

References

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- [4] <ftp://ftp.fao.org/docrep/fao/009/a0800e/a0800e08.pdf>
- [5] N.Rai *et al*, "Enhancing vegetable production in north eastern Hill region," Indian Institute of vegetable research
- [6] R de la Pena & J Hughes, "Improving vegetable productivity in a variable and changing climate," The world vegetable center
- [7] "Diffusion of conservation farming technologies in upcountry vegetable farming system-trends and effects" research study, Hector Kobbekadawa Agrarian research and Training Institute (HARTI)
- [8] Michle E. Davis and Jon A. Phillips , Learning PHP and MySQL
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- [10] Roger S. Pressman, Software Engineering sixth edition
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Appendix A – Project plan

ID	ID	Task Name	Duration	Start	Finish	Predecessors
1	1	Proposal Writing				
2	1.1	Information Collecting	22 days?	Mon 4/2/12	Tue 5/1/12	
3	1.2	Problem Identification	6 days?	Mon 4/2/12	Mon 4/9/12	
4	1.3	Writing a draft proposal	5 days?	Tue 4/10/12	Mon 4/16/12	2
5	1.4	Obtaining supervisor's comments	5 days?	Tue 4/17/12	Mon 4/23/12	3
6	1.5	Proposal Finalizing	2 days?	Tue 4/24/12	Wed 4/25/12	4
7	2	Information Gathering	4 days?	Thu 4/26/12	Tue 5/1/12	5
8	2.1	Gathering of sample survey data	22 days?	Wed 5/2/12	Thu 5/31/12	5
9	2.1.1	Overview of required information	17 days?	Wed 5/2/12	Thu 5/24/12	6
10	2.1.2	Formation of questionnaires	3 days?	Wed 5/2/12	Fri 5/4/12	
11	2.1.3	Collection of field survey data	4 days?	Mon 5/7/12	Thu 5/10/12	9
12	2.1.4	Designing a database	6 days?	Fri 5/11/12	Fri 5/18/12	10
13	2.2	Gathering of retail prices	4 days?	Mon 5/21/12	Thu 5/24/12	11
14	2.2.1	Prepare a form for data	9 days?	Mon 5/21/12	Thu 5/31/12	
15	2.2.2	Obtain monthly prices	3 days?	Mon 5/21/12	Wed 5/23/12	
16	2.2.3	Design a database	3 days?	Thu 5/24/12	Mon 5/28/12	14
17	3	Building of models	3 days?	Tue 5/29/12	Thu 5/31/12	15
18	3.1	Survey data analysis	21 days?	Fri 6/1/12	Fri 6/29/12	
19	3.1.1	Coding & classification	12 days?	Fri 6/1/12	Mon 6/18/12	
20	3.1.2	Grouping	2 days?	Fri 6/1/12	Mon 6/4/12	
21	3.1.3	Storing	1 day?	Tue 6/5/12	Tue 6/5/12	19
22	3.1.4	Analysis	1 day?	Wed 6/6/12	Wed 6/6/12	20
23	3.1.5	Build up regression models	6 days?	Thu 6/7/12	Thu 6/14/12	21
24	3.2	Analysis of retail prices	2 days?	Fri 6/15/12	Mon 6/18/12	22
25	3.2.1	Calculating seasonal indices	9 days?	Tue 6/19/12	Fri 6/29/12	
26	3.2.2	Obtaining price forecasting models	4 days?	Tue 6/19/12	Fri 6/22/12	
27	4	Analysis and Design	5 days?	Mon 6/25/12	Fri 6/29/12	25
28	4.1	Requirement analysis	15 days?	Tue 7/3/12	Mon 7/23/12	
29	4.2	Drawing system diagrams	5 days?	Tue 7/3/12	Mon 7/9/12	
30	4.3	Designing	6 days?	Tue 7/10/12	Tue 7/17/12	28
31	5	Submission of interim report	4 days?	Wed 7/18/12	Mon 7/23/12	29
32	5.1	Writing of interim report	8 days?	Mon 7/23/12	Wed 8/1/12	
			6 days?	Mon 7/23/12	Mon 7/30/12	

Page 1

ID	ID	Task Name	Duration	Start	Finish	Predecessors
33	5.2	Preparing of presentation	1 day?	Tue 7/31/12	Tue 7/31/12	32
34	5.3	Conducting of presentation	1 day?	Wed 8/1/12	Wed 8/1/12	33
35	6	Implementation & Testing	42 days?	Thu 8/2/12	Fri 9/28/12	
36	6.1	Installation of required software	1 day?	Thu 8/2/12	Thu 8/2/12	
37	6.2	Make databases	4 days?	Fri 8/3/12	Wed 8/8/12	36
38	6.3	Writing PHP codes	17 days?	Thu 8/9/12	Fri 8/31/12	37
39	6.4	Testing the system	11 days?	Mon 9/3/12	Mon 9/17/12	38
40	6.5	Obtaining comments from supervisor	3 days?	Tue 9/18/12	Thu 9/20/12	39
41	6.6	Finalizing	6 days?	Fri 9/21/12	Fri 9/28/12	40
42	7	Completion	23 days?	Mon 10/1/12	Wed 10/31/12	
43	7.1	Writing final report	19 days?	Mon 10/1/12	Thu 10/25/12	
44	7.2	Submission	1 day?	Fri 10/26/12	Fri 10/26/12	43
45	7.3	Presentation	1 day?	Wed 10/31/12	Wed 10/31/12	44

Appendix B – The questionnaire

1. Farmer's Name
.....
2. Address
.....
3. District
.....
4. G.N. Division
.....
5. D.S. Division
.....
6. Agro ecological Zone
.....

1. Household Characteristics (State the details of the farmer first)

Relationship to head of household (code)	1.Female 2.Male	Age (Yrs)	Level of education (grade)	Involved in veg. cultivation 1.Yes 2.No	Employment(code2)& Income			
					Main Occupation	Monthly Income (Rs.)	Secondary Occupation	Monthly Income (Rs.)

Code 1

Code 2

- 1. Head of household
- 2. Husband/Wife
- 3. Child
- 4. Others

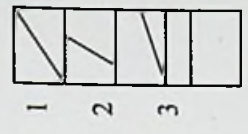
- 1. Cultivation of upcountry
- 2. Cultivation of other vegetable
- 3. Agri. Laborer
- 4. Non Agri. Laborer
- 5. Trained employments
- 6. Foreign employments
- 7. Private Sector employments
- 8. Govt. employments

- 9. Skilled employments
- 10. Self employments
- 11. Animal husbandry
- 12. Paddy
- 13. Onion
- 14. Minor export crops
- 15. Others

4. Land Utilization

Parcel No	Acreage	Type of land (code 1)	Ownership of land (code 2)	Slope of land	Crop cultivated (code 3)	Yield (Kg)	Price (Rs.)	Income (Rs.)	Made of water supply (code 4)	Crop cultivated (code 3)	Yield (Kg)	Price (Rs.)	Income (Rs.)	Made of water supply (code 4)	Crop cultivated (code 3)	Yield (Kg)	Price (Rs.)	Income (Rs.)	Made of water supply (code 4)	

Slop of land



Code 4

- 1. Rained
- 2.

