

**SKIM**

**Strengthening Knowledge Management  
for Greater Development Effectiveness  
in the Near East, North Africa,  
Central Asia and Europe**



**Central Asia  
CLIMATE PORTAL**

# Leveraging Semantic Analysis for Faster and Better Systematic Maps and Reviews

**Dr. Murat Sartas (ICARDA)**  
[murat.sartas@cgmel.org](mailto:murat.sartas@cgmel.org)

16<sup>th</sup> February 2021, International Center for Agricultural Research in the Dry Areas (ICARDA)



**Procasur**

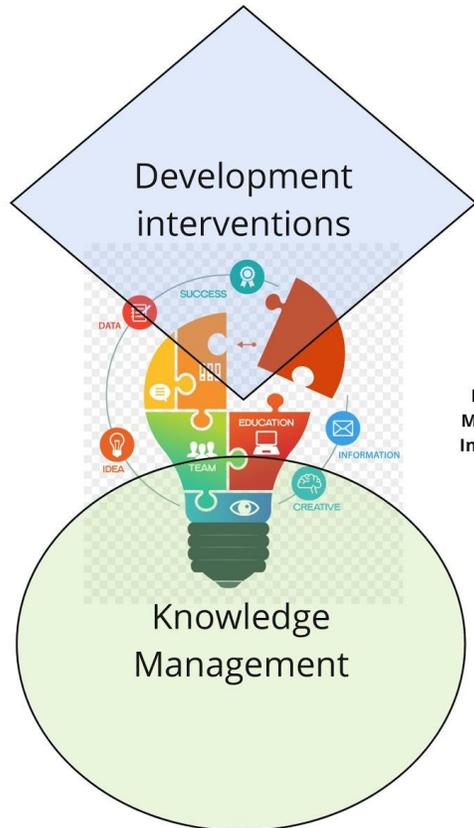


# Overview

1. What are Systematic Reviews and Maps?
  - Create knowledge from data and text
  - Support decisions
  - Create learning for the reviewer team and key stakeholders
2. What is Semantic Analysis?
  - Finding meaning from language structures and objects
  - Documents, sections, paragraphs, sentences, words and their combinations
3. A Few Challenges in Human Only Systematic Maps and Reviews
  - Process challenges (Takes time, not scalable, difficult to replicate, insufficient documentation of the learning)
  - Content challenges (Too many publications, overlapping databases, multiple versions, mainstreamed “strategic cloaking”)
  - Political challenges (Dominant industry interest and funding, resistance to science (covid 19, climate change))
4. A Hybrid Approach to Conducting Systematic Maps and Reviews
  - Combining Lexical Database with Expert Pooled Evidence Dictionaries for Queries
  - Metadata Curation Using Academic Reference Management Tools
  - Combining Computer Mapping with Human Audit
  - A Realist Approach Using Computer Aided Evidence Prioritization

A Case Example from SKiM: What Works in Improving Knowledge Management Systems in Low and Middle Income Countries?

