

# The Structuring and Good Governance of the Pulses Sector in Morocco: Results from an e-Delphi Survey

Larbi Toumi<sup>1,\*</sup>, Mohamed El Amrani<sup>2</sup>, Abdelkader Ait El Mekki<sup>2</sup>, Rachid Harbouze<sup>1</sup>, Aziz Fadlaoui<sup>3</sup>

<sup>1</sup>Agronomic and Veterinary Institute Hassan II, Rabat, Morocco.

<sup>2</sup>National School of Agriculture of Meknes, Meknès, Morocco.

<sup>3</sup>National Institute of Agronomic Research, Meknès, Morocco.

**How to cite this paper:** Larbi Toumi, Mohamed El Amrani, Abdelkader Ait El Mekki, Rachid Harbouze, Aziz Fadlaoui. (2020) The Structuring and Good Governance of the Pulses Sector in Morocco: Results from an e-Delphi Survey. *International Journal of the Science of Food and Agriculture*, 4(2), 191-202. DOI: 10.26855/ijfsa.2020.06.011

**Received:** April 24, 2020

**Accepted:** May 26, 2020

**Published:** June 3, 2020

\***Corresponding author:** Larbi Toumi, Agronomic and Veterinary Institute Hassan II, Rabat, Morocco.  
**Email:** toumilar@gmail.com

---

## Abstract

This paper aimed to identify potential proposals contributing to the structuring of the Moroccan's pulses sector and improving its governance for food security purposes by examining the issues and key constraints affecting its entire value chain and its future in the next decade. The data were collected from an e-Delphi questionnaire which consisted of 40 proposals submitted to experts and administered in two rounds. The DELPHI method used aimed to reach the consensus of 26 experts selected among the value chain actors of this sector based on a Likert measurement scale. An analysis of the experts' comments was also used. Findings show 19 new proposals suggested in the first round and added in the second round. Consensus was reached on 39 proposals contributing to the structuring of the sector and on seven proposals aimed at improving its governance. However, the analysis of experts' comments on the future of the sector revealed controversial opinions and did not make it possible to establish scenarios for changes in terms of the share of pulses in crop rotation, the potential for increasing areas, national production and marketing. Such results highlight the need for collective thinking between actors to lay the foundations for a common strategic vision of the sector and its implementation based on good governance that advocates coordination, information sharing, transparency and partnership between the actors upstream and downstream of the sector.

## Keywords

Value chain, Governance, Food security

---

## 1. Introduction

In Morocco, pulses have occupied a strategic place in the country's agricultural policies. In the 1960s and 1970s, Morocco was one of the world's leading exporters of pulses. However, the policy of wheat support, reflected in the launching of an intensification programme in 1985 aimed at sowing one million hectares of wheat through the dissemination of new varieties, the setting of a guaranteed price and marketing margins, had negative impacts on the extension and technical progress of this sector [1].

This has resulted in a low coverage of pulses consumption needs. Indeed, the average rate of consumption coverage has been only 41 percent over the last two decades (1997-2017)<sup>1</sup>. According to the trend scenario 2021-2025

---

<sup>1</sup>On the basis of our calculations using data from the Department of Agriculture's Strategy and Statistics Directorate and the Office of the High Commission for Plan on per capita consumption of pulses.

established by the Office of the High Commission for Plan (HCP), this situation will persist as annual growth in pulses production will be slightly positive, barely exceeding 2 percent, which is largely insufficient to cover pulses needs [2].

In addition, the India-Morocco Initiative for the Development of Food Legumes (IMFLI) for the period September 2014 to September 2018 has diagnosed the pulses sector and analysed the downstream part of its value chain. The main constraints arising from this diagnosis are: the weak organization of the sector and its governance, the low quality of national production, high production costs, phytosanitary diseases and lack of financing [3].

By focusing on the organisation and governance of the pulses sector in Morocco and based on the results of this initiative, this paper aims to address the following question: How to structure the pulses sector and improve its governance for food security purposes by examining the issues and main constraints affecting all the links in the value chain of the sector and its future in the next decade. Compared to the various research studies that have dealt with the issue of the structuring and governance of commodity chains at both national and international levels, the paper falls within the theoretical field of value chain analysis, which focuses on the segments where value added is created by all actors (private and public, including service providers) and activities that move a basic agricultural product from production in the field to the final consumer [4].