Code 3

- 1. Potato
- 2. Beans
- 3. Carrot
- 4. Cabbage
- 5. Leeks
- 6. Knoch-Khol
- 7. Beet-root
- 8. Raddish
- 9. Tomato
- 10. Capsicum
- 11. Paddy
- 12. Onion
- 13.
- 14. Others

Code 2

- 1. Sole owned
- 2. Joint owned
- 3. Rented in
- 4. Leased in
- 5. Mortgaged in
- 6. "Thattumaru"
- 7. "Katimaru"
- 8.
- 9. Temple land leased in
- 10. Others

Code 1

- 1. Highland
- 2. Lowland

4

5. Conservation of land

Parcel No	Height of (Code 5)	Intensity of soil (Code 6)	Method of conservation (Code 7)	Length, Width, deeply	Present Status (Code 8)	Total Cost						Period of Main tenance				
						Labor		Cost		Amount			Family	Hired	Labor	Met hod
						Owned	Hired	Labor	Method							

Code 5

- 1 - Less than one feet
- 2 - One to Two feet
- 3 - Above two feet

Code 6

- 1 - Excessive
- 2 - Average
- 3 - No erosion

7. Farmers Knowledge regarding agro ecological Problems.

7.1 Do you aware with the following agro ecological problem regarding cultivation of up – country vegetables

Agro- ecological problem	Awareness		
	Sufficient	Insufficient	Not known
Soil erosions and related Problem			
Excessive use of fertilizer and related problem			
Excessive use of pesticides and related problems			

7.2 Participated in training /Educational Program during last 5 Years

1. Yes 2. No

7.3 Sources of Agricultural knowledge and other information for vegetable farmers

Instructor	Frequency of meeting	Services obtained	Problems/difficulties
		1.	
		2.	
		3.	
		1.	
		2.	
		3.	

8. Use of Protective measures relating to vegetable farming

8.1 Awareness about the insecticides

Description				Chemical insecticides			Integrated insect control		
	Y	N	S/ST	Y	N	S/ST	Y	N	S/ST
1. Aware									
2. Used in vegetable cultivation									
3. Obtained easily?									
4. Condition/Quality /good									
5. Advantages if used?									

Y = Yes N = No S/ST = Some/Sometimes

9.3 Farmers Knowledge about use of fertilizer

Description	Mixture of fertilizer			Pure fertilizer		
	Y	N	S/ST	Y	N	S/ST
1. Aware						
2. Used in vegetable cultivation						
3. Obtained easily?						
4. Condition/Quality /good						
5. Advantages if used?						

Y = Yes N = No S/ST = Some/Sometimes

11. Awareness on soil acidity

11.1 Do you know about the soil acidity?

Appendix C – List of coding

1. District (dis1)

- | | |
|-------------|------------------|
| 1 - Matale | 2 - Nuwara-eliya |
| 3 - Badulla | 4 - Kandy |

2. Agro ecological zone(Aez1)

- | | | |
|-----------|-----------|-----------|
| 1 - DL 1b | 2- IL2 | 3 - IL3 |
| 4 - IM 3b | 5- IM 1b | 6 - WU3 |
| 7 - WU2b | 8 -WM2a | 9 - IU3d |
| 10- IU3e | 11- IU3a | 12 - IU2 |
| 13 - IM3c | 14 - WM3b | 15 - WU2b |

3. Gender (Sex)

- 1 - Female 2 - Male

4. Age group (Age1)

- 1 - Age \leq 35 2 - 35 < Age \leq 50 3 - 50 < Age

5. Level of Education(edu1)

- | | |
|--------------------|---------------|
| 1 - Primary | 2 - Secondary |
| 3 - O/L and/or A/L | 4 - Higher |

6. Main occupation (occu1)

- 1 - Vegetable cultivation 2 - Other

7. Monthly income(incgrp)

- 1 - Low 2 - Medium 3- Upper

8. Farmer's knowledge regarding agro ecological problems (prknow) Soil erosion/excess use of fertilizer and agro chemicals

- 1 - Not known 2 - Insufficient 3 - Sufficient

9. Whether the farmer's participated for training programs during last five years

- 1 - Yes 2 - No

10. Sources of Agricultural knowledge and other information for vegetable farmers(agrknow1)

- | | |
|-------------------------|--------------------------------------|
| 1 - Government officers | 2 - Private institutions (personnel) |
|-------------------------|--------------------------------------|

11. Awareness about use of protective measures relating to vegetable farming(promtd1)
On Neem/chemical insecticides/integrated insect control
- 1 – No 2 – Some times 3 – Yes
12. Farmers knowledge about use of fertilizer(ferti1)
Mixtures of fertilizers/ pure fertilizer
- 1 – No 2 – Some time 3 – Yes
13. Awareness on soil acidity(q11111)
- 1 – Yes 2 – No
14. Type of plot(plotyp1)
- 1 – High land 2 – Low land
15. Slope of the plot(plotslop1)
- 1 – Flat land 2 – Less than 45 degrees
3 – 45 Degrees 4 – Above 45 Degrees
16. Height of the top soil(height1)
- 1 – Less than one feet 2 – One to two feet 3 – Two or above
17. Soil erosion Intensity(intensity1)
- 1 – Excess 2 – Average
3 – No erosion
18. Season (season1)
- 1 – Maha 2 – Yala 3- Intermediate
19. Cultivated crop(crop1)
- 1 – Potatoes 2 – Beans
3 – Carrot 4 – Cabbage
20. Extent cultivated in Ac (extnt1)
- 1 – Extent < 0.25 2 – 0.25=< extent < 0.5
3 – 0.5 =< Extent < 0.75 4 – 0.75=< Extent < 1
5 – 1.0 or above