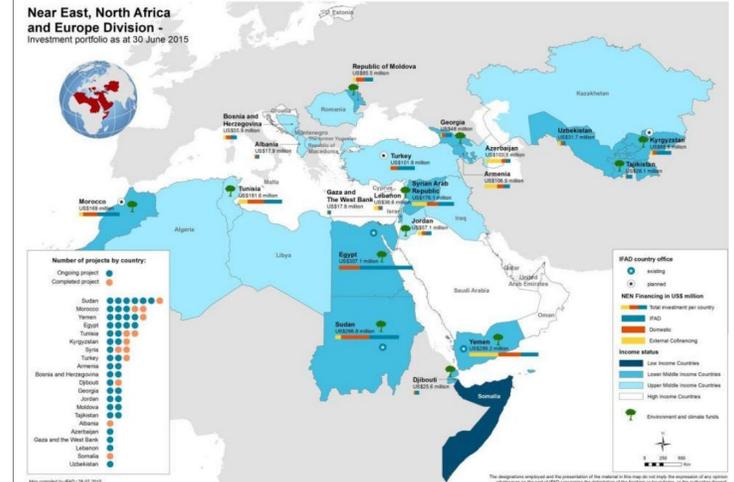
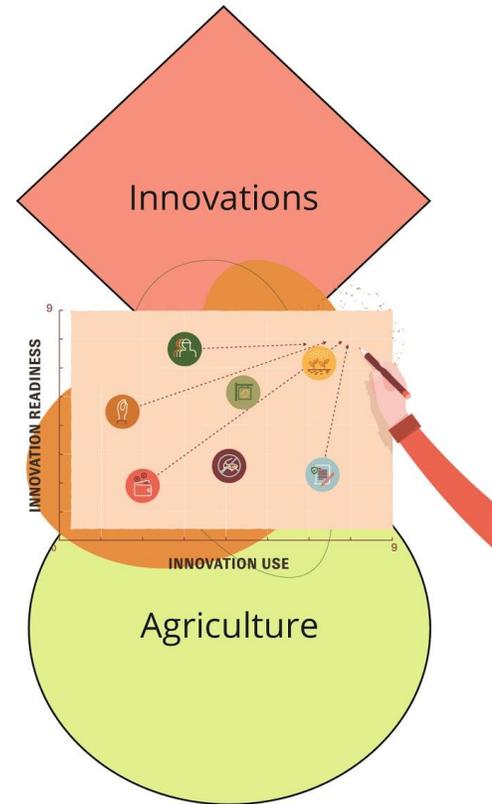
# Case Study: Knowledge Management



Knowledge Management Interventions



Agricultural Innovation Pipeline



# A Hybrid Approach to Conducting Systematic Maps and Reviews

## Dictionary + : Combining Lexical Database with Expert Pooled Evidence Dictionaries for Queries



ACCESS | AGROVOC | RELEASES | WEB SERVICES  
FAQ | GUIDELINES | backbone of information services

Number of concepts: 36,105  
Number of terms: 68,722  
Languages: 33

AIMS

SEARCH CONNECT SIGN UP LOGIN

GET INVOLVED ACCESS TO INFORMATION AGROVOC SEMANTICS ACTIVITIES THEMES ABOUT

Home > Semantics > VEST Registry (KOS) > KOS > AGROVOC >

**Search**

Alphabetical | Hierarchy

A B C C D E F G H I J K  
L M N O P Q R S S T U V  
W X Y Z 0-9

A horizons  
Aaptosyax grypus  
Aaron's rod → Verbascum  
ABA  
Abaca  
abachi → Triplochiton scleroxylon  
Abalistes stellaris  
abalones  
abamectin  
abandoned land  
abattoir byproducts  
abattoirs  
Abbottina rivularis  
shlemman

TITLE	AGROVOC Multilingual Thesaurus
LAST MODIFIED	Friday, February 1, 2019 08:42:03
TYPE	<a href="http://www.w3.org/2004/02/skos/core#ConceptScheme">http://www.w3.org/2004/02/skos/core#ConceptScheme</a>
VOID:INDATASET	<a href="http://aims.fao.org/aos/agrovoc/void.ttl#Agrovoc">http://aims.fao.org/aos/agrovoc/void.ttl#Agrovoc</a>
URI	<a href="http://voc.landportal.info/landterms">http://voc.landportal.info/landterms</a>

**Resource counts by type**

Type	Count
Concept	36105

**Term counts by language**

Language	Preferred terms	Alternate terms	Hidden terms



AGROVOC is a controlled vocabulary covering all areas of interest of the Food and Agriculture Organization (FAO) of the United Nations, including food, nutrition, agriculture, fisheries, forestry, environment etc. It is published by FAO and edited by a community of experts.

