical upscaling, present marketing and certification options and start a dialogue with the investors (WP4).

Better understanding the identity and motivations of the stakeholders in the Dutch potato industry and the connections between them is necessary for questions this report aims to answer and supports the overall goal of the SALAD project. The project engages stakeholders early and often through its project horizon, with the goal of promoting innovative technology deployment and improving climate resilience through saline agricultural practices. The success of this goal will depend in large part on whether or not the correct, relevant stakeholders adopt the practices the project recommends.

Glossary

Interest

The amount of focus on, concern for, or financial interest a stakeholder holds for a particular issue or industry.

Influence

The amount of power a stakeholder wields over other stakeholders and their opinions and actions.

Industry

A group of stakeholders related based on their primary business activities (Gorton, 2022).

Governance

Processes, systems and actors involved in addressing collective problems and guiding society towards socially desirable collective outcomes.

Institutions

Structures of rights, rules, norms, agreements and decision-making procedures that induce social practice or social order. Institutions assign roles to participants in that social practice or order and guide interactions among occupants of these roles.

Saline agriculture

Agricultural practices using saline land and saline irrigation water to achieve better production through the sustainable and integrated use of genetic resources (plants, animals, fish, insects, and microorganisms) avoiding soil recovery measures (Ladeiro, 2012).

Salt tolerance

The ability of a plant to eliminate, reduce, or repair the stress caused by higher levels of soil salinity once the salt has already penetrated the plant's tissues (Gupta, 2005).

Sector

A sector of the economy where companies engage in similar or related business activities, products or services (Kenton, 2022).

Seed potato

Potatoes grown to be sold and used for planting more potatoes.

Stakeholder

A stakeholder in an actor who has a stake or interest in a situation, i.e., the individuals and groups (or "actors") who perform certain functions within a system and therefore impact or are impacted by a situation (Reed 2009; Lelea et al 2014).

Ware potato

Potatoes grown for consumption.

List of abbreviations

CS	Civil society actor
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
NG	National government actor
NGO	Non-governmental Organisation
PPP	Public-private partnership
PR	Public research actor
SALAD	Saline Agriculture for ADaptation research project
SDG(s)	Sustainable Development Goals
SME	Small and medium enterprises, as defined by the EU
CRISPR	Clustered regularly interspaced short palindromic repeats; gene-editing technology
VC	Value chain actor
WB	Water board

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1. Introduction

The world is at a critical juncture. We have not been able to make progress with regard to Sustainable Development Goals (SDGs) 2.1¹ and 2.2² and other food security targets since setting the sustainable development agenda in 2015 (FAO, 2021). Many challenges and vulnerabilities to our food systems were found to be more significant than predicted (FAO, 2021). Currently, global food prices are at a record high; despite improvements in the preceding months, the FAO Food Price Index for August 2022 remained nearly 8% higher than August 2021 (FAO, 2022a). This crisis can be ascribed to the combined effects of global inflation, unequal patterns of economic recovery from the COVID-19 pandemic (FAO, 2022b), the war in Ukraine, supply chain disruptions (World Bank, 2022), and the impacts of climate change. These impacts have the potential to provoke a hunger and malnutrition crisis that will erase decades of progress with regard to food accessibility and nourishment. People in low- and middle-income countries will be most severely affected by these alarming trends, as they spend a larger share of their income on food relative to people from high-income countries (World Bank, 2022). To more clearly state the scope of the crisis: in 2021, approximately 2.3 billion people globally were moderately or severely food insecure (FAO, 2022b), with this number expected to increase in 2022 and beyond (FSIN and Global Network Against Food Crises., 2022).

A range of environmental pressures that can be ascribed to climate change pose a threat to the already insecure global food systems (Gregory et al., 2005). One large and widespread environmental pressure threatening food security is salinisation (Mukhopadhyay et al., 2020). Salinisation poses one of the main challenges to contemporary agriculture due to the land degradation from the expected increase of more persistent droughts, floods, and sea-level rise. As agricultural yields dwindle, rates of agricultural land abandonment will increase, leading to an increase of migration and an overall worsening of economic welfare (Mukhopadhyay et al., 2020). Adapting to the expected increase of soil salinity through strategies such as saline agriculture may help avoid the worsening of the current and looming food security crisis. Environmental impacts will not be uniformly distributed. While some countries may see their agricultural productivity severely limited, others - like the Netherlands - may not. Understanding the farmers' viewpoint on the potential threats and opportunities of salinization and saline agriculture is crucial.

An important lesson can be taken from the Dutch nitrogen crisis: considering that multiple changes may be necessary to encourage the adoption of saline agricultural practices, engaging with impacted stakeholders early and often may reduce conflict and improve the chances of success for future measures. In the case of the nitrogen crisis, Dutch agricultural stakeholders have spent several years protesting the actions taken by the national government to lower nitrogen emissions in compliance with EU standards. The causes of, and responses to, the crisis are multifold and complicated; to over-simplify

¹ “By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round” (United Nations, 2020)

² “By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons” (United Nations, 2020)

them sacrifice important context-specific nuance. However, it can be argued that one case for the protests is that farmers, in particular, feel excluded by the policy- and decision-making processes. Identifying and engaging with stakeholders, while never a perfect guarantee of success, is key to improving the strength of decisions and reforms; failure to include stakeholders often leads to poor performance or outright failure (Bryson, 2003). Applying these lessons to the challenge of saline agriculture suggests the use of a methodology for identifying the stakeholder groups present in an industry - for example, the Dutch potato industry - and measuring the relationships and balance of power between those groups. Understanding who the stakeholders in this industry are, and the relationships between them, will allow for more informed and more effective stakeholder engagement which, in turn, may improve the success of future policy reforms. This report sets out to adapt existing methodologies and apply these to the context of the Dutch national potato industry.

This methodology will focus on a stakeholder analysis approach, which allows for the systematic identification and categorization of stakeholders (Reed et al., 2009). Furthermore, it facilitates plotting and comparing their respective levels of interests, powers, roles and investigates the relationships between different stakeholders. This is including, but not limited to: alliances, collaborations, and conflicts. Stakeholder analysis can play an effective part in addressing environmental and/or natural resource management issues (Raum, 2018).

Four main pathways can contribute to the salinisation of agricultural lands in the North Sea region: irrigation, aerosol, flood, and seepage salinization (De Waegemaeker, 2019). In the Netherlands, the most significant cause of farmland exposure to salinization is through seepage of saline groundwater. Seepage occurs when underground saline water migrates and intersects with surface groundwater reserves, potentially contaminating freshwater resources used for agricultural purposes (Gould et al., 2021). The Ministry of Internal Affairs' National Environmental Vision (2020) predicts that low-lying coastal areas of the Netherlands will increasingly experience salinization due to rising sea levels and soil subsidence.

The relationship between climate change, environmental pressures and food systems is reciprocal. Besides mitigating environmental challenges that food systems are facing, there are many environmental impacts induced by the agricultural sector. First, food systems are estimated to contribute between 19% and 29% of global anthropogenic greenhouse gas emissions (Vermeulen et al., 2012). Second, agricultural practices altercate the nitrogen (N) and phosphorus (P) cycle on a global level (Steffan et al., 2005). These altercations can mainly be ascribed to exponential growth of fertilizer use since the 1950's (Steffan et al., 2005). Reactive N dynamics have casually been linked to climate change, including mitigation, adaptation, and impacts. Consequently, surplus of nitrogen (N) and phosphorus (P) in these ecological cycles causes eutrophication and dead zones in lakes and coastal zones (Diaz & Rosenberg, 2008; Rabalais et al., 2010), thus harming marine ecosystems and ecosystem services (Diaz & Rosenberg, 2008). Third, farming systems can negatively impact biodiversity due to: tillage, drainage, intercropping, grazing, pesticide- and fertilizer use (McLaughlin & Mineau, 1995). Fourth, pesticide- (Willis & McDowell, 1982) and fertilizer (Hamilton & Helsel, 1995) use in agricultural systems can have adverse effects on water quality. Fifth, soil quality can be affected by some forms of agriculture. Compactability, erodibility,

and fertility of soils can decrease over time after periodic intense cultivation (Saini & Grant, 1980). Hence, food systems play a substantial role in the Anthropocene era, in which humans are changing earth systems.

According to the FAO (2002) *“Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.”* The multidimensional definition of food security presented during the World Food Summit (1996) is widely accepted. Following this definition, food security has four key dimensions: (a) food availability, (b) food access, (c) food quality and use, and (d) food stability.

All these requirements can be met globally by the potato crop due to its adaptability, yielding capacity, and its nutritional values (Devaux et al., 2020). The potato crop can be an important component of diversified cropping systems, help fight food insecurities, and improve sustainable economic growth of communities in times of crisis and current socioeconomic pressures (Devaux et al., 2020). This particularly applies to developing countries with relatively high levels of poverty, hunger, and malnutrition (Devaux et al., 2020), as potatoes are one of the most efficient food crops in terms of dry matter and protein per hectare and per day as compared to other crops (Beukema & van der Zaag, 1990). As a result, potatoes have higher nutritional value per dollar than many other raw vegetables (Beals, 2018). While potatoes are relatively salt-sensitive, several varieties with a notably higher salt tolerance have been identified (de Vos et al., 2016) and are therefore being investigated for their potential to improve the resilience of food production in saline or potentially saline agricultural areas in the SALAD project. Some potato varieties show greater potential for conventional farming under moderately saline conditions than is generally assumed (de Vos et al., 2016). Some potato varieties held close to 100% yield with EC levels of 4, or even 8 dC/m.

The FAO considers the potato crop to have high potential for improving global food security (Qu, 2022), but using potatoes to alleviate food security is not an easy solution, as the potato industry faces challenges of its own. The plant is sensitive to drought stress (Haverkort, 1990), and its growth rate is negatively impacted by increased soil salinity (Hassani et al. 2021). Increased frequencies of heat waves, droughts, and wetter planting and harvesting seasons will require changes to potato harvesting and processing methods (Goffart et al. 2022). Different climate models predict a decrease in yield between 18% and 32% for the 2040-2069 interval for potatoes unadapted for climate change and between 9% and 18% with adaptation (Hijmans, 2003).