Appendix D- Reg. models

District	Crop	Season	AGE1	EDU1	OCCU1	INCGRP	PRKNOW	Q721	AGRKNO1	PROMTD1	FERTIL	Q1111	PLOTTYP1	PLOTSLOP1	HEIGHT1	INTENSITY1	EXTNT1	Constant
Matale	Beans	Maha	-2091			1520	-1530			-2031	-2304	-1898		1217		1170	715	14381
Matale	Cabbage	Maha		-2177	1529	-417	2627	2663		-468		-5290			6917	1208	3324	-17109
Matale	Cabbage	Yala				4680		2478	-2386		-1202				-2202		739	1338
Nuwara Eliya	Potato	Maha			8063			-5586	5217								2390	-9959
Nuwara Eliya	Carrot	Maha	173	276	-924	1458	31		-1195	2497				746	-254	1424	1620	-12671
Nuwara Eliya	Carrot	Yala	-3222	3555	1951	-5096	-8581	-9827	4851	-16247	412	-3435	-56		-3465	7539	3087	56986
Nuwara Eliya	Cabbage	Yala	15837	-18871	11561	27100		-13121	37422	80096	-13664	-48329		35039	-29867		1705	-180930
Badulla	Potato	Maha	-2158	-2519	-22128	3302	-6588	-19539	12436		20997	-5473	19015		5592	-11950	-1177	15330
Badulla	Beans	Maha	-863	-689	1034		987	-882	1975	483	2996	-882	1861					-11002
Badulla	Potato	Yala			1424								1381				775	-3396
Badulla	Beans	Yala	-28625	-10185	-44080	-4585	-25063	55830	-38093	12193	39193	5303	20995	4.15E	10880		5990	803
Kandy	Beans	Maha		-56		-1506				-1717	-1156				-1033		444	10439
Kandy	Carrot	Maha	-697				-1343	-2457		2844	235	-2306		-665	-1009			5134
Kandy	Cabbage	Maha					-2210	395					2210			480	85	3120
Kandy	Beans	Yala				-2120				-143	757				-577		110	-2120
Kandy	Carrot	Yala			-3075	-3528	-8390	-4025		8393	4995			-4036	5772	6351	3575	-15549
Kandy	Cabbage	Yala	-19		-1048		2581	-1338	1283	-48	1766			262	-1078	150	2014	-10602
Kandy	Carrot	Intermedi	2534	640	1284	-1793	-1171			3639	-1543			1083	-2085	2609	-527	-10600
Kandy	cabbage	Intermedi		92		2209	-2593			3689	-672	-3271	-824		-1679	-1000	1635	6885

Appendix E- forecasting models

Crop	Exponential	Linear	Logarithmic	Polynomial	Power
Beans	$y = 42.89e^{0.007x}$ $R^2 = 0.833$	$y = 0.563x + 38.06$ $R^2 = 0.786$	$y = 18.04\ln(x) + 3.319$ $R^2 = 0.583$	$y = 0.002x^2 + 0.285x + 43.72$ $R^2 = 0.798$	$y = 24.91x^{0.267}$ $R^2 = 0.697$
	$y = 31.78e^{0.007x}$ $R^2 = 0.711$	$y = 0.378x + 28.51$ $R^2 = 0.640$	$y = 11.84\ln(x) + 6.223$ $R^2 = 0.454$	$y = 0.002x^2 + 0.085x + 34.48$ $R^2 = 0.666$	$y = 19.89x^{0.237}$ $R^2 = 0.558$
Carrot	$y = 40.94e^{0.007x}$ $R^2 = 0.763$	$y = 0.549x + 36.22$ $R^2 = 0.704$	$y = 17.23\ln(x) + 3.747$ $R^2 = 0.501$	$y = 0.002x^2 + 0.242x + 42.47$ $R^2 = 0.719$	$y = 24.59x^{0.259}$ $R^2 = 0.592$
	$y = 50.88e^{0.005x}$ $R^2 = 0.681$	$y = 0.348x + 49.17$ $R^2 = 0.659$	$y = 11.86\ln(x) + 24.96$ $R^2 = 0.554$	$y = 0.001x^2 + 0.124x + 53.72$ $R^2 = 0.677$	$y = 34.28x^{0.182}$ $R^2 = 0.663$

Appendix F- Most suitable models

cropcode	Crop	ModelNo	Model Name	Equation	Correlation	coeval1	coeval2	coeval3
01	Beans	1	Exponential	$y = 42.89e^{0.007x}$	$R^2 = 0.833$	42.89	0.007	
02	Cabbage	1	Exponential	$y = 31.78e^{0.007x}$	$R^2 = 0.711$	31.78	0.007	
03	Carrot	1	Exponential	$y = 40.94e^{0.007x}$	$R^2 = 0.763$	40.94	0.007	
04	Leeks	1	Exponential	$y = 35.52e^{0.008x}$	$R^2 = 0.847$	35.52	0.008	
05	Red pumpkin	4	Quadratic	$y = 0.004x^2 - 0.215x + 28.21$	$R^2 = 0.804$	0.004	-0.215	28.21
06	Beet root	4	Quadratic	$y = 0.0054x^2 - 0.1446x + 44.889$	$R^2 = 0.7005$	0.0054	-0.1446	44.889
07	Ladies fingers	4	Quadratic	$y = 0.0032x^2 - 0.0221x + 29.237$	$R^2 = 0.8803$	0.0032	-0.0221	29.237
08	Bitter gourd	4	Quadratic	$y = 0.0056x^2 - 0.1932x + 42.721$	$R^2 = 0.8706$	0.0056	-0.1932	42.721
09	Brinjals	1	Exponential	$y = 27.568e^{0.0078x}$	$R^2 = 0.7804$	27.568	0.0078	
10	Potatoe	1	Exponential	$y = 50.88e^{0.005x}$	$R^2 = 0.681$	50.88	0.005	