Source: [FAO.org](http://FAO.org)

AGROVOC is a multilingual controlled vocabulary covering all areas of interest to the Food and Agriculture Organization of the United Nations (FAO), including food, nutrition, agriculture, fisheries, forestry and the environment. The vocabulary consists of over 35,000 concepts with up to 671,000 terms in different languages. It is a collaborative effort, edited by a community of experts and coordinated by FAO. (Wikipedia)

## WordNet Search - 3.1

- [WordNet home page](#) - [Glossary](#) - [Help](#)

Word to search for:

Display Options:

Key: "S:" = Show Synset (semantic) relations, "W:" = Show Word (lexical) relations

Display options for sense: (gloss) "an example sentence"

### Noun

- **S: (n) wordnet** (any of the machine-readable lexical databases modeled after the Princeton WordNet)
- **S: (n) WordNet, Princeton WordNet** (a machine-readable lexical database organized by meanings; developed at Princeton University)

Source: [wordnet.princeton.edu](http://wordnet.princeton.edu)

WordNet is a lexical database of semantic relations between words in more than 200 languages. WordNet links words into semantic relations including synonyms, hyponyms, and meronyms. The synonyms are grouped into synsets with short definitions and usage examples. WordNet can thus be seen as a combination and extension of a dictionary and thesaurus (Wikipedia)

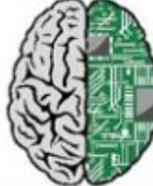
# A Hybrid Approach to Conducting Systematic Maps and Reviews

Dictionary + : Combining Lexical Database with Expert Pooled Evidence Dictionaries for Queries

But lexica are not sufficient alone !!!

All systematic reviews and maps have unique elements

Until artificial intelligence software are good enough, the best we have is human brain

	Computing wins	<ul style="list-style-type: none"><li>• Input and output</li><li>• Information processing and memory</li></ul>
	Closely matched	<ul style="list-style-type: none"><li>• Complex movement</li><li>• Vision</li><li>• Language</li><li>• Structured problem solving</li></ul>
	Brain still wins	<ul style="list-style-type: none"><li>• Creativity</li><li>• Emotion and Empathy</li><li>• Planning and Executive Function</li><li>• Consciousness</li></ul>

Source: [becominghuman.ai](http://becominghuman.ai)

# A Hybrid Approach to Conducting Systematic Maps and Reviews

Dictionary + : Combining Lexical Database with Expert Pooled Evidence Dictionaries for Queries



1. Create a dictionary from speciality lexicon (Agrovoc)
2. Update the dictionary with filling the gaps in the speciality lexicon with general lexicon (Wordnet)
3. Collect evidence related to the map or review content from a set of (randomly sourced) experts
4. Analyze the evidence set to identify most common and central words and phrases
5. Update the dictionary with the vocabulary from the evidence set
6. Convert it into query

# A Hybrid Approach to Conducting Systematic Maps and Reviews

Dictionary + : Combining Lexical Database with Expert Pooled Evidence Dictionaries for Queries



- Root
  - Knowledge
    - Knowledge activities - EXPERT
    - Knowledge objects - EXPERT
    - Knowledge types - EXPERT
  - Context
    - Spatial context
      - Country - WORDNET
        - Countries - AGROVOC
          - India
          - Bangladesh
          - Nepal
        - Region
          - South Asia
        - Continent
        - Rurality
      - Other
        - Recreational areas - AGROVOC
      - Scales
      - Ecological
        - Climatic zones - AGROVOC
        - Protected areas
        - Entities - Soil Types - AGROVOC
          - Anthropogenic soils
          - Chemical soil types
          - Climatic soil types
          - Cultural soil types
          - Ecological soil types
          - Genetic soil types
          - World Reference Base soil types
          - Lithological soil types
          - Mineralogical soils
          - Palaeosolic soil types
          - Physiographic soil types
          - Structural soil types
          - Textural soil types
      - Administrative
        - Sites - AGROVOC
      - Physiographic features - AGROVOC
        - Inland waters - AGROVOC - TO BE FILLED
        - International waters - AGROVOC - TO BE FILLED
        - Land cover - AGROVOC - TO BE FILLED
        - Landforms - AGROVOC
        - Marine areas - AGROVOC - TO BE FILLED
        - Ponds - AGROVOC
        - Wetlands - AGROVOC
        - Soil morphological features
    - Temporal context
      - Year