This research aims to highlight the importance of structuring and good governance in the development of the pulses sector in Morocco through the proposal of concrete recommendations. In particular, authors aim to achieve the following results:

- Potential proposals contributing to the structuring of the pulses sector according to its different links in the value chain;
- Proposal of recommendations for good governance of the value chain for food security purposes.

## 2. Materials and Methods

### 2.1 Methodological detail to address research question

To address the research question, authors used the Delphi method that specifically aims to explore and establish increased understanding through the process of seeking consensus on key issues from a group of identified experts [5]. This method was chosen for its relevance both in terms of the selection of experts with knowledge and know-how in relation to the problematic issue addressed and the results of research studies that have applied this method in the agricultural field. Authors have opted for an iterative online consultation of the group of experts selected on the basis of a questionnaire to which the experts will have to answer in full and be informed of the results of the responses of the entire panel of experts consulted.

This consultation shall be repeated as many times as necessary in order to reach a consensus between the participants on the proposals envisaged to the questions raised. The method's specialists believe that consensus has been reached with the use of a predetermined level of consensus based upon a minimum percentage of respondent agreement and consideration of the measure of standard deviation for rated items. Responses with larger standard deviations were interpreted as having weaker consensus [5]. "Ref. [6]" consider consensus when at least 70% of the experts' agreement on the same response modality and "Ref. [7]" state that it is possible to use a standard deviation threshold at the median for measuring the level of consensus of each proposal. A standard deviation less than one is synonym of consensus.

The methodological process consists first of all of elaborating the problem to which the experts are called upon to respond. The research problem stems from the synthesis and capitalization of the results of IMFLI initiative. Once the problem has been defined, the stage of choosing and selecting the experts is started. Before contacting online, the selected experts, the questionnaire was constructed, validated and tested by other professionals and experts not surveyed to assess the relevance of the questions and the proposed answers and the feedback they might generate. In terms of data analysis and in accordance with the DELPHI method, the paper applies the following statistical indicators:

- The median score for each proposed measure;
- AMSD: Absolute Mean Standard Deviation at the median to measure the degree of consensus among respondents for each proposal:

$$AMSD = \frac{|\sum_i^n xi - M|}{n}$$

xi: degree of agreement of each proposal by expert i

M: Median of each proposal

n: total number of experts

- The level of agreement: % of experts who agreed and strongly agreed for each proposal.

Authors used the agreement percentage (>80%) to measure the level of consensus between experts. Furthermore, they have calculated the AMSD of each proposal to confirm the level of consensus. As the questionnaire includes open-ended questions with respondent comments, the analysis focused on the frequency of recurring main ideas and

controversial opinions on a matrix of comments classified and coded into 9 thematic dimensions in the appendix.

## 2.2 Data Collection

The data were collected from an e-Delphi questionnaire in two rounds. The first version of the questionnaire was developed on the basis of an analysis and capitalisation of the deliverables and studies carried out by the IMFLI initiative and other research in order to ask the questions and propose answers affecting all the links in the value chain. The questions are of two types:

- Firm questions with a response grid in which the expert is asked to express his or her degree of agreement with the proposals on a scale of 1 to 5 (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree);
- Open-ended questions with comments from the expert where he or she is asked to propose alternative proposals and argue his or her choice and/or response.

The questionnaire of the first round includes 40 proposed answers to the different constraints and main issues of the different links of the value chain of the sector, in addition to open questions related to the future of the sector in the next decade in terms of the potential for increasing areas, national production, yield, marketing and the share of pulses in crop rotations. These proposals, called items, are distributed in the appendix by thematic dimension corresponding to the nature of the questions. Following the closure of the first round, the second questionnaire is drawn up on the basis of the quantitative and qualitative analysis of the responses from the first round, where the respondent is asked to express again his or her agreement/disagreement on the basis of the median score and the % agree and strongly agree for each proposal for all respondents as well as new proposals that were not included in the questionnaire of the first round.

## 2.3 Establishment of the panel of experts

The questionnaire was administered online in two rounds to a panel of 26 resource persons involved in the pulses sector. The selection of experts was carried out on the basis of the following criteria:

- Involvement as actors in the innovation platforms created in the framework of the IMFLI initiative, as an appropriate tool for consultation and coordination between actors in the sector and for the dissemination and adoption of technologies introduced by this initiative [8].
- Knowledge and know-how related to pulses in terms of exercising one's profession as a producer, seed producer, exporter, importer, aggregator, processor, agricultural adviser and manager working in public institutions (Department of Agriculture, National Office for Food Safety, Inter-professional National Office of Cereals and Pulses, National Society of commercialization of Seeds, Morocco Foodex, National Institute of Agronomic Research, National Office of Agricultural Advice).