Appendix G – Use cases and Activity diagrams

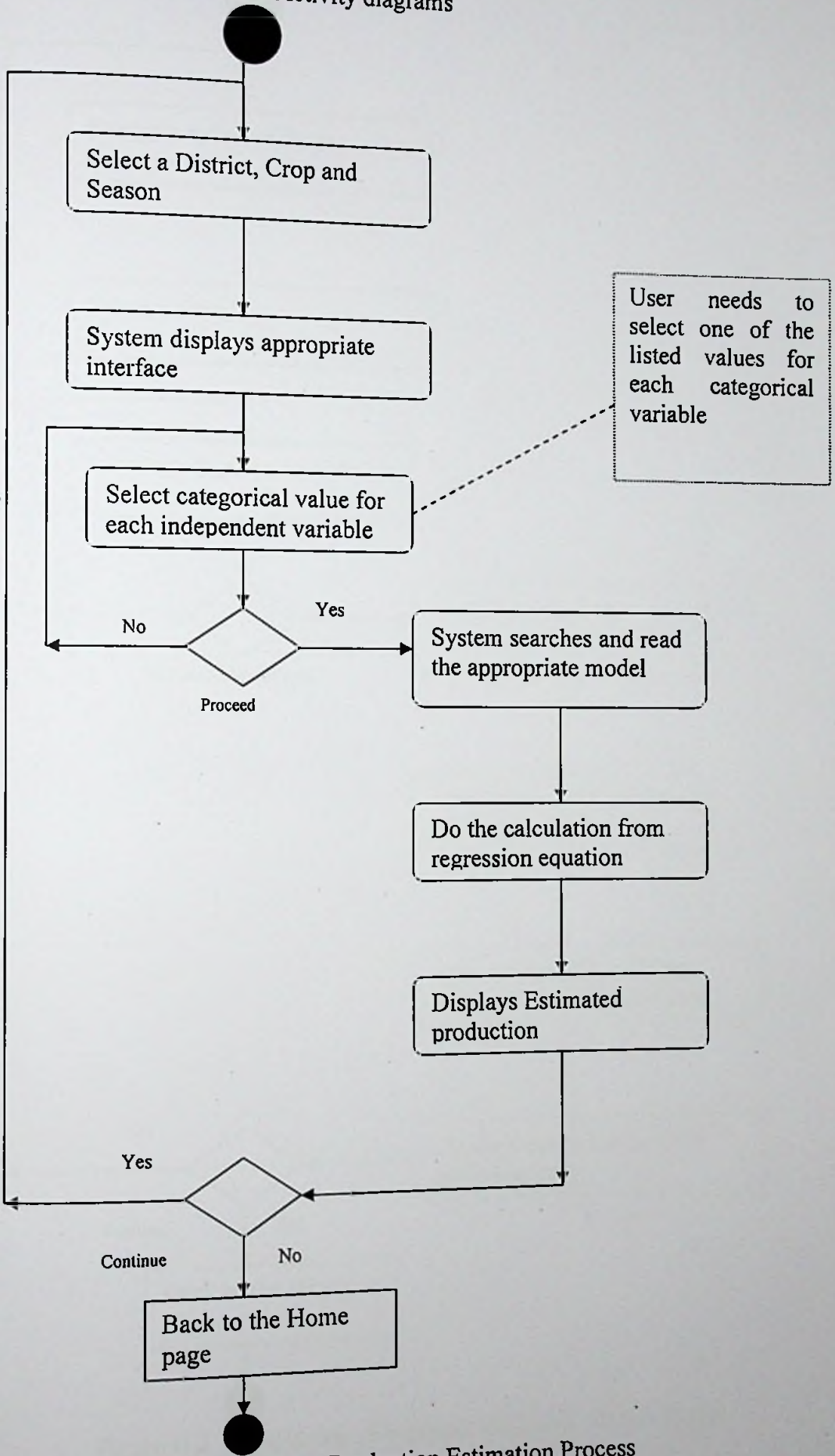


Figure G.1 – Production Estimation Process

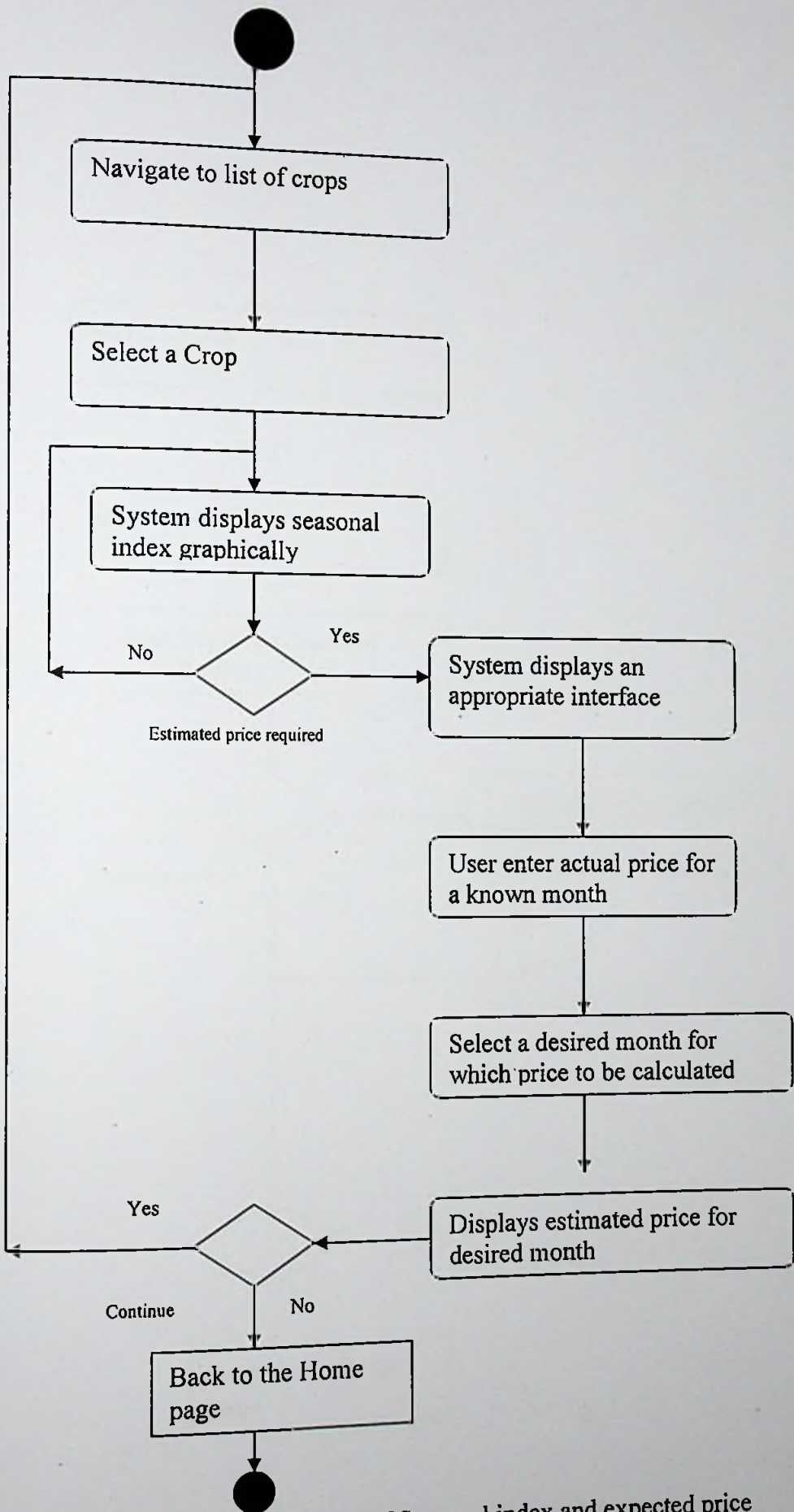


Figure G.2 – Displaying of Seasonal index and expected price

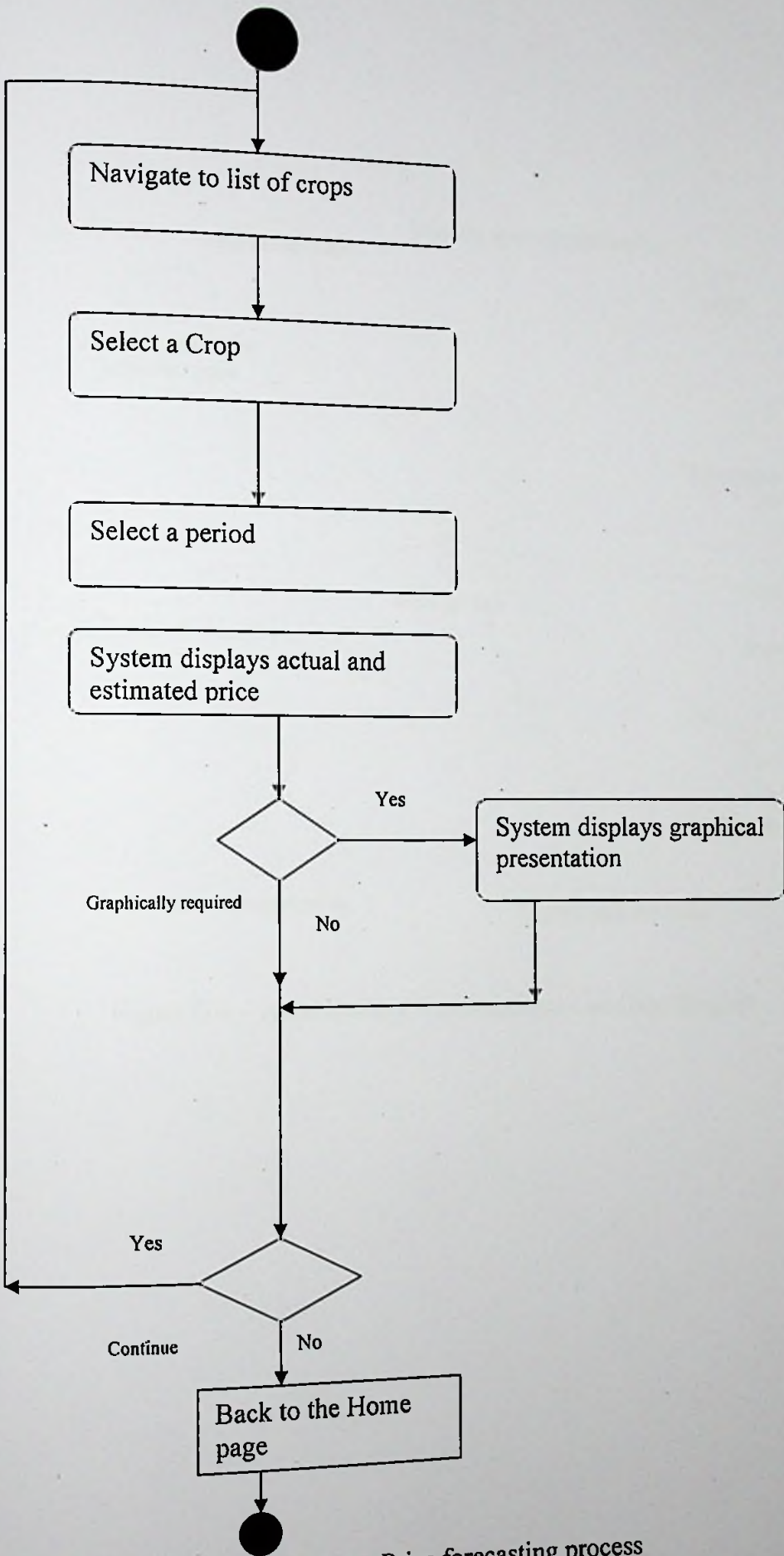