Potatoes are historically grounded in Dutch culture, emphasized by Vincent van Gogh’s ‘Potato Eaters’ painted in 1885 (Van Gogh Museum, 2022). The Netherlands is a leader in the global potato industry, producing more than 7 million tonnes of potato (FAOSTAT, 2020) and more than 900,000 of seed potato annually (NAK, 2022). The potato crop plays a large role in domestic agricultural industries. The Netherlands dedicates more arable land to potatoes than any other country in Northwestern Europe (Goffart et al. 2022), is the tenth largest potato producer globally and the third largest potato processor in the world (West et al., 2021). The Dutch also dominate seed production, and notably export the vast majority of their seed and processed product; this stands in contrast to many other countries, where

most potatoes are sold and consumed domestically (West et al., 2021). Accordingly, thousands are employed by this sector nationally, and annual investments measure in the hundreds of thousands of dollars (ibid). This industry is poised to expand even further as climate change impacts crop growth patterns worldwide; the relative importance of potato production in Northwestern Europe - and the Netherlands in particular - is predicted to increase in coming years (Goffart et al. 2022). In the Netherlands potatoes are grown by 2,200 seed potato growers, 7,000 ware crop growers and 2,500 farmers who produce starch potatoes (NAO, 2007). The Netherlands accounted for 10.5%, or approximately 1.3 billion Euros of the value of production of potatoes at basic price in 2020, as visualized in Figure 1. The EU is a net exporter of seed and main crop potatoes and the Netherlands was the leading trader in (Eurostat, 2020). The total consumer value of fresh and processed potato is valued at over three billion euros in the Netherlands. This is four times the farm gate price. (NAO, 2007). The Netherlands accounted for 25.4% of intra-EU and a staggering 58.8% of extra-EU exports of potatoes in value terms in 2020 (Eurostat, 2020).

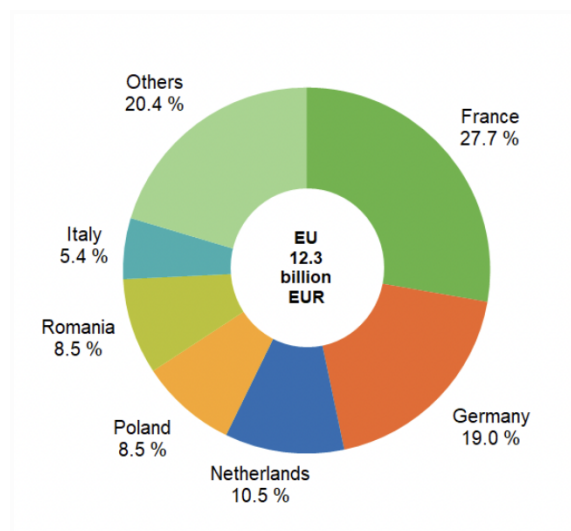


Figure 1. Value of potato production by country (Eurostat, 2020)

However, this growth will not come without challenges. Currently, as a direct result of food systems in the Anthropocene era, the Netherlands is in a nitrogen crisis. In May 2019 the Council of State ruled the government's nitrogen reduction strategies did not comply with EU directives and therefore needed to implement draconic measures for short-term nitrogen reductions (RIVM, 2019). While the measures are defended as necessary for complying with EU directives and reducing the environmental impact of the agricultural industry, they have not been well received by Dutch farmers. Since the decision, farmers and agricultural grassroots groups have led multiple national protests pushing back against these measures (Stokstad, 2019). However, many farmers feel continuously ignored or "not taken seriously" by the political response to their opinion (Hendrikse, 2022); this increases the divide between stakeholder groups and may impact the feasibility of further nitrogen reduction strategies.

Raum (2018) highlights the challenge of governing and managing ecosystem services, including food systems, which involves multiple stakeholders with distinct yet interconnected interests. To address this

complex and fragmented governance landscape, understanding the current status quo is crucial for policymakers, environmental organizations, and researchers to gain useful insights and identify a way forward. Building trust among stakeholders and researchers is essential for achieving systemic change (Lealea et al., 2014; Sloan & Oliver, 2013), which requires consistent communication and involvement (Guba & Lincoln, 1982). However, identifying the relevant stakeholders and respectfully engaging with them is a prerequisite for establishing these relationships. Adopting the normative approach to stakeholder research and engagement during the data collection stage provides an excellent opportunity to establish relationships and build trust between stakeholders and the research team (Reed et al., 2009). Semi-structured interviews are an ideal qualitative data collection method for building trust, as they facilitate more conversation and time spent between researchers and subjects, and empower stakeholders by incorporating their feedback throughout the data collection process (Reed et al., 2009).

Incorporating agricultural practices is just as necessary in this investigation as the saline potential of individual crops. Accordingly, collaborating and sharing knowledge with the stakeholders who work in the potato industry is vital for the success of the project. Collaborating with stakeholders requires knowing who they are, the role they each play in the industry, and the relationships that exist between each stakeholder group. This is a process that requires a thorough understanding of each agricultural industry under investigation. To build the SALAD project's methodology for this process, it will first be tested on one singular agricultural industry: the Dutch potato industry.

Engaging with stakeholders in this industry and utilizing their direct knowledge will ensure that the results of this research are as accurate as possible. Stakeholder engagement increases the likelihood of success for the SALAD project and global efforts to combat food insecurity, and may better prepare the Dutch potato industry as a whole to adapt to the incipient challenges climate change brings to their livelihoods.

In this report, we address the following research questions:

1. *Who are the stakeholders in the Dutch potato industry?*
2. *To what extent are stakeholder groups of the Dutch potato industry interested in the sector?*
3. *To what extent do stakeholder groups of the Dutch potato industry hold influence over the sector?*
4. *What are the relationships between stakeholder groups of the Dutch potato industry?*
5. *What barriers and opportunities does the industry confront in embracing change?*
6. *To what extent is increasing salinisation viewed as a problem or an opportunity for the industry's future?*

2. Methodology

This report proposes a methodology for the process of stakeholder mapping for case studies of the (saline) food systems and applies it to the Dutch potato sector. This methodology can be transferred to other contexts and on other crops. This section presents the methodology for stakeholder mapping, including the value chain, and the subsequent analysis of their interests, influences and relationships. We begin with describing the data collection. We then describe the data analysis procedure. The section finishes with limitations of the adopted approach.

2.1 Data Collection & Analysis

The first step of this research, for answering research question 1: *'Who are the stakeholders in the Dutch potato industry?'*, is to map all relevant stakeholders of the Dutch potato industry and consequently create a common stakeholder mapping research protocol that can be applied to other crop-specific case studies in varying contexts. To achieve this, firstly, a study of the literature and existing secondary resources was conducted. These resources included existing stakeholder lists and maps produced by other researchers within the SALAD project, and published reports from within the industry or other engaged stakeholders (e.g., seed potato companies, the Ministry of Agriculture, Nature and Food Quality, and public-private knowledge sharing partnerships such as SeedNL, etc.). This resulted in a preliminary list of stakeholders involved in the Dutch potato sector. Next, stakeholder interviews and surveys were used to add missing stakeholders until the saturation point, or the point at which no more themes and observations are reached (Guest et al., 2006). In addition to the findings of the literature, new stakeholders were identified using the snowball sampling technique, which were subsequently contacted for new rounds of interviews or surveys. Snowball sampling relies on the social networks of participants to generate new participants, which may lead to a biased sample that does not represent the broader population. The resulting sample may be skewed towards individuals who have strong social connections or are more willing to participate in research studies. The data was collected as part of the semi-structured interviews and surveys. These newly identified stakeholders were then added to the list and included in subsequent rounds of data collection. This method is visualized in Figure 2.

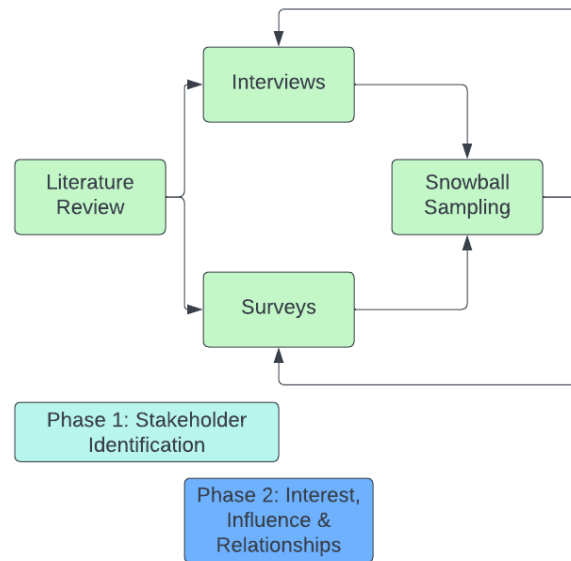


Figure 2. Conceptual model of the data collection process

Stakeholders from the preliminary list, constructed from secondary sources, were approached with interview requests. Our aim was to collect data from a near-equal number of stakeholders from each category. The final sample of interviewees is shown in Table 1, including the codes that will be used in this report for referencing. It is not a perfect representative sample of the population, due to difficulties in contacting and scheduling with the appropriate spokespeople for specific stakeholder groups, such as policymakers. During the interviews, which lasted between 30-60 minutes, the same interview guide was followed to ensure consistency in data collection. This guide was used for different stakeholder groups to ensure the replicability of the data. The interviews were conducted in Dutch and English and were recorded with consent. Transcriptions were translated and are provided in English. These interviews were conducted via videoconferencing software, due to their cost-effectiveness and time-efficiency (Archibald, Ambagstheer & Casey, 2019). The interviews were semi-structured, which allowed for the interviewer to steer the conversation into a relevant direction (Harrell & Bradley, 2009). Ethical requirements are considered at multiple stages in the interview process. Beforehand, interview participants were asked full consent for recording and the option was always given to withdraw information at a later stage. It was emphasized that participation in the interview process was completely voluntary. To protect sensitive data, interviewees were assured that collected data stayed confidential and that any research results were made anonymous to make sure it could not be traced back to the source. It was attempted to avoid interview bias by maintaining a neutral stance during the interviews.

Table 1. Sample of interviewees

Stakeholders involved in the Dutch potato industry	Number of interviews	Reference code in report
Genetics, plant breeding and seed production	5	VC1-5
Civil Society	3	CS1-3
National governing institution	1	NG1
Water board	1	WB1
Public research institution	2	PR1-2
Public-private partnership	1	PPP1
Total	13	

In order to enhance the sample size and increase the amount of data collected, a survey was created using the interview guide. The survey maintained the exact question format and order as the interview guide and was available in both English and Dutch to enhance accessibility. By quantifying and restating the perspectives of the same stakeholder groups, the survey can be employed as a triangulation of results. An alignment of the qualitative and quantitative results would enhance the survey's validation. The survey was designed to be effective by minimizing bias, being appropriate and cost-effective, and aligning with the principles of survey research. (Kitchenham & Pfleeger, 2002). The survey was sent to all stakeholders approached for an interview throughout the process who had not responded to the initial interview request. New stakeholders identified during snowball sampling were offered the choice of an interview (n=13) or completing the survey (n=3).