The composition of this panel by category of expertise is given in the following table:

**Table 1. Composition of the panel of persons surveyed by area of expertise**

Category of membership	Areas of expertise	Number of persons surveyed
Professionals/private sector	Seed production and marketing	2
	Production + Processing (GIE and Cooperatives)	4
	Import/trade	2
<b>Total category of Professionals</b>		<b>8</b>
Institutional/public sector	Market Supply and Regulation	2
	Administration (Ministry and Regional Directorates of Agriculture)	3
	Sanitary control	1
	Agricultural Advice	2
	Export Coordination and Control	1
	Agricultural Research	4
<b>Total category of Institutions</b>		<b>13</b>
Experts and specialists	Varietal selection, production, organization, marketing,...	5
<b>Total category of independent experts</b>		<b>5</b>
<b>Grand Total</b>		<b>26</b>

Authors' compilation (Delphi survey 2019)

Of the 26 persons selected and contacted to take part in the DELPHI survey, the response rate was very satisfactory both in the first round (88%) and in the second round (96%). The first round of questionnaires took place from mid-July to mid-September 2019 and the second round took place from the beginning of October to the end of November 2019. Expert support by telephone was planned throughout the methodological process of the Delphi survey.

## 2.4 Limitations

One the major limit of the Delphi method is to guide the consensus by proposing answers to experts. To avoid this inconvenient, authors have chosen a panel of experts with profile varied to arise not only consensus but also disagreement and have included in the questionnaire open-ended questions with comment from the expert where he must argue his choice of level of agreement of each proposal. An accompaniment by phone to experts is also planned in order to explain the process of the Delphi method, ask for their explanations of their choice and to have their response in time.

## 3. Results and Discussion

### 3.1 Consensus versus Disagreement of the Experts Responses

By analysing the AMSD (Absolute Mean Standard Deviation at the median) of the responses of the experts at the level of each proposal between the two rounds, there is a consensus in all the proposals, since the AMSD varies between 0.043 (Min) and 0.68 (Max) for the 1st round and oscillates almost between the same minimum and maximum values in the 2nd round (0.045 (Min) and 0.65 (Max)). These AMSDs are all less than 1, which is synonymous with consensus. In addition, the ranking of proposals by round of questionnaire according to the level of agreement can be envisaged as follows:

- First level: very strong agreement around 90%-100%.
- Second level: strong agreement around 80%-90%.
- Third level: moderately strong agreement around 60%-80%.
- Fourth level: medium to low agreement < 60%.

As mentioned in the table below, authors conclude that in moving from Round 1 to Round 2, the number of proposals at the first level of agreement increased by +10 at the expense of proposals at the second level (-6) and the third level (-4), implying that respondents were influenced by the results of all respondents in Round 1. However, it should be noted that there are no proposals with a low to medium level of agreement (< 60%).

**Table 2. Ranking of proposed responses by level of agreement**

Levels of agreement	1 <sup>st</sup> Round	2 <sup>nd</sup> Round	Evolution
	Number of proposals	Number of proposals	
1 <sup>st</sup> level 90-100%	26	36	+10
2 <sup>nd</sup> level 80-90%	10	4	-6
3 <sup>rd</sup> level 60-80%	4	0	-4

Authors' compilation (Delphi survey 2019)

On the other hand, the analysis of the rate of disagreement after the second round for the value chain actors of the sector according to the category of the experts surveyed, shows a divergence in the disagreement between professionals and institutions from public sector. Indeed, for professionals both upstream and downstream of the value chain, the low disagreement rate of 20% is evident for the following proposals:

- Proximity of certified seed outlets as a measure to improve the utilisation rate of certified seeds;
- Labour costs as a constraint on the development of the sector.

While for the public sector, the disagreement rate varies between 17% and 33% and mainly concerns the following proposals:

- Lack of financing as a constraint to the development of the sector;
- Affordability of Certified seed prices as a measure to improve the rate of use of Certified seeds;
- Professionalization of the negotiation process between value chain actors as a measure to strengthen the visibility between actors in the value chain.

So, this analysis of consensus and disagreement between experts shows an orientation more towards consensus than disagreement.