Search items	Whole word	Case sensitivity	Starting letters
ecological soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bog soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
forest soils	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
grassland soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
heathland soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
marshland soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
prairie soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
rangeland soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
scrubland soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
swamp soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
virgin soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
wetland soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Name	Owner	Last modified	File size	
20200408 - Scaling Readiness 2nd R...	me	Apr 12, 2020	me	596 KB
Bello 2014 Ag Extension in Suda...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	791 KB
Edelenbos et al. 2010 Interfaces ...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	200 KB
Hagman and Gilman 2017	me	Apr 12, 2020	me	936 KB
IFAD 2014 Lessons learned on S...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	450 KB
IFAD 2014 Practitioner's guide - L...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	6 MB
IFAD 2016 Approach for SSTC E...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	311 KB
IFAD 2016 Approach Paper Evala...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	560 KB
IFAD 2017 Approach Paper Impa...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	1 MB
IFAD 2018 Approach Paper PPE ...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	756 KB
Irwis et al. 2018 Knowledge refs...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	834 KB
kileu2011.pdf	Emilie Vansant	Apr 16, 2020	Emilie Vansant	210 KB
KMADJ3221-37.pdf	Emilie Vansant	Apr 16, 2020	Emilie Vansant	179 KB
Mansfield 2015 KM-CAST cap. a...	Akmal Akramkhanov	Apr 13, 2020	Akmal Akramkhanov	38 KB
mugo2012.pdf	Emilie Vansant	Apr 16, 2020	Emilie Vansant	221 KB
oreszczyn2010.pdf	Emilie Vansant	Apr 16, 2020	Emilie Vansant	487 KB

## Expert Pooled Evidence

1. Scanned more than 100 people (LinkedIn and ResearchGate)
2. Outreached to more than 30 ppl
3. 9 people (mostly insiders) returned with literature resources
4. About 40 journal articles, book chapters, communication products collected

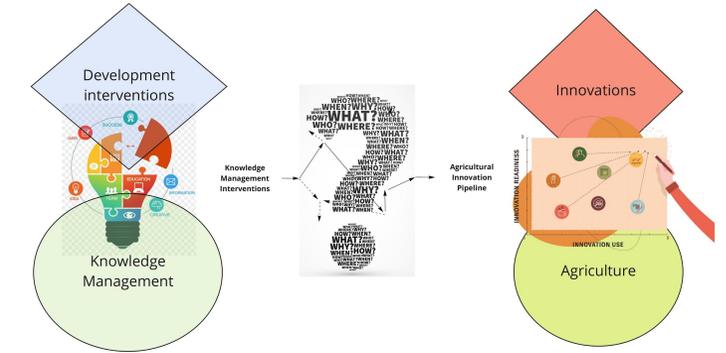


# A Hybrid Approach to Conducting Systematic Maps and Reviews

Dictionary + : Combining Lexical Database with Expert Pooled Evidence Dictionaries for Queries



Knowledge Management	Intervention (30)	Innovation (45)	Agriculture (15)	Pipeline (14)
knowledge	project	innovation	farmer	development
management	activity	information	agricultural	system
KM	strategy	practice	rural	research
KMS	policy	approach	agriculture	study
	support	technology	crop	design
	network	new	water	assessment
	implementation	institutional	field	plan
	government	extension	land	paper



Web of Science

Search

Results: 226

You searched for: TOPIC: ("knowledge management" OR "knowledge creation" OR "knowledge generation" OR "knowledge capture" OR "knowledge storage" OR "knowledge retrieval" OR "knowledge enhancement" OR "knowledge dissemination") AND TOPIC: (project OR activity OR strategy OR policy OR support OR network OR implementation) AND TOPIC: (innovation OR information OR practice OR approach OR technology OR new OR institutional OR service OR tool OR organizational) AND TOPIC: (farmer OR agricultural OR rural OR agriculture) AND TOPIC: (development OR system OR research OR study)