To organize stakeholders within the Dutch potato industry, we utilized an inductive taxonomic approach that was tailored to this specific industry. This approach ensures that it is aligned with both theory and practice and allows for a bottom-up, inclusive process. The inductive taxonomic approach involved starting with the data and identifying emerging patterns, themes, and categories rather than relying on a pre-existing theoretical framework. By using this approach, we were able to limit and define the choices available to stakeholders when mapping their interests, influences, and relationships, rather than asking them to describe and organize available stakeholders. This approach ensured that the validation phase of the interviews progressed quickly and efficiently while also promoting comparability since the snowball sampling method resulted in continuous updating of stakeholder categories and groups throughout the process. Finally, the time and research constraints of this research led us to decide to aim for providing a more general overview of the sector and its stakeholder groups, instead of mapping the characteristics of all individual stakeholders. Future research could expand upon this by gathering data on all individual stakeholders. The stakeholders were divided amongst 6 categories and 17 sub-groups. These groups each encompass several individual stakeholders, or 'actors'. These categories and groups are found in Table 2.

Table 2. Categories and stakeholder groups

Category	Stakeholder groups		
Value chain	Genetics, breeding and seed production	Potato production	Processing (logistics, transport and packaging)
	Trade and wholesale	Retail and marketing	Consumers
Government institutions	Regulatory bodies	Water boards	Municipal government
	Provincial government	National government	International government
Civil society	Advocacy groups		
Research institutions	Public research institutions	Private research institutions	
Financial institutions & funds	Public financing institutions & funds	Private financing institutions	
Public-private partnerships			

Normative methods were used to address research questions 2, 3 and 4 by gauging relative interest in the issue or industry in question, interests in a particular outcome for that issue or industry, influence or power over the industry, and for mapping the relationships between the stakeholder groups. In order to capture interest and influence levels, the individual stakeholders were asked to score the stakeholder categories and groups on their level of interest and influence in the industry. This was done to capture internal perspectives of the balance of power among the actors in the industry (Bryson 2003; Eden and Ackermann 2011). A comparative score of 1-8 (1=lowers, 8=highest) was granted by the interviewee for each stakeholder group or category. Subsequently, those scores were categorized over a set of qualitative variables over a eight-point likert scale as shown in Figure 3.

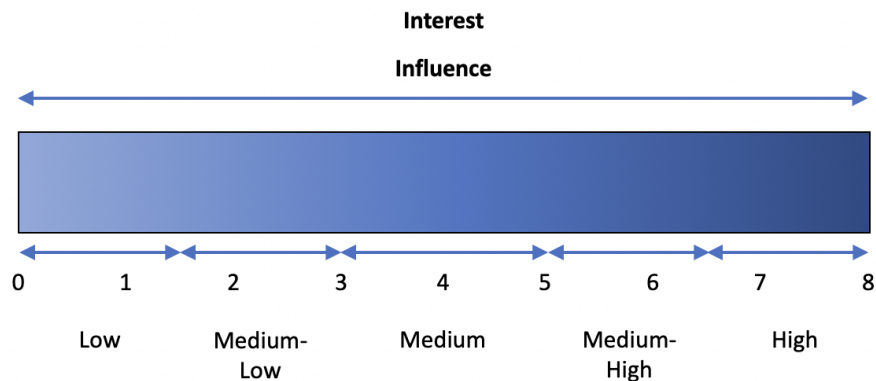


Figure 3. Eight-point likert scale used for interest and influence score

This also allowed the interviewer to assign scores for qualitative answers given. The interest-influence scores stakeholders gave during the interviews and within the survey were compiled into an anonymised tracking document for quantitative, descriptive analysis. In order to maximize relative comparability, the interest and influence scores were normalized following the formula in Figure 4, where Z represents the z-score, or normalized score, x is the observed data-point, μ represents the sample mean and σ represents the sample's standard deviation.

$$Z = \frac{x - \mu}{\sigma}$$

Figure 4. Normalization formula

Finally, stakeholders were asked about the strength of the relationship they or their organization has with the other stakeholder groups or categories. Stakeholders were instructed to indicate relationships according to strength (weak, medium and strong) and whether they were opposing or supporting. An opposing relationship was defined to interviewees as a measure of how much their organization works against the specific stakeholder in question (e.g., “how opposed are your goals?”). A supporting relationship was defined as a measure of how much they or their organization works with or support the other stakeholder in question (e.g., “how aligned are your goals?”). Stakeholders did not score their own group, as a stakeholder’s impact on itself may not be meaningfully measurable (Mabrouk, Sperandio & Girard 2014).

In order to answer research questions 5 & 6, the interviews were subjected to qualitative analysis through coding. The codebook for the analysis was generated using a theory-driven deductive (DeCuir et al., 2011) coding approach. This was first used to build code categories that emerged during the data collection phase, therefore ensuring that there were codes for emerging themes, ensuring data relevant to the research questions were tagged for analysis. The deductive approach allows for a more detailed analysis of the data, but is inherently rigid and may therefore overlook themes and narratives that arise organically from stakeholders during the interview process (Braun & Clarke, 2006). During the data analysis process, we applied a secondary in-vivo coding method to establish codes based on the words used by the interview subjects. This approach ensured that the research remained grounded in the voices of the subjects. By creating codes directly from the language used by the interviewees, we were able to better understand the industry's current challenges and relationships from the stakeholders' perspectives. This approach aligns with the principles of Saldaña (2021) and helped us gain valuable insights into the experiences of the stakeholders. Generating codes from the raw data in the interview transcriptions also ensured that strict adherence to the pre-existing coding framework or the researchers' analytic preconceptions did not preclude new insights into the data (Braun & Clarke, 2006). In-vivo codes were tagged as such as they were added to the codebook. The codes were applied to the interview transcripts using the software Atlas.ti. Once coded, interviews were analyzed to investigate emerging narratives and themes.

2.2 Limitations

Although our aim was to collect data from a near-equal number of stakeholders from each category, the reality is that not all sectors are equally represented in our sample. Specifically, farmers, processing, trade, and retail sectors were not included due to unresponsiveness towards interview or survey requests, despite multiple attempts to contact them. The lack of farmer response may be due to the timing of the research, overlap with harvest season, or language barriers. In the future, efforts should be made to mitigate these issues and incorporate the voices of farmers as much as possible. Additionally, policymakers and research institutions were under-represented in our sample, and some stakeholder categories had only one representative. The lack of complete stakeholder representativeness and the limited sample size may lead to biased or incomplete conclusions. The missing stakeholders' perspectives and interests may not be fully represented, leading to a skewed understanding of the issue at hand. The absence of certain stakeholders may also result in limited diversity of perspectives, potentially leading to groupthink or a narrow set of recommendations. Furthermore, excluding certain stakeholders can limit the practicality and feasibility of proposed solutions, as they may not be fully aligned with the needs and realities of all actors in the system. To address the problem of missing stakeholders, we recommend increasing the overall response rate by using multiple recruitment strategies, such as follow-up emails, phone calls, or personal visits, and diversifying the methods of data collection to reach a wider range of stakeholders. Additionally, researchers could collaborate with local organizations or institutions that have established relationships with the missing stakeholder groups to increase participation. It is important to recognize that industries are constantly evolving, and our report provides a snapshot of the industry's current state and context.

While our study provides valuable insights into the power dynamics among the interviewees, we acknowledge that our ability to assess invisible power relations was limited. Specifically, we did not have access to financial records or interviews from other parties who could assess each other's relationships, which could have provided a more comprehensive understanding of power dynamics. Therefore, we recommend that future studies using this methodology should incorporate these additional data sources to gain a more complete understanding of power dynamics. We also acknowledge that our methodology involved assigning interest and influence scores to each interviewee based on our interpretation of their statements, which may be subjective. While we took steps to minimize researcher bias, such as having multiple researchers co-review and code the interviews, some degree of subjectivity in assigning these scores cannot be completely avoided. Therefore, readers should interpret our results with this limitation in mind. To minimize researcher bias in assigning interest and influence scores, we recommend having multiple researchers co-review and code the interviews, and conducting sensitivity analyses to assess the robustness of our findings to different scoring methodologies. Lastly, we note that our study was conducted on a specific population and may not be generalizable to other contexts. Therefore, caution should be exercised when applying our findings to other settings or populations.

3. Results

This section presents the results of a content analysis of the interviews and surveys conducted amongst stakeholders in the Dutch potato industry. The stakeholders who either participated in an interview or completed the survey will hereafter be referred to as ‘participants.’

All participants are either representatives of individual stakeholders or stakeholder groups included in the stakeholder list (Annexes A until E). Hence, their responses provide valuable insights into the current state of the Dutch potato industry and the perceived balance of power and relationships between the respective stakeholders and stakeholder groups. Their insights are presented below.

3.1 Stakeholder list

To answer the first research question, all participants were presented with a list of stakeholder groups (Table 1) either during the interview or within the questionnaire. Thereafter, the stakeholders were asked to validate whether this list of groups accurately represented a taxonomic classification for public, private, civil society and hybrid actors of the Dutch potato industry. Next, the stakeholders were asked to provide specific stakeholders within these categories. Additionally, a literature review was conducted to supplement the stakeholder list. The full list of identified stakeholders classified according to this approach can be found in Annexes A until E.

3.1.1 Potato value chain

For the potato value chain, the plethora of small family owned farms, solely focusing on harvesting potatoes were omitted. There are an estimated 11,700 potato growers in the Netherlands (NAO, 2007). Listing these all individually would be infeasible for the scope and aim of this report. Therefore we focused on small and medium enterprises (SMEs), as stated in the EU’s definition of SMEs (European Commission, 2003). Additionally, individual stakeholders situated in retail and the demand side of the value chain (supermarkets, restaurants, street retailers and consumers) are omitted from Annex A, as these actors exist in large numbers as well and potatoes are not a priority of their business operations. Identifying these falls outside the scope and aim of this report following the same reasoning as for the individual producing stakeholders.

Taking into account the exclusion criteria for individual stakeholders mentioned above, a sample of 67 stakeholders was identified for the Dutch potato value chain. Table 1 shows that a significant proportion of actors operated in multiple levels of the value chain. Only 31.3% of actors exclusively focused on one aspect of the value chain, while 29.9% focused on two aspects. On the other hand, 38.8% of actors operated in three or more aspects of the value chain. A representative example of a firm that is active across levels of the value chain is HZPC. Their operations are grounded in, but not exclusive to: breeding, farming, trade and marketing. Through being active across multiple levels, according to HZPC’s mission statement, they "inspire the potato value chain worldwide by delivering innovative products and services" (HZPC, 2022). According to the data presented in this report, Dutch stakeholders active in the

potato value chain are generally characterized by their involvement across the value chain. A leading example of a firm that is solely focused on one aspect in the value chain and through years of experience, mastered it, is Rijk Zwaan Zaadteelt en Zaadhandel B.V., specialized in breeding and seed production. With a market share of 9%, Rijk Zwaan is the number four vegetable breeding company worldwide. A substantial number of Dutch actors were found to have considerable positions and shares within their segment of the global potato market. This is no surprise when considering both the relative intra- and extra-EU trade value share of the Netherlands (Eurostat, 2020).