### 3.2 Consensus versus Disagreement on new proposals from the panel of experts

The analysis of the respondents' comments was very rich in new ideas. Indeed, the experts surveyed proposed 19 new measures in the first round and added in the second round. 16 of the 19 proposals (84%) received a very strong level of agreement, ranging from 80%-100% of the experts, which indicates their relevance for experts. Moreover, some new measures proposed have a low level of disagreement and concerns the following thematic dimensions:

- **Global diagnosis of the sector:**

Lack of mapping for the most appropriate species and varieties for each production area as a new constraint for the development of the sector (55% of disagreement).

- **Inputs/Seeds:**

State guarantee of a sale price that could pull up the price and encourage farmers to grow pulses as a measure to improve the rate of utilisation of certified seeds (32% of disagreement);

According to the respondents' opinions on improving governance for food security purposes, the governance model of the sector must be based on consultation, dialogue and partnership between the actors upstream and downstream of the sector. The eight new proposed actions of good governance advocates coordination, information sharing, transparency and partnership between the actors upstream and downstream of the sector. They received a strong level of agreement from the experts. So, the all new proposals with a strong level of agreement are summarized and ranked in the table below according to the level of agreement by thematic dimensions:

**Table 3. Level of agreement and Ranking of new proposals**

Thematic Dimensions	New proposals	Level of agreement (%)	Ranking
Global Diagnosis of the sector	-The irregularity of climatic conditions as a recurring factor given the vulnerability of pulses to climate change;	94	1
	- The factors of unaffordable prices and availability of certified seeds to producers encourage producers to use local seeds	83	2
Inputs/seeds	-Support of national research to develop new adapted and productive varieties	83	1
Production	-Installation of Village Based Seed Enterprises for the production of seeds of declared quality at the level of Economic Interest Groups or Cooperatives;	83	3
	-Introduction of pulses varieties adapted to mechanical harvesting, particularly for lentils;	94	1
	-Encouraging and raising farmers' awareness of forms of association around pulses (agroforestry)	89	2
Transformation and Valorisation	-Identification of traditional local gastronomic products based on pulses suitable for technological processing;	94	1
	-Support for young producers for the creation of start-ups in rural areas for the processing of pulses;	94	1
	-Accompaniment and supervision of organizations at the local level (Provincial Directions of Agriculture, Chambers of Agriculture, Agricultural Advice services, Sanitarian Control services,...) of the activities launched at the scale of the 5 regional innovation platforms created within the framework of the Moroccan-Indian Initiative for Food Legumes (IMFLI) to ensure a good functioning of the valorisation units already identified	94	1
Governance and Food Security	-Improving the efficiency and effectiveness of actions in favour of the sector (seed production, varietal research, health control, agricultural advisory services, Pillar II and aggregation projects of Green Morocco Plan, supply and demand regulation);	95	2
	-Reinforcement of coordination and synergies between the value chain actors concerned by pulses for better optimisation of actions and reduction of production factor costs;	95	2
	-Development of trust and transparency vis-à-vis the various partners and users involved in the sector;	91	3

-Improvement of the quality of the services provided and consolidation of the climate of trust between the actors involved in the sector;	91	3
-Strengthening the role of the Inter-Professional National Office of Cereals and Pulses for the local supply of pulses and price stabilization, particularly in the event of low national production (regulation of supply and demand);	77	5
-Sharing of information on prices between the actors concerned by the sector and development of a price observatory;	86	4
-Development of short and/or local circuits on the part of consumers, local authorities and the State to reduce price increases by intermediaries;	100	1
-Reinforcement of the coordination of product control along the value chain (inputs to the consumer) within the framework of the provincial commissions (sanitarian control services, local authority, Province, ...) .	86	4

Authors' compilation (Delphi survey 2019)

### 3.3 Consensus versus Disagreement of the panel of experts on the proposals contributing to the structuring of the sector

In order to propose an outline of the proposals contributing to a structuring of the pulses sector within each link of the value chain, authors have retained the action proposals with a very high level of agreement ranging from 80%-100%. On the other hand, the analysis of the divergence of opinions on these proposals between actors upstream and downstream of the value chain after the two rounds of the Delphi survey did not reveal a great divergence of opinions. The only disagreement was on the proximity of sales outlets as a measure of increasing the rate of use of certified seeds.

The agreed proposals are summarised by the main issues of each value chain link in the table below. According to the ranking of expert's agreement, the first actions responding to the main issues of each link of the pulses value chain are:

#### ▪ Inputs/Seeds:

- Supporting national research to develop new, adapted and productive varieties;
- Strengthening Farm Advisory Services: Demonstration Trials and Field Farms School.