Figure G.3 – Price forecasting process

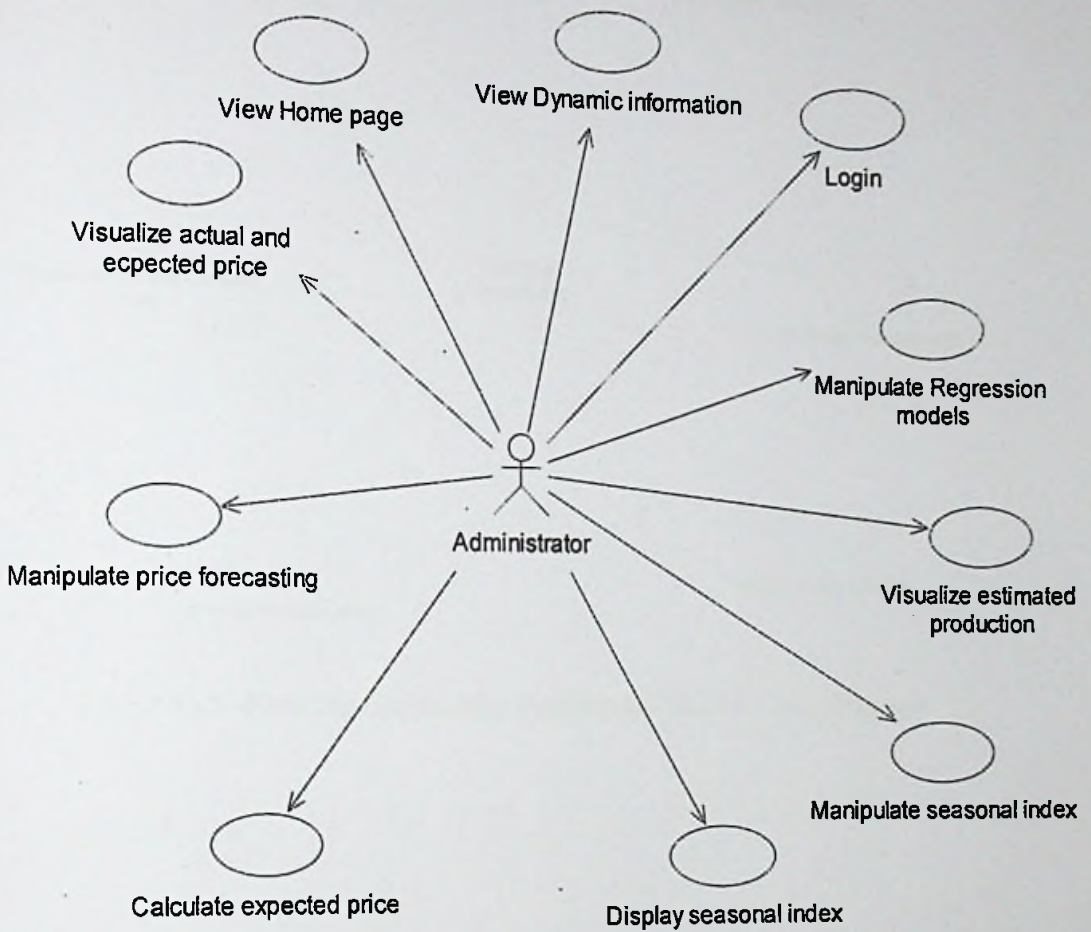


Figure G.4 – Administrator functionalities Use Case diagram

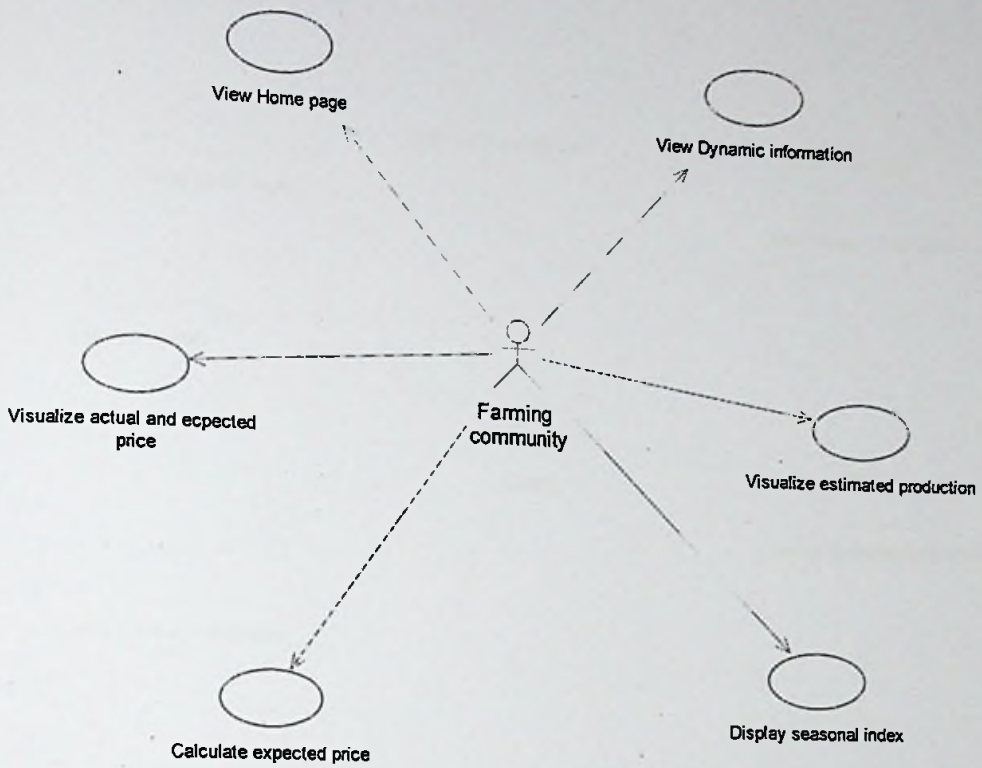


Figure G.5 -Farming community functionalities Use Case diagram

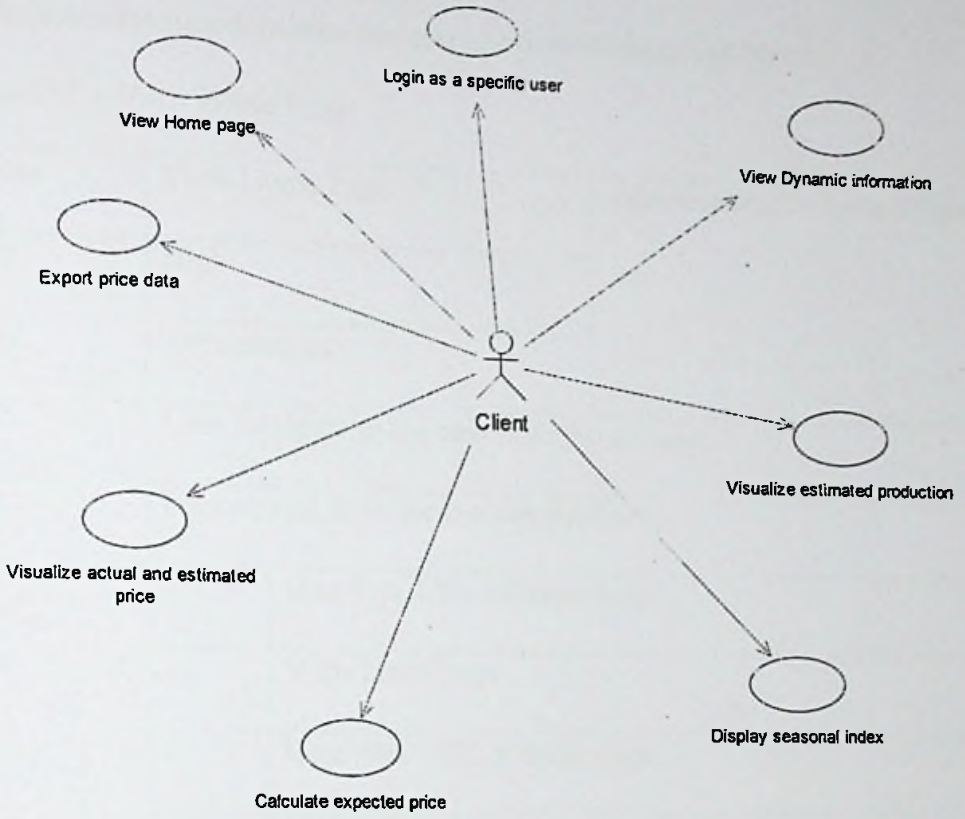