Next, we look at the distribution of the actors across the value chain categories (see Figure 5). The total number of actors from this graph will exceed the sample of n=67. A relatively high share of the actors are active in trade and wholesale (69%), whereas retail and marketing only was represented by a relatively low number of the stakeholders in our sample (25%). It was noticeable that a lot of actors that are active in processing, focused on the processing of potatoes into starch or frozen potato products (e.g. french fries, croquettes and rösti). This is not surprising, as in this sector, the Netherlands holds a significant European market share. Of the total EU produced frozen potato products, approximately one-third came from Dutch manufacturers, valued at nearly 1.3 billion euros annually (CBS, 2016). One example of a firm that specializes in adding value across the chain by processing potatoes into frozen products is Lambweston. They are one of the world’s largest processors of potato products. Their headquarters are located in the United States, but hold 4 processing facilities located in the Netherlands. This is characteristic for the globalized character of the Dutch potato sector. A substantial number of actors focus on processing and trade in potato starch. The export value of potato starch was 150 million euros in 2021 (Statista, 2021). One example of a specialized company in this market segment is Avebe. Furthermore, a small number of actors are active in saline agriculture. One such example is Wadzilt BV, a company that grows herbs and vegetables, including potatoes in saline conditions.

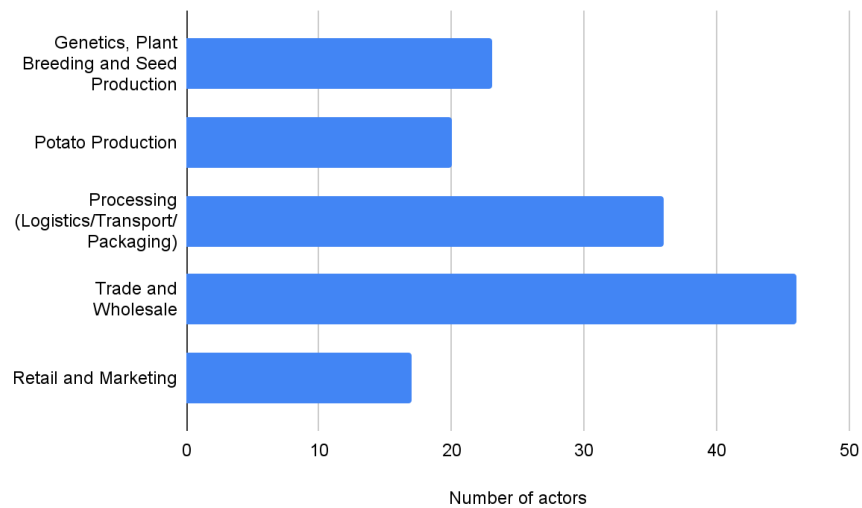


Figure 5. Number of actors active per category of the value chain

3.1.2 Government institutions

The list of stakeholder of national and international government institutions active within the Dutch potato sector can be found in Annex B. The stakeholders have been divided over the categories presented in Table 1: regulatory bodies, waterboards, provincial and municipal governing bodies, the national government, and international governing institutions

The regulatory bodies that were identified by the stakeholders consisted of the NAK (Dutch general inspection service for seed and propagating material of agricultural crops), that are responsible for carrying out statutory inspections on behalf of and under the supervision of the Ministry of Agriculture, Nature and Food Quality (NAK, 2022). The NAK has a high-tech laboratory where large-scale post-testing of seed potatoes is carried out by applying molecular research techniques. Furthermore, the Netherlands Food and Consumer Product Safety Authority (NVWA) was identified, which monitors animal and plant health, animal welfare, and the safety of food and consumer products, and enforces nature legislation (NVWA, 2022). The NVWA is an independent agency in the Ministry of Agriculture, Nature and Food Quality and a delivery agency for the Ministry of Health, Welfare and Sport. Both of these ministries are part of the national government institutions that are responsible for laws and regulations that affect the Dutch potato industry. The ministry's self-proclaimed mission states *"We work with all stakeholders to restore and maintain natural areas and aim to consolidate the agriculture sector's leading international position, strengthen the link between nature and agriculture, and improve farmers' economic situation"* (LNV, 2022). The Ministry of Foreign Affairs, Ministry of Economic Affairs and Climate, and its subsidiary, Netherlands Enterprise Agency (RVO), were identified as important national government institutions for strengthening the international competitive position of the Dutch potato, the sustainable economic development of the sector and creating a strong entrepreneurial business climate.

The Dutch water boards are a fairly unique type of regional governing body. Water boards are independent of administrative governing bodies like provinces and municipalities. Their responsibilities include: managing rivers and canals, drainage issues, flood and erosion prevention. They manage polder systems, water levels, water barriers and locks, and water quality, amongst other things. Some of these tasks and responsibilities are highly relevant for agriculture and the potato sector in particular, especially with regards to hydroclimatic events (e.g. droughts) and the effects thereof (e.g. salinisation). Further regional governing bodies that were identified consisted of provincial and municipal government institutions. Not all of these have a comparative stake in the Dutch potato sector. For the provinces, in terms of potato production in absolute numbers, Drenthe is the top producing region. As of 2012, the production in Drenthe was 1,194,000 tonnes, which accounted for 17.65% of Netherlands' potatoes production (Knoema, 2012). The 5 provinces with the highest potato production (Drenthe, Groningen, Flevoland, Noord-Brabant, and Zeeland) account for 70.23% of the total national production (Knoema, 2012). The Netherlands' total production was estimated at 6,766,000 tonnes in 2012 (Knoema, 2012).

A substantial number of international governing institutions were identified. Especially those related to soil and salinity management. Naturally, the European Union has a big effect on the industry through EU

agricultural policy; this effect includes themes of food quality, traceability, trade and promotion of EU farm products (European Commission, 2022). Furthermore, the EU has a substantial number of active financial instruments to support European farmers and encourage sustainable and eco-friendly practices, while investing in the development of rural areas (European Commission, 2022). These will be discussed in-depth in section 3.1.5. The potato crop holds an important position in the Food and Agriculture Organization of the United Nations' (FAO) global food security strategy. Dr. Qu Dongyu, Director-General of the FAO stated during the 11th World Potato Congress in May, 2022, in Dublin: *"Potato will become one of the advantage crops in the global food security system when the yield of other cereal crops is close to the limit"* (FAO, 2022b). Subsidiary partnerships and networks launched by the FAO include the Global Soil Partnership (GSP), European Soil Partnership (ESP), Global Alliance for Climate-Smart Agriculture (GCSA), International Network of Salt-Affected Soils (INSAS) and The Global Framework on Water Scarcity in Agriculture (WASAG). These institutions and initiatives tackle the global challenges related to climate change, by adapting soil, water and salinity management strategies to different climate scenarios. These scenarios will become relevant for the Dutch agricultural and potato sector in the foreseeable future due to sea level rise, land subsidence and automic salinisation (Oude Essink et al., 2010). In order to mitigate these future scenarios, the Netherlands is involved in these FAO subsidiaries.

3.1.3 Civil Society

Excluding regional subsidiaries, there have been 21 civil society actors identified for the Dutch potato sector (see Annex C). A substantial number of these actors were identified as advocacy groups. Advocacy groups can be defined as special interest or lobbying groups that aim to influence public opinion and ultimately policy. An example of these are regional agricultural collectives, which organize agricultural landscape- and nature management efficiently and effectively. They are the link between individual farmers and the government institutions that grant subsidies. A recent example that has been getting a lot of publicity in the news is the Farmers Defense Force (FDF), a Dutch interest group for farmers founded in 2019. They have been an active group in the nitrogen crisis, defending the interests of the farmers against national regulations proposed by the ministry of agriculture, and more specifically, the minister of nitrogen.

Oxfam Novib and SNV Netherlands are examples of non-governmental organizations for development aid. One of their missions is to ensure food security for developing countries in which the potato crops could play an important role, aligning with the vision and strategy of the FAO. Foundations such as the Netherlands Food Partnership (NFP), are endorsed by the national government. Their proposed transformations are in line with the Dutch policy for Foreign Trade & Development cooperation. They accelerate initiatives led by Dutch companies and partners from low and middle income countries in order to achieve food and nutrition security. The NFP has a potato specific impact coalition, highlighting the importance of the potato crop for synergies for social, economic and ecological food dimensions between the Netherlands and low and middle income countries. Salt Farm Foundation and Stichting de Zilte Smaak are examples of Dutch civil society initiatives that already successfully grow vegetables on salt-affected soils, or with saline water.

3.1.4 Research institutions

Through interviews and literature reviews, 19 research institutions were identified that focus part of their research on the Dutch potato industry (See Annex D). In the collected sample, 47% of the institutions are public, whereas 53% are private. An example of a public research institution is Wageningen University, which specializes in life sciences with a focus on agriculture. It is a globally recognized important center for life sciences and agricultural research. Wageningen does a substantial amount of work and research on potatoes. In 2010, they established the Wageningen Potato Center (WPC), which bridges the gap between science and industry. They even design potato specific courses, such as 'Potato Sector Development for Emerging Markets'. They furthermore conduct research on plant growth models, crop rotation and genetic variation, amongst other topics. A private research institution that conducts experiments on potatoes is SPNA research, with established open field test sites. They have developed training modules on saline farming and offered workshops for farmers and regional policy makers in a transnational setting.

3.1.5 Financial institutions and funds

Annex E depicts the sample of financial institutions and funds besides individual peer-to-peer lenders, venture capitalists, angel, impact investors and national subsidies relevant for the Dutch potato industry. One interviewee mentioned an interest of venture capitalists in agricultural technology, in particular related to CRISPR technology. The sample only holds 2 private institutions, whereas it holds 8 public institutions and funds, of which 5 are EU funds. One climate fund for sustainable agriculture, by the Groenfonds, is an initiative by both private and public institutions. Rabobank and the Triodos bank are examples of private banks that lend money and invest in agriculture. However, Rabobank is marked as more of a traditional bank, whereas Triodos only invests in sustainable projects. The EU's common agricultural policy (CAP) consists of two funds. The first pillar is the agricultural guarantee fund (EAGF), which offers an income support scheme for European farmers, consisting of €270 billion for 2021-2027 and an additional €21.1 billion of the fund will be used for agricultural markets (see Figure 6). The second pillar is the European agricultural fund for rural development (EAFRD) totalling €95.5 billion for 2021-2027. This includes €8.1 billion for the next generation EU injection to help address the challenges posed by the COVID-19 pandemic of which 30% will be available in 2021 and 70% in 2022. (see Figure 6).