#### ▪ Supply:

- Strengthening the capacities of producers and professional organisations in management and negotiation to assert their rights.

#### ▪ Production:

- Producers' use by producers of sustainable good agricultural practices for the management of pulses (direct sowing, long crop rotation, water and soil conservation, choice of varieties, etc.);
- Use of varietal choice with high production potential;
- Awareness of producers to organize collectively in cooperatives to reduce production costs (collective purchase of inputs);
- Mechanization of pulses handling operations;
- Introduction of pulses varieties adapted to mechanical harvesting, particularly for lentils;
- Encouragement and technological transfer of the results of agronomic research on pulses to producers and enable them to benefit from international practices and progress in this sector;
- Encouraging and making producers aware of the forms of association with pulses;
- Use of disease-resistant varieties.

#### ▪ Transformation and valorisation:

- Diversification of pulses products (flour, semolina, shelled, frozen, preserved), through the development of new transformation processes;
- Reinforcement of existing cleaning and calibration operations to improve quality;

#### ▪ Distribution:

- Elaborating of supply contracts in favour of structuring the downstream part of the value chain and encouraging greater investment along the value chain;
- Development of short and/or proximity circuits by consumers, communities and the State;
- Encouraging attractive outlets (out-of-home catering) around the labels of pulses (Origin/Bio/Geographic

- Indication);
- Promotion of pulse product labels to wholesale traders;
  - Integration of pulses into existing and efficient distribution channels;
- **Consumption:**
- Conduct of a joint action between the health authorities and the Department of Agriculture to make Moroccan consumers aware of the nutritional and health benefits of pulses;
  - Reinforcement of the control of imported pulses against Genetic Modified Organisms.

These proposals will help the actors of the value chain to understand the functioning of each link of the value chain through the identification of the main issues that are facing the structuring of the value chain as a whole. Concerning the agricultural policies, they are not identified by the Green Morocco Plan which consists only on some tools and actions in favour of the sector and mainly concern:

- The opportunities offered by aggregation and projects for the development of the sector;
- Multi-risk insurance where pulses benefit from a 90% subsidy rate in unfavourable, intermediate and favourable first-level areas;
- The adoption of a law 12-03 on the inter-professional organization of agricultural sectors, which the pulses sector does not benefit from;
- A law on the adoption of Distinctive Signs of Origin and Quality (DSOQ) through which the Zaer lentil (Khemisset province) was recognized as a geographical indication;
- A programme contract between the State and the profession for the development of the seed sector where the use of certified pulse seeds didn't reach the rate of 10% projected in 2020.

However, these actions don't concern all the value chain links of the pulses sector and are not integrated into a strategic vision dedicated to the sector, taking into account its specificities.

**Table 4. Proposals structuring the pulses sector according to its links in the value chain**

Value Chain links	Main Issues	Proposals with +80% of agreement	Ranking
<b>Seeds</b>	- Broaden the range of adapted and productive varieties through varietal research programmes	- Strengthening Farm Advisory Services: Demonstration Trials and Field Farms School;	1
		- Subsidy for the multiplication of certified seeds by producers;	2
		- Price accessibility of certified seeds;	3
		- Proximity of certified seed outlets;	4
		- Supporting national research to develop new, adapted and productive varieties;	1
<b>Supply</b>	- Helping producers to better position themselves in the supply chain - Strengthen visibility between supply chain actors	-Awareness of the creation of producer associations around a national federation in order to overcome the fragmentation of local supply;	3
		-Strengthening of producer organisations around subjects of common interest (management, marketing, labelling, etc.) that can be dealt with collectively;	2
		-Strengthening the circulation and sharing of information between actors in the value chain (product origin);	2
		-Development of partnerships between upstream and downstream players in the sector for the well-being of the consumer (quality and accessibility);	2
		-Grouping producers and industrialists around food-processing groups to form a negotiating force;	3
		-Improvement of the internal and democratic governance of professional organizations (Associations, Cooperatives, Economic interest groups, Inter-professional Federations);	2
		-Strengthening the capacities of producers and professional organisations in management and negotiation to assert their rights;	1
-Professionalization of the negotiation process between actors in the value chain	4		