Figure G.6 -General client functionalities Use Case diagram

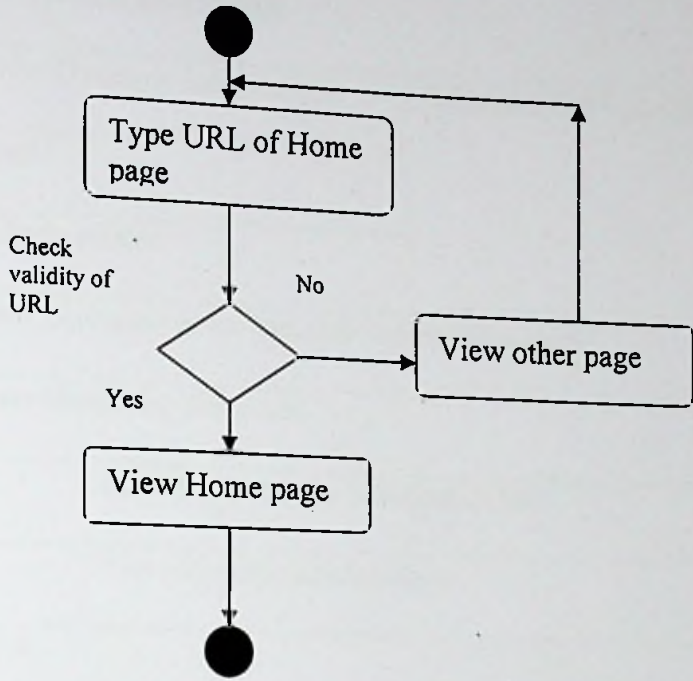
5.5 Description of Use Cases

The administrator functionalities use cases have been described below.

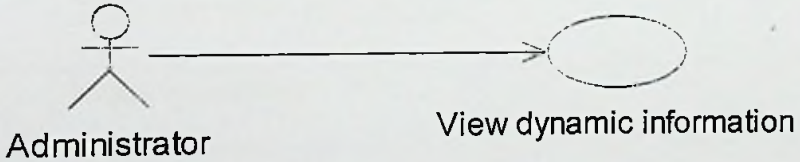
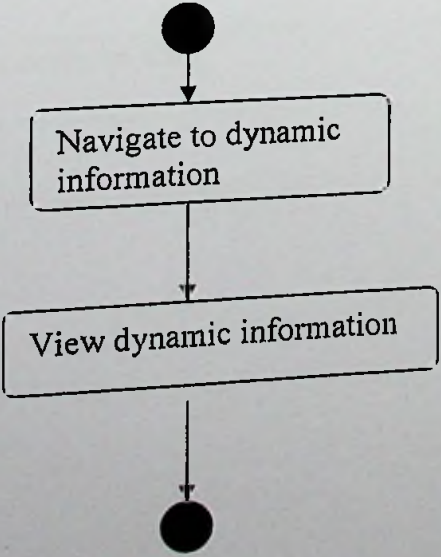
Use Case 01 – View Home Page