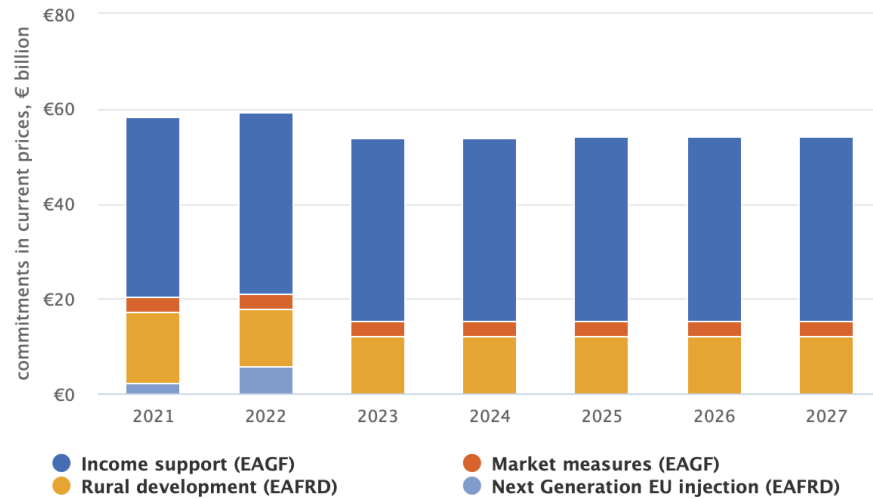


Figure 6. CAP allocations, 2021-27 (European Commission, 2022)

3.1.6 Public-private partnerships

In addition to the stakeholders presented in the annexes, two public-private partnerships came forward in the interviews. The first is SeedNL, which supports food security while promoting innovations that enable sustainable seed sector transformation. They mobilize knowledge and expertise for tangible contributions through partnerships towards the Sustainable Development Goals. Three parties established SeedNL: the Ministry of Agriculture, Ministry of Foreign Affairs, and Plantum, a private Dutch branch association for planting materials. The second is the Task force Agricultural Water Management (DAW), where agricultural entrepreneurs, public bodies and water managers work closely together on the water challenges of farmers.

3.2 Influence and interest

To answer the second research question: *‘To what extent are stakeholder groups of the Dutch potato industry interested in the sector?’*, and the third: *‘To what extent do stakeholder groups of the Dutch potato industry hold influence over the sector?’*, participants were asked to rank other individual stakeholders and stakeholder groups on an interest-influence matrix regarding their level of interest and influence respectively in and on the Dutch potato industry and provide arguments for their scores. When reflecting on these results, it is important to keep in mind that this data represents the *perceived reality* of each stakeholder group. While this may differ from the objective, measurable reality of interest and influence, the perceived reality is still important to understand. Stakeholder perceptions help the researcher to understand the social dynamics within the industry, to identify the stakeholders whose “buy-in” is needed, and the interests and power bases that must be considered and accounted for when trying to introduce changes such as saline agricultural practices (Bryson, 2003).

3.2.1 Value chain

The interviews reveal several themes with regard to the interest and influence each stakeholder group is perceived as holding within the Dutch potato industry. First and foremost, the interviews were characterized by contrasting stakeholder scores, revealing a lack of consensus on which group holds the most power within the potato supply chain.

While farmers and potato production companies are broadly agreed to be central to the industry, participants disagree how much direct power they hold. One civil society participant argued that producer interest is high because potatoes are a significant part of their annual yield (CS2), while a participant from a research institute credited that interest to the large amount of money they have taken as a loan to invest in potato production (PR1). In contrast, a member of the genetics, plant breeding, and seed production stakeholder group argued that because potatoes are only one of many crops a producer grows in a year, they have limited interest in this industry specifically (VC4). A second civil society participant argued that producers have indirect influence over the supply chain. This participant discussed how farmers are independent and make their own choices about which varieties to grow each year, while also making those selections at the direction of large companies; simultaneously, they described that those companies must convince a sufficient number of farmers to grow specific products to meet their demand (CS2). Hence it can be concluded that while farmers do the central, vital task of growing the potatoes themselves, they hold little direct power over the industry at large.

Amongst participants there is no consensus on the level of interest, influence, or impact that consumers hold over the market. No participant disputes that demand shapes the market, and sets prices, but there was disagreement between the stakeholder groups about how much of this demand, and therefore power, sits with the consumer. Consumers are not viewed as having a nuanced understanding of potatoes, with little to no recognition of the different varieties on the market - or, in the words of one participant, have a "potato is a potato" attitude (PPP1, VC1+2, CS2). Therefore, while some participants viewed the consumer as "totally determining... what the industry looks like" (PR1), others viewed them as having very little influence on the direction of the market in terms of the varieties and traits being researched and grown because as long as consumers are able to purchase potatoes they are satisfied (CS2). Ultimately, as potatoes are a commodity with high substitution options and ample competition, they are therefore relatively inelastic in price. Therefore, it does indeed seem that the demand of consumers holds little sway over the market.

The largest consensus on the question of both interest and influence within the potato supply chain was that retailers - and in particular, supermarkets - hold a large amount of power over the Dutch potato industry. This view was expressed by participants from four different stakeholder groups (Policymakers, Public-Private Partnerships, the Potato Supply Chain, and Civil Society). Supermarkets were specifically mentioned as having "big power" (NG1), and a level of influence so high that they set the direction of the industry (VC1, CS2). One participant described supermarkets as having a monopoly on the Dutch potato industry, and therefore able to make significant changes to the market such as price setting (PPP1). Another participant explained this monopoly as resulting from supermarkets' preferences to

have only one or two suppliers for all of their vegetable, fruit and potato products, with the role of supplier being very difficult to obtain (CS2). One expression of this monopoly is that retailers “only put like three or four types of potatoes in supermarkets” (interview 4). This poses another barrier to entry for new potato varieties, such as newer, more salt-tolerant ones - if they are not chosen by supermarkets, or are not produced by one of the few, select suppliers, it will be difficult to prove these varieties can be profitable.

This power is amplified further by the international connections present in the industry. If Dutch producers set their prices too high, a governing institution participant argued, supermarkets “can always default elsewhere” to purchase potatoes and potato products (NG1). This imbalance of power, and the resulting pressure on producers to keep their prices low, was also reported in non-Dutch potato industries. One participant, whose genetics, plant breeding and seed production organization works in strengthening small potato markets in other countries, described the lack of storage facilities, and the narrow window of time producers have to sell their product before it rots, as the driving factor of this imbalance (VC1). This suggests that the balance of power within the global potato supply chain rests largely with the retailers; they have the advantage of time and many options when it comes to negotiating prices with individual producers who must sell their product relatively quickly to avoid financial losses.

3.2.2 Government institutions

The overarching theme regarding the interest and influence of government institutions is that, while powerful in their ability to influence the potato industry, they do not have much interest in it. Specifically, they are not perceived as being interested in accurately understanding the nuance of the industry even as they regulate it. Policymakers are neither perceived as being interested in the potato industry (VC2), nor focused on industry-relevant issues like saline agriculture (PR1); rather, their focus is on large-scale agricultural changes, such as the European Green Deal (PR1). Policymakers are able to exert their influence over the issues they are interested in through regulation and funding or subsidies. For example, a participant from the policymaker group identified the Ministry for Agriculture as a stakeholder who might be able to change the behavior of supermarkets using regulation (NG1). However, that influence may not be evenly distributed. While participants from the public-private partnership group do see the Dutch government spending significant funds on agriculture and seed development, they feel most of that interest and influence is focused on developing countries (PPP1).

Furthermore, participants from multiple stakeholder groups reported a definitive hierarchy of influence amongst policymakers: the European Union sets the policy agenda, the national government follows it, and the provinces, and finally the municipality executes it (NG1, VC2, CS2). When lower levels of policymakers, whose interest may be greater than those above them, attempt to implement their own “take” on policies, they are often overruled. This is seen as true for provinces being overruled by the national government (VC2) as it is for the Dutch government being overruled by the European Union (CS2). In the words of one civil society participant: “The European law is also the Dutch law. And we have some influence before that’s a law, but we are a small country” (CS2). This parallels the sentiment

expressed by members of the potato supply chain about policymakers - that their more specific expertise is being overridden by others with more influence to the detriment of stakeholders in the Dutch industry.

3.2.3 Civil Society

Participants from all stakeholder groups perceived civil society stakeholders to have a high level of interest in the potato industry, but relatively low influence over and within it (Figure 8, 9). Civil society actors such as advocacy groups are connected with other stakeholder groups. A participant from a research institution gave the example of Land- en Tuinbouw Organisatie Nederland (LTO), which that individual viewed as playing an important role in the industry by speaking for farmers (PR1). However, participants from all groups generally perceived policymakers as not listening to or involving civil society groups in their decision-making process unless they are publically pressured. As an example of the sort of pressure policymakers are responsive to, a participant from a governance institution stated that the scale of the 2019-2022 farmer nitrogen protests necessitated a policy response from the Ministerie van Landbouw, Natuur en Voedselkwaliteit (NG1). Many of the civil society stakeholders identified by this research are groups focused on supporting saline agriculture efforts or the potato industry in countries outside of the Netherlands. This aligns with the concerns participants expressed about governing institutions - that these issues are viewed as problems that must be solved for other countries, and do not pose a threat domestically.

3.2.4 Research institutions

When asked for their opinions on the research institutions of the Netherlands, participants from all stakeholder groups expressed high levels of regard for their knowledge and expertise. Universities in particular were perceived to have one of the highest levels of interest in the industry, on par with production and retail groups within the potato value chain. As research institutions' work requires data from the land, they reported closer connections with farmers than other stakeholders outside of the potato value chain (NG1). Their perceived influence on the industry comes from the central role their research plays in discovering and testing new varieties; stakeholders from other groups overwhelmingly spoke of this research as happening within or in partnership with research institutions (PPP1, CS2). However, the influence of this research is limited by the funding requirements and sources of universities. Research institutions require funding to be interested in specific projects or industries (CS2). When that funding comes from private sources, other stakeholders in the industry do not feel the resulting knowledge is accessible - a barrier that can hinder their adoption of new technology or varieties (VC2).

Consultants, the other stakeholders within the Knowledge and Education group, were viewed as a less useful, but still necessary, piece of the larger industry who mostly give advice on selecting product varieties (CS2).

3.2.5 Financial institutions & funds

During an interview with a prominent financial industry expert (PR2), we gained insight into the two categories of financial institutions: private investors, such as banks, and public investors, including government funds and non-profit organizations. The latter group invests in public projects, programs, or initiatives with the primary objective of promoting social welfare or addressing specific societal needs. Unlike for-profit investors, non-profit public investors do not prioritize financial returns on their investments. Private institutions are seen as holding a huge influence over the industry, especially on farmers, who have the most precarious financial position within the industry (CS2). This precarious position, the expert explained, is because Farmers are the ones who absorb the largest financial costs when “something goes wrong” elsewhere in the supply chain (PR1). Private investors such as banks may have special loan programs farmers can apply for, or they may finance new research and business ventures within the industry (PR2). Other actors are also influenced through funding - for example, civil society and genetics, plant breeding and seed production participants viewed financing sources as having a significant impact on the direction of research and the accessibility of research findings (VC2, CS2).