<b>Production</b>	- Ensuring production in quantity and quality;	-Producers' use of sustainable good agricultural practices for the management of pulses (direct sowing, long crop rotation, water and soil conservation, choice of varieties, etc.);	1
		-Use of varietal choice with high production potential;	1
		-Awareness of producers to organize collectively in cooperatives to reduce production costs (collective purchase of inputs);	1
		-Increase in the rate of use of certified seed by producers;	2
		-Mechanization of pulses handling operations;	1
		- Installation of Village Based Seed Enterprises for the production of seeds of declared quality at the level of Economic Interest Groups or Cooperatives;	3
		-Introduction of pulses varieties adapted to mechanical harvesting, particularly for lentils;	1
		-Encouragement and technological transfer of the results of agronomic research on pulses to producers and enable them to benefit from international practices and progress in this sector;	1
		-Encouraging and making producers aware of the forms of association with pulses;	1
	-Use of disease-resistant varieties.	1	
<b>Transformation and valorisation</b>	Develop transformation and valorisation processes specific to pulses;	-Diversification of pulses products (flour, semolina, shelled, frozen, preserved,) through the development of new transformation processes;	1
		-Reinforcement of existing cleaning and calibration operations to improve quality;	1
		-Encouragement of producers for certification and labelling;	2
		-Encouragement for the development of storage systems in order to limit the fall in agricultural prices during years of high production;	2
		-Identification of traditional local gastronomic products based on pulses suitable for technological processing;	3
		-Support for young producers for the creation of rural start-ups for the processing of pulses;	2
		-Support and supervision of local organizations (Provincial Directions of Agriculture, Chambers of Agriculture, Agricultural Advice services, sanitarian control services, ...) of the activities launched at the scale of the 5 regional innovation platforms created within the framework of the Moroccan-Indian Initiative for Food Legumes (IMFLI) to ensure a good functioning of the already identified valorisation units.	2
<b>Distribution</b>	Modernizing the distribution channels of the value chain	-Elaborating of supply contracts in favour of structuring the downstream part of the value chain and encouraging greater investment along the value chain;	1
		-Development of short and/or proximity circuits by consumers, communities and the State;	2
		-Encouraging attractive outlets (out-of-home catering) around the labels of pulses (Origin/Bio/Geographic Indication);	1
		-Promotion of pulse product labels to wholesale traders;	1
		-Integration of pulses into existing and efficient distribution channels;	1
<b>Consumption</b>	Developing the nutritional importance of pulses in the consumption of Moroccans	-Conduct of a joint action between the health authorities and the Department of Agriculture to make Moroccan consumers aware of the nutritional and health benefits of pulses;	1
		-Consumer awareness through nutritional rehabilitation in schools;	2
		-Innovation on new products more suitable for consumption and use by high-income social groups;	3
		-Reinforcement of the control of imported legumes against Genetic Modified Organisms	1

Authors' compilation (Delphi survey 2019)

### 3.4 Analysis of experts' comments on the future of the sector in the next decade (horizon 2030)

After having questioned the experts of our panel on the measures to be taken to overcome the main issues of the different links of the value chain of the sector and its good governance for food security purposes, authors considered it useful to know their opinion on the potential of growth of the sector in the next decade taking into account the issues and constraints that this sector is facing. The opinions were controversial, which did not make it possible to establish scenarios for changes in terms of the share of pulses in crop rotation, the potential for increasing areas, national production and marketing. The following is a summary of the interpretation of the respondents' comments:

**Table 5. Experts' opinions on the future of the pulses sector by 2030**

Themes	Experts' opinions
<b>Crop rotation</b>	Some argue for an increase due to rising pulses prices and in case of good weather conditions (30% frequency of opinions); Others link the positive development of crop rotation to State support measures for this sector (30% frequency of opinions); On the other hand, others see a downward trend due to the low yields recorded, which may be amplified by the risk of climate change (33% frequency of opinions); 20% of respondents did not express their opinion while 7% see stagnation.
<b>Areas</b>	64% of respondents estimate an increase in the order of 10-25%, given the extensive work done to increase interest in pulses at both producer and consumer levels. In addition, raising awareness of the importance of soil conservation and improving soil quality through the adoption of rotations and crop associations with pulses would increase the area sown to these crops. On the other hand, those who have a contrary opinion (29% of the opinions) consider a regression due to the fact that pulses are secondary crops among farmers and the negative effect of the high added value plantations encouraged by the Green Morocco Plan. Other opinions (7%) see stagnation in the absence of a clear strategy dedicated to this sector.
<b>Production</b>	50% of the respondents consider an increase provided that new technologies are applied and political support given the social and economic nature of pulses and the limitation in particular of imports in the normal season. On the other hand, 40% of the respondents' opinions project a regression due to production levels reflecting a sustained reduction for several decades due to the low profitability of these crops and price competition from foreign products. Others see stagnation in the absence of a clear strategy dedicated to pulses (10% opinion).
<b>Marketing</b>	Only 33% of respondents expressed opinions that were not unanimous. Some argue that it would have no prospects given the current situation in the marketing of pulses, marked by low quantities marketed on the internal market and massive competition from imported pulses, generally due to non-compliance of quality with internal market requirements. Others believe that there is potential for marketing provided that the chain is structured along its value chain and progress is made in improving quality and performance.