Use Case Name	View Home Page		Administrator Functionalities
Priority	High		
Primary Business Actor	Administrator		
Brief Description	User Navigate to the web site's home page		
Pre-Condition	User should have the Internet facility		
Basic Flow	1	User type URL of home page	
	2	View home page	
Alternative Flows	1	User type URL of home page	
	2	URL is incorrect	
	3	Navigate to an incorrect page	
Relationships	N/A		
Use-Case Diagram	<pre> graph LR Admin[Administrator] --> UC((View home page)) </pre> <p>The diagram shows a stick figure actor labeled 'Administrator' on the left. A horizontal arrow points from the actor to an oval use case on the right labeled 'View home page'.</p>		
Special Requirements	N/A		
Post-Conditions	N/A		

Activity Diagram



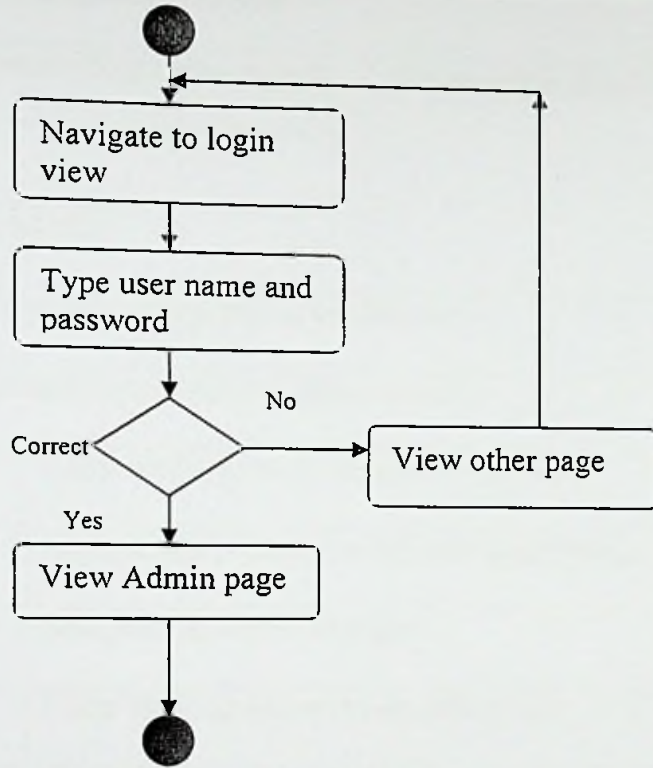
Use Case 02 – View Dynamic Information

Use Case Name	View Dynamic Information	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to the dynamic information page	
Pre-Condition	User should be in the site	
Basic Flow	1	Click the Dynamic information link
	2	View dynamic information
Alternative Flows	N/A	
Relationships	N/A	
Use-Case Diagram	 <pre> graph LR Admin((Administrator)) --> UC([View dynamic information]) </pre>	
Special Requirements	N/A	
Post-Conditions	N/A	
Activity Diagram	 <pre> graph TD Start(()) --> A1[Navigate to dynamic information] A1 --> A2[View dynamic information] A2 --> End(()) </pre>	

Use Case 03 – Login

Use Case Name	Login as Administrator	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to the web site's login screen	
Pre-Condition	User should be in the home page	
Basic Flow	1	Click the Administrator login link
	2	Type user name and password
	3	Successfully login to the administrator view
Alternative Flows	1	Click the Administrator login link
	2	Type user name and password
	3	Login is a failure
Relationships	N/A	
Use-Case Diagram	<p>The diagram shows a stick figure actor labeled 'Administrator' on the left. A horizontal arrow points from the actor to an oval use case on the right labeled 'Login as Administrator'.</p>	
Special Requirements	Lower cases be used	
Post-Conditions	N/A	

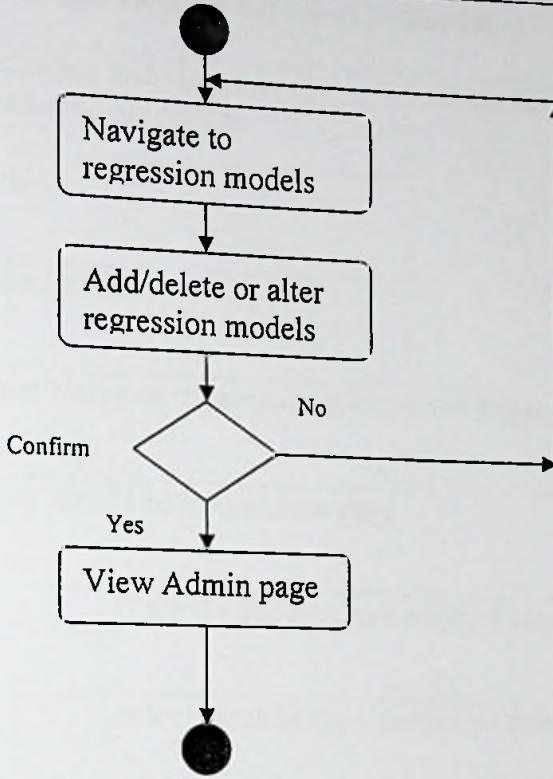
Activity
Diagram



Use Case 04 – Manipulate Regression models

Use Case Name	Manipulate Regression models	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to Regression models view	
Pre-Condition	User should have logged as Administrator	
Basic Flow	1	Click the Regression manipulation link
	2	Alter or add production estimation regression
	3	Successfully do the changes
Alternative Flows	1	Click the Regression manipulation link
	2	Alter or add production estimation regression
	3	Failure of filling the identification variables
Relationships	N/A	
Use-Case Diagram	<pre> graph LR Admin[Administrator] --> UC((Manipulate regression models)) </pre> <p>The diagram shows a stick figure actor labeled 'Administrator' on the left. An arrow points from the actor to an oval use case labeled 'Manipulate regression models' on the right.</p>	
Special Requirements	Well performance models be prepared	
Post-Conditions	Any User may be selected this model too	