Public funds are the primary vehicle for policymaker influence, especially funds from the European Union. Civil society participants reported that many farmers are supported by EU funds (CS2), and therefore more inclined or obliged to follow any requirements or standards that come with these funds. This influence is magnified by the EU’s leadership role - a public-private partnership participant observed that when the EU grants funding for certain projects, other sources of funding for the same or similar issues are likely to follow (PPP1). As a result, funding may be more accessible if it is linked to an issue of high priority for the EU; one research institution participant recommended increasing both public and private funding for saline agriculture projects by framing it as a climate change adaptation (PR2).

3.2.6 Quantitative scoring

First and foremost, it is important to note that the sample size used in this study is relatively small, which can pose risks when drawing conclusions from the data. This is especially true with quantitative data, where small sample sizes can lead to a lack of statistical power and increased sampling error. The results may not be generalizable to the broader population, and there may be a higher risk of bias due to unobserved factors. Therefore, caution should be exercised when interpreting the results, and the limitations of the study should be acknowledged. Despite these limitations, the study provides valuable insights into the characteristics of actors in the Dutch potato industry, and the findings can be used to inform future research and policy decisions.

In Addition to the arguments regarding the respective interest and influence that stakeholders hold over the Dutch potato industry, interviewees were asked to assign quantitative scores for both these factors, as highlighted in the methods section. The results are presented below. The relative differences between interest and influence obtained from the scores of the eight-point likert scale are presented in Figure 7. These include responses from the surveys, hence n=16. A score > 0 represents an interest higher than

the influence and a score < 0 vice versa. Farmers and advocacy groups are clear outliers in terms of higher perceived interest than influence, whereas national and international government institutions are perceived to have a relatively higher influence than interest in the Dutch potato sector.

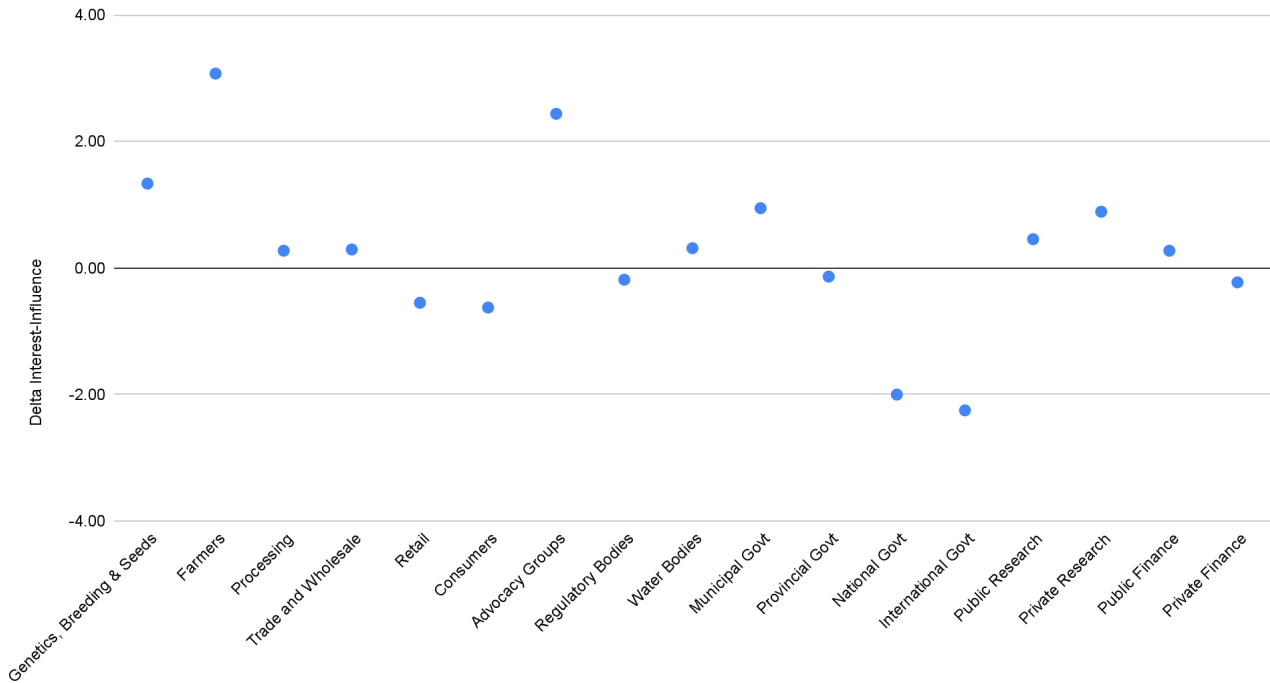


Figure 7. Relative differences of interest-influence scores

The results gathered from the eight-point likert scale were all on the high end of the scoring spectrum. Therefore, the scores have been standardized to highlight relative differences. These scores for the categories and stakeholder groups can be found in Figure 8 and 9, respectively. When looking at the standardized interest-influence scores by stakeholder category (Figure 8), it is notable that the potato value chain is the only category that has both perceived positive interest and influence by other stakeholder groups. While civil society’s perceived interest is almost as high as the value chain’s, it lacks the corresponding level of perceived influence. In an inverse of the civil society scores, government institutions have high perceived influence but low interest amongst the interviewees. If looked more closely at the stakeholder groups, farmers and consumers are observed to have substantially less observed influence over the Dutch potato sector compared to other stakeholder groups of the value chain. All stakeholder groups of the value chain are found to have a relatively high interest, except for consumers, who are found to not have a particular high interest in potatoes, as this crop is seen as a commodity. Advocacy groups are found to have a relatively high perceived interest, but a low perceived influence, which is remarkable as their end goal is to ultimately influence policy. All government institutions were perceived to have a low interest in the Dutch potato sector, whereas only national and international government institutions are found to have a relatively high perceived influence. Public

research institutions hold both a high perceived interest and influence, while private research institutions hold relatively low scores for both factors. Both public and private financial institutions were perceived to hold low scores for both influence and interest.

The quantitative results align with the qualitative findings, suggesting internal validation of the data and affirming the survey's value as a triangulation of results. The findings reinforce the idea that government institutions hold significant influence but are not perceived as interested in the industry. It is intriguing that financial institutions were considered to have lower influence despite some participants attributing significant weight to their funding in shaping the industry. Additionally, it is worth noting that although stakeholders described themselves as reactive to the industry's direction, the value chain emerged as a leader due to its high scores.



Figure 8. Standardized Interest-Influence Score by Stakeholder Categories

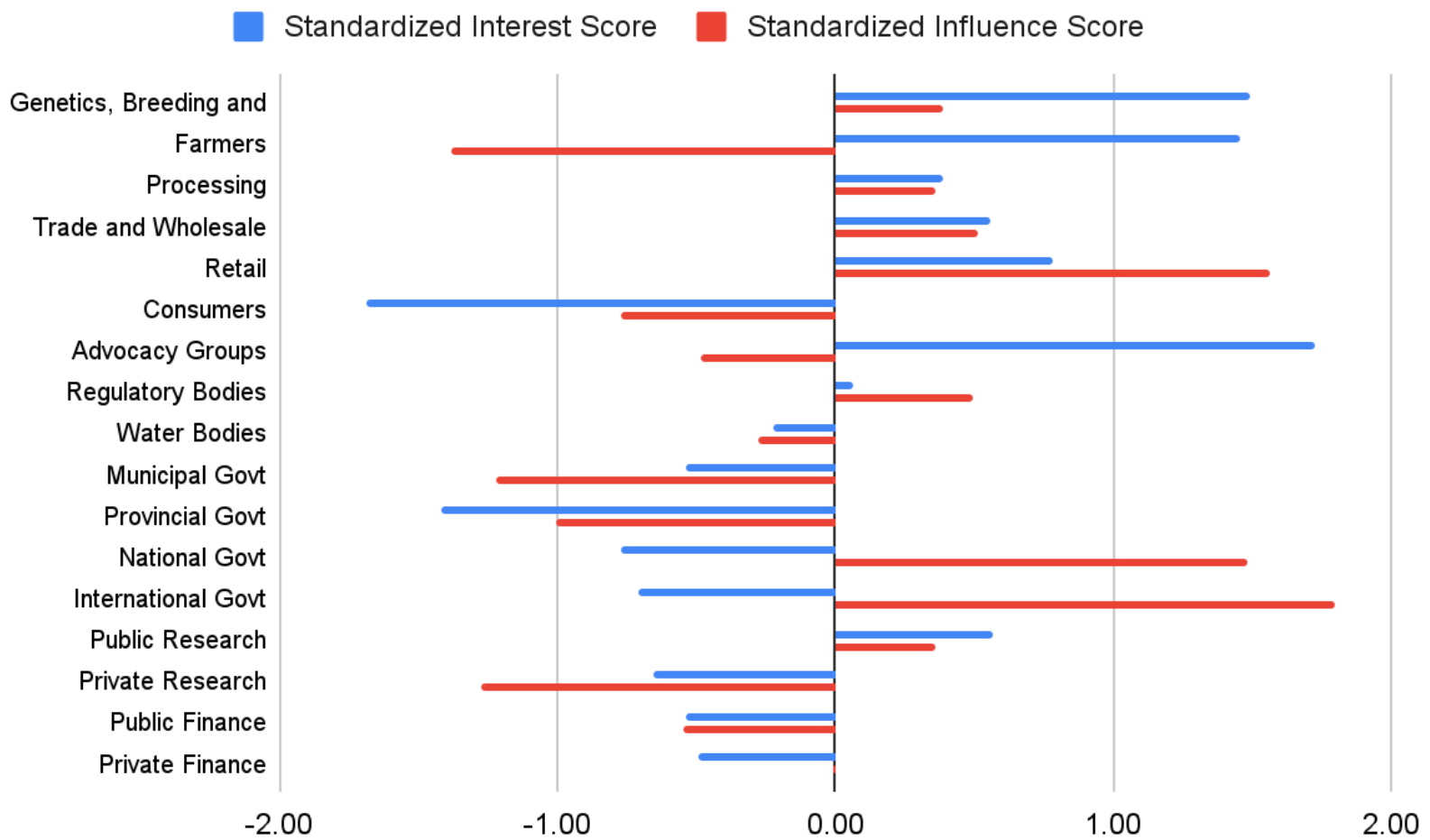


Figure 9. Standardized Interest-Influence Score by Stakeholder Groups

3.3 Relationships

To answer the fourth research question: *'What are the relationships between stakeholder groups of the Dutch potato industry?'*, participants were asked to assess the strength of their relationship to other stakeholder groups, and whether or not these relationships were supportive or if their positions in the industry are oppositional to one another, with regard to their respective goals. An overview of the results gathered from the interview can be found in Table 3, yielding several insights into the relationship dynamics of the industry. Themes that arose following these interviews will be discussed thereafter.