Authors' compilation (Delphi survey 2019)

On the other hand, in terms of yield prospects, the majority of experts (+90%) believe that there is a potential for a 50% increase in yield in the next decade, but only if an optimal technical itinerary is adopted (use of certified seeds of high-performance varieties, adoption of direct seeding, fertilisation, control of diseases, pests and weeds, mechanization of harvesting, etc.) and the introduction of winter varieties (in the case of chickpeas). This result can be explained by the absence of a common vision of development of the pulses sector shared by all the actors in the sector.

## 4. Conclusion

In conclusion, authors can state that the application of a method that has proven its scientific relevance has been revealing and very rich in ideas and concrete recommendations for a structured, organised and good governed pulses sector. Indeed, this method has enabled authors to gain insight into the perception of experts with varied profiles, both on the future of the sector and on its development. The analysis of disagreement through the arguments and comments between actors in the value chain of the sector did not reveal a great divergence of opinions. On the other hand, it showed an enrichment of ideas oriented more towards consensus than disagreement. However, in terms of forward-looking analysis, opinions are controversial and the Delphi method did not allow authors to establish scenarios for changes in terms of the share of pulses in crop rotation, the potential for increasing areas, national production and marketing.

Two main orientations emerge from the results of this research, namely:

- The structuring and good governance of the pulses sector through its various links of value chains for its organization and development;
- The need for a collective thinking between actors of the sector in order to respond to the main issues of the different links of the value chain of the sector and to lay the foundations for a common strategic vision of the sector and its implementation based on good governance that advocates coordination, information sharing, transparency and partnership between the actors upstream and downstream of the sector.

The proposals contributing to the structuring of the Moroccan's pulses sector and its good governance are interesting, where organisation and governance are largely lacking and impact on the country's food security in pulses. The results are therefore a commendable orientation for public policy decision-makers to re-launch this sector as a strategic sector. In the light of these results, authors believe that the emergence of a common strategy through a balanced professional and inter-professional dialogue between upstream and downstream actors of the sector should emerge from an organizational framework that Morocco offers through the law on the inter-profession, which unfortunately the pulses sector does not benefit from.

Also, the emergence of such a common strategy is a long process and requires learning and capacity building of the actors of the sector to use the tools for the production of knowledge and know-how around the sector within this organizational framework where good governance actions are shared and respected by all actors.

## References

- [1] Arrach, R. and Fadlaoui, A. (2015). 'Activité sur les politiques publiques et leurs incidences sur le secteur des légumineuses alimentaires'. *Morocco-Indian for the Development of Food Legumes Initiative Rapport*, 1-40.
- [2] High Commission for Plan. (2019). Quelles perspectives pour la dépendance alimentaire du Maroc à l'horizon 2025. *Les brefs du Plan*, N°12-16 Décembre 2019, 1-3.
- [3] Laamari, A. (2015). Etude Données de base des Légumineuses alimentaires au Maroc: Analyse de l'offre, coûts de production et indicateurs de performance. *Morocco-Indian for the Development of Food Legumes Initiative Rapport*, 1-74.
- [4] African Development Bank Group. (2013). Development and Financing of Agricultural Value Chains (FCVA) for Export Competitiveness Improvement. *Document of the African Development Bank Group*. [https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Agricultural\\_Value\\_Chain\\_Financing\\_\\_AVC\\_F\\_\\_and\\_Development\\_for\\_Enhanced\\_Export\\_Competitiveness.pdf](https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Agricultural_Value_Chain_Financing__AVC_F__and_Development_for_Enhanced_Export_Competitiveness.pdf).
- [5] Ashmore, R., Flanagan, T., Mcinnes, D. and Banks, D. (2016). The Delphi Method: methodological issues arising from a study examining factors influencing the publication or non-Publication of mental health nursing research. *Mental Health Review Journal*, 21(2), 85-94.
- [6] Ayala, J. C. and Manzano-Garcia, G. (2017). "Insufficiently Studied factors related to burnout in nursing: results from an e-Delphi study." *PLoS One*, 12(4): e 0175352, doi: 10.1371/journal.pone.0175352, 1-17.
- [7] Baille, P., Fallery, B. and Girard, A. (2013). La méthode Delphi pour définir les accords et les controverses: applications à l'innovation dans la traçabilité et dans le e-recrutement. *18ème colloque de l'Association Informatique et Management (AIM)*, Lyon, France, 1-22.
- [8] FOCP, IAV Hassan II, ICARDA and INRA. (2015). India-Morocco Food Legumes Initiative: Increasing Food legumes production by small farmers to strengthen Food and Nutrition Security through adoption of improved technologies and governance with south-south cooperation, Project report, 1-88.