Timespan: All Years. Indexes: SCI-EXPANDED, SSCI, AH&L, ESCI, ...Less

Create an alert

Sort by: Date | Times Cited | Usage Count | Relevance

1. Ethical practice in my work: community health workers' perspectives using photovoice in Wakiso district, Uganda  
By: Musoke, David; Soemgabo, Charles; Ndegi, Rawlance; et al.  
BMC MEDICAL ETHICS Volume: 21 Issue: 1 Article Number: 68 Published: AUG 2020

2. Promoting Behavioral Change Using Text Messages: A Case Study of Blackberry Farmers in Ecuador  
By: Carrion-Yaguna, Vanessa D.; Ahwang, Jeffrey; Barrera, Victor H.  
JOURNAL OF AGRICULTURAL AND APPLIED ECONOMICS Volume: 52 Issue: 3 Pages: 398-419 Published: AUG 2020

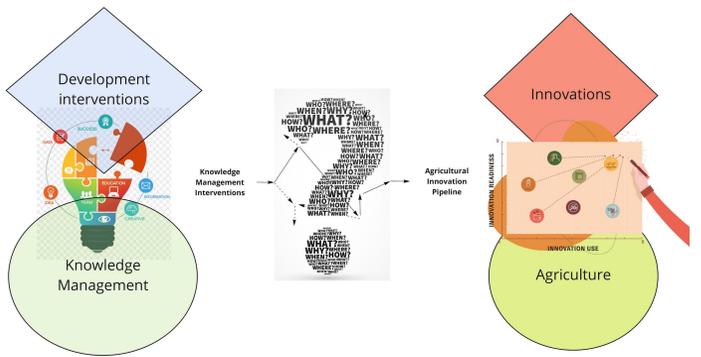
3. Digitalization in the agri-food industry: the Beziehung between technology and sustainable development  
By: Carmelo Amadi, Maria; Brunetta, Federica; Capu, Francesca; et al.

# A Hybrid Approach to Conducting Systematic Maps and Reviews

## Metadata Curation Using Academic Reference Management Tools



Database Name	Literature Found	Duplicates	Has PDF	Has No PDF	Journal Article	Book	Book Chapter
Scopus	657	55	313	289	312	207	81
WoS	225	78	145	2	116	2	1
AGRIS	290	113	139	38	48	12	2
Pubmed	75	0	72	3	72	0	0
AgEcon	10	0	10	0	4	0	1
Cab Abstracts EBSCOHOST	618	14	433	171	453	0	0
Cab Abstracts OVID	200	16	121	63	180	0	0
Total V2.	1715	556	554	873	837	226	86
Total v3.	2075	276	1233	566	1185	221	85
Overall - Cutpoint	1539	0	1001	538	910	230	90
After Final Curation			936				



# A Hybrid Approach to Conducting Systematic Maps and Reviews

## Combining Computer Mapping with Human Audit



Strengthening Knowledge Management  
for Greater Development Effectiveness  
in the Near East, North Africa,  
Central Asia and Europe

**Document System**

de Brauw et al. 2018 - Biofortification, Crop Adoption and Heal	151
Girard et al. 2017 - Promotion of Orange-Fleshed Sweet Potato I	76
Hagenimana and Low 2000 - Potential of Orange-fleshed Sweet Pot	37
Hagenimana et al. 2001 - Enhancing Vitamin A Intake in Young Ch	74
Hummel et al. 2018 - Sensory and cultural acceptability tradeof	114
Jongstra et al. 2020 - Iron Absorption from Iron-Biofortified S	42
Kiarie et al. 2016 - Biochemical relationships involving multip	44
Lagerkvist et al. 2016 - Nutrition promotion messages - The eff	72
Lagerkvist et al. 2020 - Predictors of Intention to Integrate B	95
Levin et al. 2019 - What is the cost of integration - Evidence	82
Low et al. 2020 - Nutrient-Dense Orange-Fleshed Sweetpotato - A	237
Malavi et al. 2018 - Good Manufacturing Practices and Microbial	63
Malavi et al. 2021 - Effect of food safety training on behavior	64
Mithamo et al. 2020 - Acceptability of a mushroom enriched comp	29
Mudege et al. 2017 - Women and men farmer perceptions of econom	97
Mudege et al. 2018 - Correction to - Women and men farmer perce	9
Mutiso et al. 2018 - Effect of nutrition education and psychoso	95
Mwanga and Ssemakula 2011 - Orange-fleshed sweetpotatoes for fo	52
Mwanga et al. 2007 - Release of Two Orange-fleshed Sweetpotato	29
Mwanga et al. 2007 - Release of two orange-fleshed sweetpotato	28