A central and recurring observation was the strong connections between national stakeholders in the Netherlands and foreign actors, distributed globally. Participants confirmed that the majority of the annual Dutch yield is destined for international export. International demand is a large driver for the production quantities and the varieties chosen (PR1, VC2). This aligns with the findings regarding the distribution of actors across the value chain presented under 3.1.1, highlighting a strong presence of actors in the trade and wholesale domain.

Salt-tolerant varieties were mentioned as being mostly developed in the Netherlands for demand from more arid countries, with no mention of domestic use (PPP1, PR2, CS2). Supermarkets, in particular, were described as being able to maintain their position of power relative to other domestic stakeholders by procuring supply from outside of the Netherlands rather than from Dutch producers (CS2). This connection was also viewed as extending to Dutch research organizations participating in agricultural research with many international partners (CS2), and international stakeholders such as development organizations, embassies, and both Dutch and international Ministries of Foreign Affairs and Economic Affairs being named as key players for ensuring Dutch potato products reach their intended markets (VC1).

This Dutch-international connection was also observed in the policymaking space by several participants. This relationship was largely portrayed as having a clear hierarchy, with much relevant Dutch policy being "of course... created in Europe", taken to mean the European Union (VC1). Several participants from the potato supply chain stakeholder group spoke of national and international policymakers as making policy decisions without understanding the day-to-day reality of stakeholders in the supply chain, or without adequately consulting their expert knowledge (NG1, PPP1, VC1). Simultaneously, participants viewed the ability of advocacy groups such as LTO to effectively lobby policymakers on behalf of the supply chain as having waned over the years (PR1). As a result, stakeholders engaged in growing both ware and seed potatoes did not appear optimistic that engaging with Dutch policymakers would result in policies more supportive of the supply chain.

Table 3. Summary of the perceived relationships between stakeholder groups

Stakeholder group	Key stakeholder connection	Relationship strength	Description of relationship	Source
Farmers	Retail	Weak (opposing)	Supermarkets have pricing power; If Dutch prices are too high the buyers will default to other EU countries.	NG1
	Genetics, breeding and seed production	Strong (supporting)	Strong cooperation; Farmers can be directly engaged with seed production through co-ops and even be employed by seed breeding companies.	VC1+3
	National government	Weak (mixed)	Power lies with the national government; Collectively, the farmers do hold power in decision making; Very limited cooperation between the two parties; Regulations are restrictive; Salinity not included in decision making; Government controls production rates. Some ministries are well aligned with the interests of the sector (economic affairs, embassies); Good support with regard to trade, business development and economic aspects.	NG1, PPP1, VC1+2, CS2
	Provincial government	Weak (opposing)	Do not see eye to eye due to opposing agendas; Green transition course of the province is not supported by a substantial number of farmers.	WB1
	Water boards	Strong (supporting)	Water boards 'problem-solve' for farmers; Potato farmers are not dependent on water supply, but are on water and soil management (against salinisation).	WB1
	Civil society	Strong (mixed)	Civil Society distributes knowledge; Raises awareness for sector issues; Not all farmers see the value of this and agree to the discourse of civil society actors.	NG1
	Research institutions	Weak (mixed)	Farmers' wishes are taken into account; Results are insightful for farmers; Some are critical of the theoretical focus of the research and advocate for it to be more grounded in practice.	NG1
	Private financing	Weak (mixed)	Private investors are generally not interested in small-cap farmers; Big companies or	PR2

	institutions		collectives do get their support.	
	Public financing institutions	Medium (supporting)	Plenty of (EU) funds, but mostly for transitioning to 'climate-smart' agriculture.	PR2
	Public-private partnerships	Strong (supporting)	Advocacy in favor of farmers; Farmers are often engaged in these partnerships.	VC1
Genetics, breeding and seed production	National government	Weak (mixed)	Not much interaction; Affected by policies	VC4+5
	Civil society	Weak (supporting)	Not much interaction; But collaboration is perceived positively when it occurs.	VC3+4
	Public research institutions	Strong (supporting)	Plenty of fruitful cooperation and synergy with regard to research on genetics and breeding.	VC3+4+5
	Public financial institutions	Medium (supporting)	Some public funds are available, but mostly for projects of a substantial size and impact.	VC3+4+5
Consumers	Retail	Weak (mixed)	Creates demand; Steers markets towards biological products; Lack of nuance in consumer understanding of different product aspects, like true pricing; Lack of direct contact between the value chain, including farmers, and consumers.	NG1, PPP1, VC2, CS2
Government institutions	Public research institutions	Strong (mixed)	Different levels of government decide (part of) the research agenda; Reciprocally, research steers policy.	NG1
	Public financial institutions	Strong (supporting)	Connects international (EU) investments with secondary stakeholders to support their projects; EU funds LNV in order to reach international targets.	NG1, PR2
Water boards	Public research institutions	Strong (supporting)	Collaboration on various projects regarding salinisation: 'Boeren meten water' and 'Zoet-zout knooppunt'	WB1
	Province	Medium (mixed)	Partnerships and projects for improving soil and water quality; Sometimes unequal investment of resources between the two parties; Provinces are currently focusing more on nitrogen, while problems stretch much wider; Province has a 'black and white vision' on environmental, economic and social challenges	WB1
Research	Civil Society	Strong	Knowledge exchange fundamental and	PPP1, CS3

institutions		(supporting)	reciprocal.	
	Public-private partnerships	Strong (mixed)	Applied universities are grounded in practice and closely connected to society; Theoretical universities focus on theoretical problems that are perceived to not exist by other parties.	VC1

3.4 Industry barriers and opportunities

Respondents were tasked with addressing the fifth research query: *‘What barriers and opportunities does the industry confront in embracing change?’*. According to the qualitative analysis, the most significant obstacle to change in the industry is a deficiency in mutual understanding. Different stakeholder groups do not perceive other groups within the industry as properly understanding what they do for the industry. Participants believe this lack of understanding comes from both consumers and policymakers and most negatively impacts the potato supply chain. The lack of understanding these stakeholders have about the internal workings of the potato supply chain prohibits or slows progress within the industry.

Consumer lack of understanding primarily presents as a lack of understanding who the stakeholders within the supply chain are, and the difference between potato varieties. Stakeholders such as seed breeding companies, who feel that they play a large role in the industry and have a significant impact on its direction, do not feel visible to customers (VC2). Retail stakeholders deliberately limit the types of potatoes they sell, as they assume customers will be confused by more than four choices (PPP1). The overall perception of participants is that as long as customers can buy a potato, they will buy whichever variety is available - sometimes without even noticing a difference between their choices (VC1, CS2).

Policymaker lack of understanding is connected to the slow pace at which the potato industry is able to adapt. One participant used the term “farmer’s generation” as a time scale of at least twenty years to describe the rate at which it is possible to breed, test, and widely produce a new potato variety (VC2). As discussed previously in this report, participants within the Potato Supply Chain distrust policymakers at various levels as they do not feel that their knowledge of potatoes and the industry are properly accounted for in policy decisions. This sentiment is also reflected in the view that governments “think from one election to the next,” making policy decisions and goals in a time frame much shorter than that of the “farmer’s generation” (VC2).

Policymakers’ power to grant or revoke import and export permits, especially at short notice, can negatively impact the potato supply chain. Policy changes motivated by protectionism or a demand for stricter regulations may be made without policymakers understanding their impact on producers, or without communicating these changes with sufficient forewarning. This intersects negatively with the “farmers generation” pace of work, and may result in financial losses as potatoes already grown or

already planted are no longer able to be sold in specific markets (VC1). Even temporarily delaying the delivery of potato shipments to debate or review permits and regulations can result in financial losses as the product rots (VC1).

3.5 Implications of salinisation

In response to the sixth research inquiry, *'To what extent is increasing salinisation viewed as a problem or an opportunity for the industry's future?'*, the participants stress salinisation as a substantial danger to the industry, while giving minimal consideration to the potential of adaptation through saline agriculture.

One participant estimates that about 60% of potato production takes place in the northern region of the Netherlands (VC2). Producers, particularly in the Waddenzee area, are very aware of salinisation and see its presence in the area, but they are afraid of the threat it poses to their current potato crops, which are not well-adapted to higher levels of salinisation (VC2, CS2, WB1). There are fears that increased salinisation of surface water will lead to a decline in potato production (WB1), and that potatoes that are not correctly adapted to the new saline environment will become more expensive (PPP1). One participant explicitly emphasized that salinisation should only be seen as a threat to be resolved, and not an opportunity the industry should adapt to (VC2). In contrast, while policymakers are aware of salinisation in the Netherlands, participants do not perceive policymakers at any level of government as feeling it is an urgent issue (PR1). The problem of demand as it pertains to saline agriculture. Participants do not currently perceive high levels of demand for saline agricultural products or practices, and without this demand from all stakeholder groups within the industry, scaled-up adoption of saline agriculture is viewed as being unlikely (PR1).

However, some participants did view salinisation as an opportunity - though mostly in regards to the amount of seed potato varieties designed for higher salinity environments that are produced in the Netherlands to be sold abroad to countries such as Egypt and Morocco (VC2, PR2, CS2). Other opportunities mentioned were research into the sources of salinisation and how to mitigate it (WB1), and catching the attention of public investors by linking saline potato research and projects to "climate smart agriculture" (PR2). A second participant also suggested that saline potatoes could also be appealing to investors when their stronger performance in regions affected by salinity is framed as a more secure investment decision (PPP1).

The potato industry in the Netherlands faces barriers to change, primarily due to a lack of mutual understanding between stakeholders and a slow pace of adaptation. Salinisation is mostly viewed as a threat rather than an opportunity for the industry, and there is a lack of demand for saline agricultural products. These barriers negatively impact the industry and hinder its ability to adapt and progress. However, some participants did view salinisation as an opportunity, primarily in terms of the export of Dutch engineered seed potato varieties designed for higher salinity environments.

3.5.1 Food security

As mentioned previously, actors such as the FAO view potatoes as having high potential to combat food insecurity (Qu, 2022). However, the participants of this study did not strongly hold this opinion. Food security was mentioned in five interviews (NG1, PPP1, VC2+3) and only discussed in more than passing detail in two (VC2+3). This issue was exclusively mentioned in the context of the potato's ability to assist food security in other countries - specifically China and countries in central Africa. Seed potatoes, rather than ware potatoes, are viewed as the key product for addressing food hunger (VC2+3). This could be due to the limited geographical focus of this research, the Dutch national context.