**Appendix. List of 40 proposals (items) by thematic dimension (1<sup>st</sup> round)**

<b>Thematic dimensions</b>	<b>Proposals (items)</b>
<b>Global Diagnosis of the sector</b>	1. Land: status of land limits investment
	2. Prices and market conditions (multitude of players: intermediaries, importers, wholesalers)
	3. Lack of production technology (mechanization)
	4. High labour costs
	5. Phytosanitary diseases
	6. Weak producer organisation
	7. Competition from imported products
	8. Lack of funding
<b>Inputs/Seeds</b>	9. Strengthening of the Farm Advisory Board: Demonstration Trials and FFS
	10. Subsidy for the multiplication of certified seeds by producers
	11. Proximity of points of sale of certified seeds
	12. Price accessibility of certified seeds
<b>Production costs</b>	13. Awareness of producers to organize collectively in cooperatives to reduce production costs (collective purchase of inputs)
	14. Producers' use of sustainable good agricultural practices for the management of pulses (direct sowing, long crop rotation, water and soil conservation, choice of varieties, etc.).
	15. Mechanization of pulses handling operations
<b>Supply</b>	16. Awareness of the need to create producer associations around a national federation in order to overcome the fragmentation of local supply.
	17. Strengthening of producer organisations around subjects of common interest (management, marketing, labelling, etc.) which can be dealt with collectively.
	18. Strengthening the circulation and sharing of information among value chain actors (product origin)
	19. Development of partnerships between actors upstream and downstream of the sector for the well-being of the consumer (quality and accessibility)
<b>Positioning of producers in the Value Chain</b>	20. Grouping producers and industrialists around food-processing groups to form a negotiating force;
	21. Improvement of the internal and democratic governance of professional organizations (Associations, Cooperatives, Groups of Economic Interest, Inter-professional Federations)
	22. Strengthening the capacities of producers and professional organizations in management and negotiation to assert their rights
	23. Professionalization of the negotiation process between actors in the value chain
<b>Production</b>	24. Increase in the rate of use of certified seeds by producers
	25. Use of varietal choice with high production potential
	26. Encouraging and monitoring the technological transfer of the results of agricultural research on food legumes to producers and enabling them to benefit from international practices and progress in this sector
	27. Use of disease-resistant varieties
<b>Transformation/Valorisation</b>	28. Diversification of pulses products (flour, semolina, shelled, frozen, preserved, etc.) through the development of new processing methods.
	29. Strengthening of existing cleaning and grading operations to improve quality
	30. Encouraging and incentivising producers for certification and labelling
	31. Encouraging the development of storage systems to limit the fall in agricultural prices during years of high production.

Thematic dimensions	Proposals (items)
<b>Distribution</b>	32. Elaborating of supply contracts in favour of structuring the downstream part of the value chain and encouraging greater investment along the value chain
	33. Development of short and/or local circuits on the part of consumers, communities and the State
	34. Encouraging attractive outlets (out-of-home catering) around the labels of pulses products (AO/Bio/GI)
	35. Promotion of pulses product labels to wholesale traders
	36. Integration of pulses into existing and efficient distribution channels
<b>Consumption</b>	37. Conduct of a joint action between the health authorities and the Department of Agriculture to make Moroccan consumers aware of the nutritional and health benefits of pulses ;
	38. Innovation on new products more suitable for consumption and use by high-income social groups.
	39. Strengthening the control of imported pulses against GMOs (Genetically Modified Organisms)
	40. Consumer awareness through nutritional rehabilitation in schools