**Code System**

- Code System (3036)
  - MAXDICTIO (0)
    - Components (9)
      - Business training (0)
      - Plant material (224)
      - Agricultural extension (66)
      - Contract farming (0)
      - Cold chain (2)
      - Processing equipment (2)
      - Credit (21)
      - Information campaign (21)
      - Demonstration (0)
    - Core Innovation (0)
      - Orange Fleshed Sweet Potato (278)
        - Roots (189)
        - Vine (102)
        - Puree (32)
        - Bread (32)
    - Evidence Type (0)
      - None (256)

**Document Browser: Wanjuu et al. 2019 - Consumer knowledge and attitude tow... (Page 1/7)**

moderately." There was a significant relationship between socio-demographics, knowledge about the root, the bread

versatile ingredient in food processing and culinary arts. In Kenya, the SUSTAIN (Scaling Up Sweetpotato Through Agriculture and Nutrition) project piloted the commercialization of baked products containing OFSP as a major ingredient. A variety of processed products that contain OFSP as the main ingredient such as bread and buns are commercially available. The successful commercialization of these OFSP-based products depends on how well the consumers accept them.

In Kenya, bread is consumed by millions of people of different socio-economic status. The quality of OFSP bread is defined by its characteristics that lead to consumer satisfaction and contentment. The attributes of OFSP bread encompasses nutritional values, functional aspects, sensory properties (appearance, texture, taste, and aroma), chemical constituents and mechanical properties. Various parameters can be used to determine the

\*Corresponding author: **Tawanda Muzhingi**, Food and Nutritional Evaluation Laboratory, International Potato Center (CIP) Regional Office for Africa, International Livestock Research Center (ILRI), Old Naivasha Road, Uthiru, Nairobi, Kenya, Tel: +254 (0)20 422-3639, Email: [T.muzhingi@cgiar.org](mailto:T.muzhingi@cgiar.org)

**Cecilia Wanjuu, George Abong**, Department of Food Science, Nutrition and Technology, University of Nairobi, P.O. Box, 29053-00625 Kangemi, Kenya

**Temesgen Becher, Jan Low, Daniel Mbogo, Simon Heck, Tawanda Muzhingi**, International Potato Centre (CIP) Sub-Saharan Africa (SSA) Regional Office, Old Naivasha Road, P.O. Box 25171-00603, Nairobi, Kenya

**Daniel Mbogo, Tawanda Muzhingi**, Food and Nutritional Evaluation Laboratory (FANEL), CIP-SSA, Biosciences east and Central Africa (BeCA), ILRI, Old Naivasha Road, Nairobi, Kenya

Open Access. © 2019 Cecilia Wanjuu et al., published by De Gruyter. This work is licensed under the Creative Commons Attribution 4.0 Public License.

DE GRUYTER Consumer Knowledge and Attitude Towards (OFSP) Pure Bread in Kenya — 617

quality of commodities (Popper et al. 2004). The level of consumer acceptability is usually assessed by asking consumers to rate how much they like a product (Menon et al. 2015). A product may be proven to have health benefits but may not be accepted if it is unattractive to consum-

puree bread, assessing their socio-demographic factors, knowledge, and practices about OFSP and OFSP bread, product acceptance through sensory evaluation and their willingness to pay.