3.5.2 Environmental stress

Salinisation was the most-mentioned environmental stress across all interviews, discussed by participants from each stakeholder group (PR1+2, PPP1, VC2, CS2, WB1). However, it was not perceived as an urgent issue, or the most pressing issue facing the industry today. Adapting the industry to salinisation was mentioned by only one participant (VC2). This participant described how seed production companies are investigating greater focus on salt-tolerant varieties for international markets where climate change will exacerbate salinisation, such as Egypt (VC2).

Outside of salinisation, participants expressed the highest level of concern for nitrogen as the environmental stress posing the largest threat to the industry. Specifically, they were concerned about the recent national legislation aimed at lowering Dutch nitrogen emissions. Nitrogen was mentioned more than any other environmental stress issue, including food insecurity, climate change, and potato blight. This suggests that nitrogen and the current controversy regarding its regulation is currently the industry's top concern - perhaps even more so than salinisation. It should also be noted that multiple stakeholders independently mentioned the 2022 farmer protests against these nitrogen regulations (NG1, VC2, PR2). Some participants feel as though Dutch policymakers are implementing large-scale changes without proper engagement with involved stakeholders, similar to their impression of how policymakers are not listening to experts within the industry when implementing changes that impact the potato supply chain (VC2, CS2, WB1). This implies that stakeholder awareness of the nitrogen crisis and the negative feelings expressed towards policymakers in that context may be influencing the overall stakeholder perception of how policymakers understand and pay attention to the potato industry.

In contrast, climate change was only briefly mentioned and never explicitly linked to the issue of salinity. Two participants mentioned climate change in the context of non-agricultural challenges to explain that most EU and global policy making attention is focused on the energy transition and carbon emissions (PR1+2). Climate change was only mentioned in the context of agriculture as it pertains to increased risk of water shortages. Here stakeholders such as water boards are considering which crops can survive with less water as part of their adaptation plans (WB1).

4. Final remarks and a way forward

The challenge of facilitating change within the industry is complicated by a lack of internal consensus about who the leaders in the industry are and a general feeling of lack of agency amongst all stakeholders. From a multi-stakeholder view, a lack of consensus about industry leadership and a general feeling of lack of agency among stakeholders is not desirable. In fact, it can hinder progress and make it difficult to achieve common goals. Ideally, the development pathway would involve clear communication and collaboration among all stakeholders to identify common goals and establish a shared vision for the industry. This would require strong leadership from key players in the industry to take on a guiding role and facilitate the process of change. Additionally, power imbalances between stakeholders can make it difficult to achieve equal representation and involvement in decision-making processes. To overcome these challenges, it is important for stakeholders to engage in open and honest dialogue, build trust and respect, and commit to working together towards a common goal. This may require investment in resources and support structures to facilitate effective communication and collaboration, as well as a willingness to prioritize the greater good over individual interests. Ultimately, the key to success is to create an inclusive and transparent process that enables all stakeholders to have a voice and feel empowered to make meaningful contributions to the industry's evolution.

Analysis of the interest-influence scores suggests that each participant feels as though someone else is always the driver of change, making the decisions that shape the market, and that they are each only responding to the market as they perceive it. Supermarkets and (international) policymakers are perceived as the largest sources of influence throughout the industry, though neither are perceived to be particularly interested in the potato industry in terms of a means to fight food security or adapt to climate change. To maximize impact and efficient use of resources, researcher institutions should collaborate more with farmers or other stakeholders.

The Dutch potato industry holds a strong global position in terms of research, genetics, seed production, and international trade. However, stakeholders within the industry do not express the same immediate concern about the impact of salinisation as researchers outside of the industry. This could be partly due to the Dutch nitrogen crisis, which poses a significant threat to farmers' livelihoods. To address this, raising awareness about the severity of the salinisation issue is crucial to identifying it as a parallel problem that also endangers the food systems, including potatoes. Furthermore, developing varieties and systems adapted to saline environments through innovation could give rise to a plethora of opportunities in terms of export. However, other areas of the world have had decades of experience with saline agriculture and thus, mutual learning could provide more sustainable and inclusive international development.

In a world where change is needed more than ever, mutual understanding is crucial in order to make a positive impact in terms of sustainable development. By learning to see things from different perspectives, we can break down barriers and find common ground.

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Annex A: Stakeholder list value chain

Stakeholder	Genetics, Plant Breeding and Seed Production	Potato production	Processing (Logistics/ Transport/ Packaging)	Trade and Wholesale	Retail and Marketing
A. De Nijs & Zn. B.V.				X	
Aardappelfarm		X			X
Aardappelgroothandel Jac van den Oord BV			X	X	
Aardevo B.V.	X		X		
Agrico	X	X		X	
Agroplant	X				
Altena Potatoes		X	X		
Avebe		X	X	X	
Averis Seeds B.V.	X			X	
Aviko Potato			X	X	X
Bejo	X				
Bergia Frites B.V.			X	X	
Bijl Aardappelen BV			X	X	
Den Hartigh	X	X		X	
Dutch Potato Pro			X	X	
Duynie Ingredients			X	X	X
East4Fresh			X	X	X
Eosta			X	X	
Europlant	X				
Farm Frites			X	X	
FZ Organic Food BV			X	X	X
G. Sevenhuysen V.O.F.				X	
Geersing Potato Specialist	X			X	
Greydanus Aardappelgroothandel & Transport BV			X	X	
HZPC	X	X		X	X
Incotec	X				

Stakeholder	Genetics, Plant Breeding and Seed Production	Potato production	Processing (Logistics/ Transport/ Packaging)	Trade and Wholesale	Retail and Marketing
Intersnack Netherlands			X	X	X
Interseed Holland B.V.	X	X			X
IPM Holland BV	X	X		X	X
Jac van den Oord Potatoes			X	X	X
Jansen-Dongen		X	X	X	
Kleinjan's Aardappelhandel B.V.				X	
Kruizinga Fresh Produce			X	X	
KWS Potato B.V.	X	X			X
Lamb Weston Meijer			X	X	X
Landjuweel B.V.			X		
Leo de Kock & zn BV			X		
Living Foods BV		X			
McCain Foods Holland B.V.			X	X	X
Meelunie B.V.				X	X
Meijer Potato	X		X	X	
Molenaar				X	
Mr Farmer B.V.			X	X	
Nedato			X		
Novidon B.V.			X		
Plantera B.V.	X	X		X	
Planture Group			X	X	
Q-Potato				X	
Quik's Potato Products		X	X	X	
Rijkzwaam	X				
Royal Ingredients Group				X	
Royal Zap	X	X	X	X	
Stakeholder	Genetics, Plant Breeding and	Potato production	Processing (Logistics/	Trade and Wholesale	Retail and Marketing

	Seed Production		Transport/ Packaging)		
Schaap Holland	X		X	X	
Scholtens Marknesse VOF		X			
Selectiebedrijf KOOI b.v.	X	X		X	
Semagri Holland B.V.	X			X	X
Skogsgreven			X		
Solynta	X				
Stet Holland B.V.	X	X		X	
The Potato Company (TPC)	X			X	
Yellow Chips			X	X	
Van Marcke Foods			X	X	
Verhagen Holland				X	
Vitrocom Holland BV		X			
Wadzilt BV		X	X		X
Westhoeve Potatoes			X	X	
ZVL Friet		X	X		X

Annex B: Stakeholder list government institutions

Category	Stakeholder
Regulatory Bodies	Nederlandse Algemene Keuringsdienst voor zaaizaad en pootgoed van landbouwgewassen (NAK)
	Netherlands Food and Consumer Product Safety Authority (NVWA)
Water Boards	Water boards of the Netherlands (consisting of 21 local subsidiaries)
Municipal Government Institutions	Municipalities of the Netherlands (consisting of 344 local subsidiaries)
Provincial Government Institutions	12 Provinces of the Netherlands
National Government Institutions	Ministry of Agriculture, Nature and Food Quality
	Ministry of Economic Affairs and Climate
	Ministry of Foreign Affairs
	Netherlands Enterprise Agency (RVO)
	Ministry of Health, Welfare and Sport
International Government Institutions	European Union
	Dutch embassies
	International Ministries of Agriculture
	International Ministries of Economic Affairs
	The Food and Agriculture Organization of the United Nations (FAO)
	Global Soil Partnership (GSP)
	European Soil Partnership (ESP)
	Global Alliance for Climate-Smart Agriculture (GCSA)
	International Network of Salt-Affected Soils (INSAS)
	The Global Framework on Water Scarcity in Agriculture (WASAG)

Annex C: Stakeholder list civil society

Stakeholder	Advocacy Groups
Acacia water foundation	
Agricultural collectives (consisting of 40 local subsidiaries)	x
Agriterra	
Agrofoodcluster	
BO Akkerbouw	x
Boerennatuur	x
Farmers Defense Force	x
LTO Nederland (NLTO/ZLTO/LLTB)	x
NAO Nederlandse Aardappel Organisatie	
Natuurmonumenten	
NAV (Nederlandse Akkerbouw Vakbond)	x
Netherlands Food Partnership	
Netherlands Water Partnership	
Oxfam Novib	
Salt Farm Foundation	
SNV Netherlands	
Stichting de Zilte smaak	
The Potato Valley	
Verspillingsmarkt	
Waddengoud	
Zout zout knooppunt	

Annex D: Stakeholder list research institutions

Stakeholder	Public Research Institutions	Private Research Institutions
Acacia Water		x
Aeres University of Applied Sciences	x	
Delft University	x	
Delphy		x
Deltares		x
Groningen University	x	
HLB		x
Kennisplatform Aardappels		x
Meijer Potato		x
PlantXR (NWO)		x
Pootaardappelacademie		x
Royal Tropical Institute (KIT)	x	
SoilCares		x
SPNA Research		x
Utrecht University	x	
Van Hall Larenstein	x	
VU Amsterdam	x	
Waddenacademie	x	
Wageningen University	x	

Annex E: Stakeholder list financing institutions & funds

Institutions & funds	Public finance	Private finance	EU Fund
European agricultural fund for rural development (EAFRD)	x		x
European agricultural guarantee fund (EAGF)	x		x
European recovery fund (NextGenerationEU)	x		x
European social fund plus (ESF+)	x		x
Groenfonds - Investeringsfonds duurzame landbouw (IDL)	x		
Groenfonds - Klimaatfonds voor duurzame landbouw	x	x	
Horizon Europe cluster - Food, bioeconomy, natural resources, agriculture and environment	x		x
Nederlandse Waterschapsbank (NWB Bank)	x		
Rabobank		x	
Triodos		x	
Waddenfonds	x		