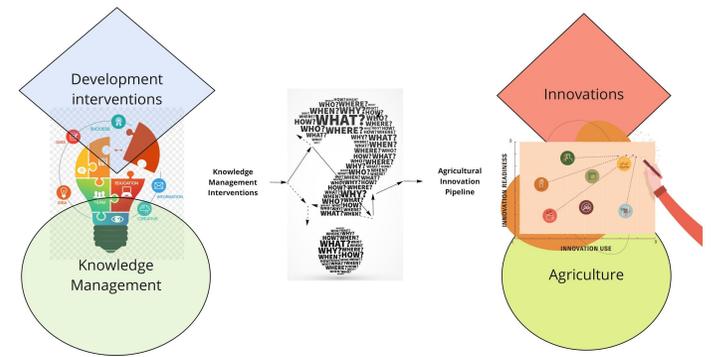
**Retrieved Segments**

**1 coded segment (from 1 document, 1 document group)**

**Neela and Fanta 2019 - Review on nutritional composition of ora**

Prolonged storage of OFSP is usually achieved by drying (sun drying), and during the traditional drying (sun drying) techniques, microbial contamination was reported as the major problem due to the high moisture content of the fresh OFSP. Amajor et al. (2014) reported that OFSP flours can produce by sun drying and milling of the fresh OFSP roots. OFSP flour prepared by milling of dried slices can also utilize as entire flour or as a combined with others. Some of the reported studies on animal or human studies related to the role of OFSP in VAD management are summarized in Table 6.

12 | PRODUCTS FORM OFSP  
Orange-fleshed sweet potato consumed frequently in family meal

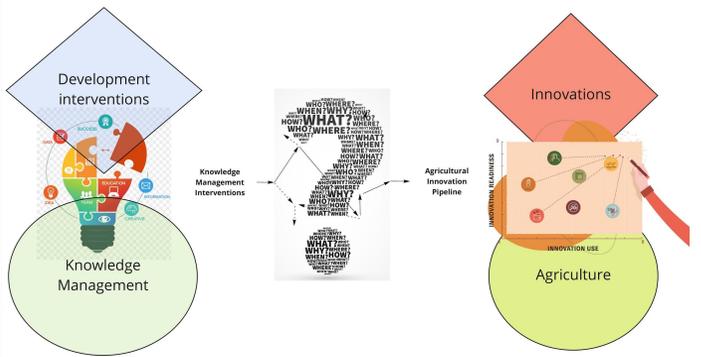


# A Hybrid Approach to Conducting Systematic Maps and Reviews

## A Realist Approach Using Computer Aided Evidence Prioritization



	Knowledge	Knowledge \ Knowledge activities	Knowledge \ Knowledge objects	Context	Context \ Spatial context	Context \ Spatial context \ Country	Context \ Spatial context \ Region	Context \ Spatial context \ Other	Context \ Spatial context \ Scales	Context \ Spatial context \ Ecological	Context \ Spatial context \ Continental
Aabeyir and Kobo-bah 2012 - Experiences in mainstreaming monito	13	8	88	55	73	0	0	0	73	7	4
Aare et al. 2020 - Methodological Reflections on Monitoring Int	86	9	262	24	46	3	0	0	191	11	4
Abee 2006 - Application of criteria & indicators of sustainable	0	0	70	23	7	10	0	0	48	29	0
Abenet Yabowork et al. 2017 - Making CGIAR outputs open and acc	22	15	118	8	27	3	0	0	89	6	2
Abubaker 2019 - Book of Abstracts - 6th International Conferenc	14	7	79	13	14	2	0	0	111	7	3
Abubaker and Abeysinghe 2018 - 5th International Conference on	9	1	597	124	74	94	5	0	2387	96	207
....	19	0	305	31	62	16	1	0	118	5	19



# SKIM

Strengthening Knowledge Management  
for Greater Development Effectiveness  
in the Near East, North Africa,  
Central Asia and Europe



# Thank You