Activity
Diagram



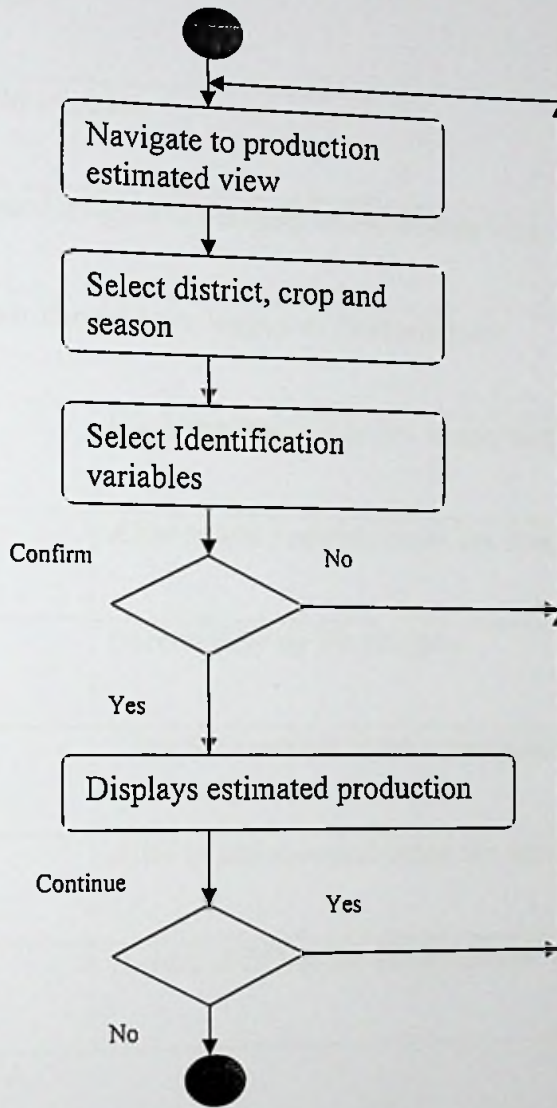
Use Case 05 – Calculate and visualize estimated production

Use Case Name	Calculate and visualize estimated production	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to production estimated Regression models view	
Pre-Condition	User should be in the home page	
Basic Flow	1	Click the Production estimated view
	2	Select identification variables (district, Crop and season)
	3	Select categories for independent variables
	4	View the estimated production
Alternative Flows	1	Click the Production estimated view
	2	Select identification variables (district, Crop and season)
	3	Select categories for independent variables
	4	Failure, unsuccessful selection
Relationships	N/A	
Use-Case Diagram	<pre> graph LR Admin[Administrator] --> UC((Calculate and visualize estimated production)) </pre>	
Special Requirements	User may have understanding of categorical variables	

Post-Conditions

User may be verified with practical situation

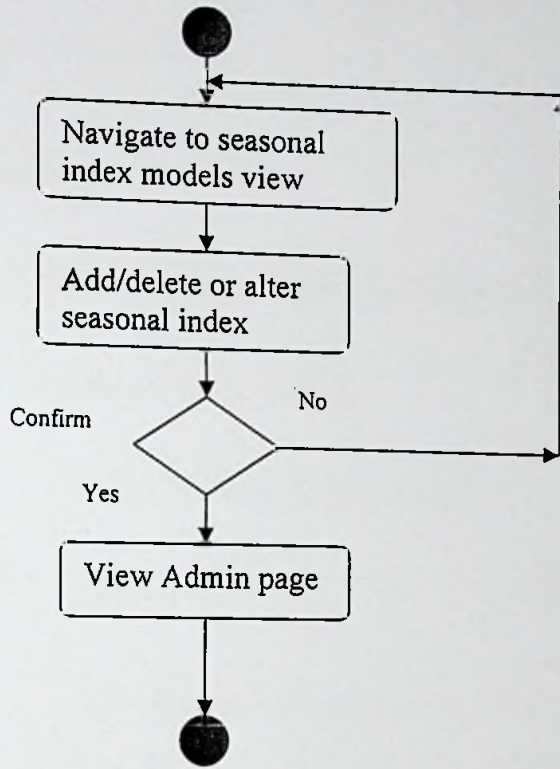
Activity Diagram



Use Case 06 – Manipulate seasonal index

Use Case Name	Manipulate seasonal index	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to seasonal index models view	
Pre-Condition	User should have logged as Administrator	
Basic Flow	1	Click the seasonal index manipulation link
	2	Alter or add seasonal index for desired crop
	3	Successfully do the changes
Alternative Flows	1	Click the seasonal index manipulation link
	2	Alter or add seasonal index for desired crop
	3	Failure of filling the identification variables
Relationships	N/A	
Use-Case Diagram	<pre> graph LR Admin[Administrator] --> UC((Manipulate seasonal index)) </pre>	
Special Requirements	With generally ten years data a seasonal index be prepared	
Post-Conditions	Any user may be selected this index later for visualization	

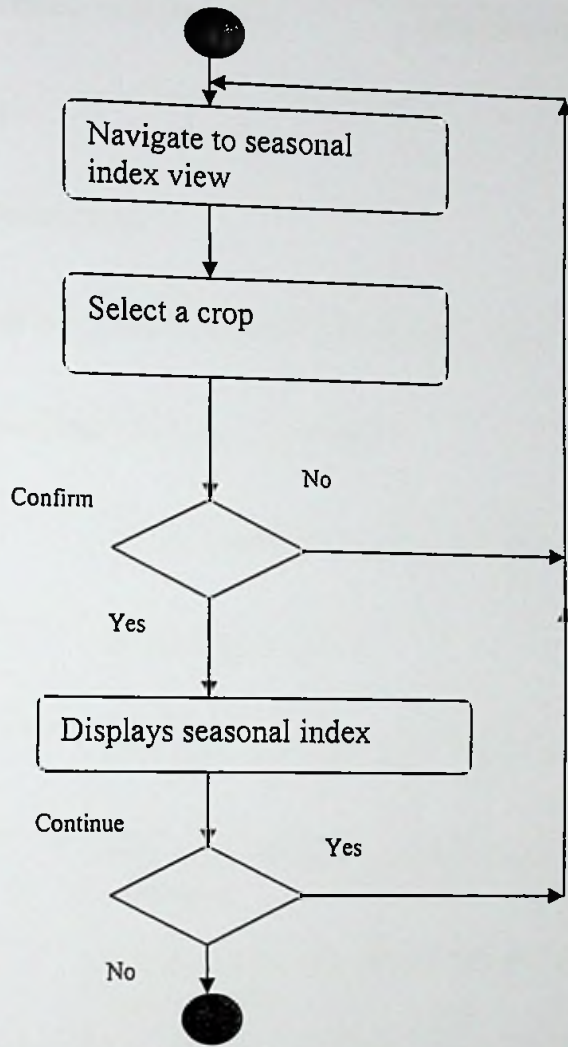
Activity Diagram



Use Case 07 – Display seasonal index

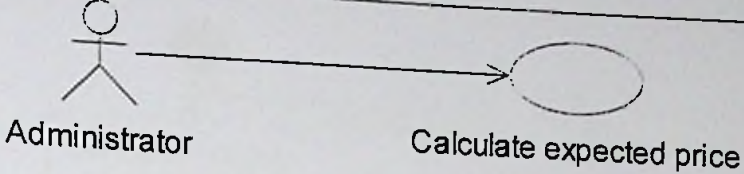
Use Case Name	Display seasonal index	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to seasonal index models view	
Pre-Condition	User should be in the home page	
Basic Flow	1	Click the seasonal index view
	2	Select a desired crop
	3	View the seasonal index graphically
Alternative Flows	1	Click the seasonal index view
	2	Select a desired crop
	3	Failure, unsuccessful selection
Relationships	N/A	
Use-Case Diagram	<pre> graph LR Admin[Administrator] --> UC((Display seasonal index)) </pre>	
Special Requirements	User may be aware about seasonal index	
Post-Conditions	N/A	

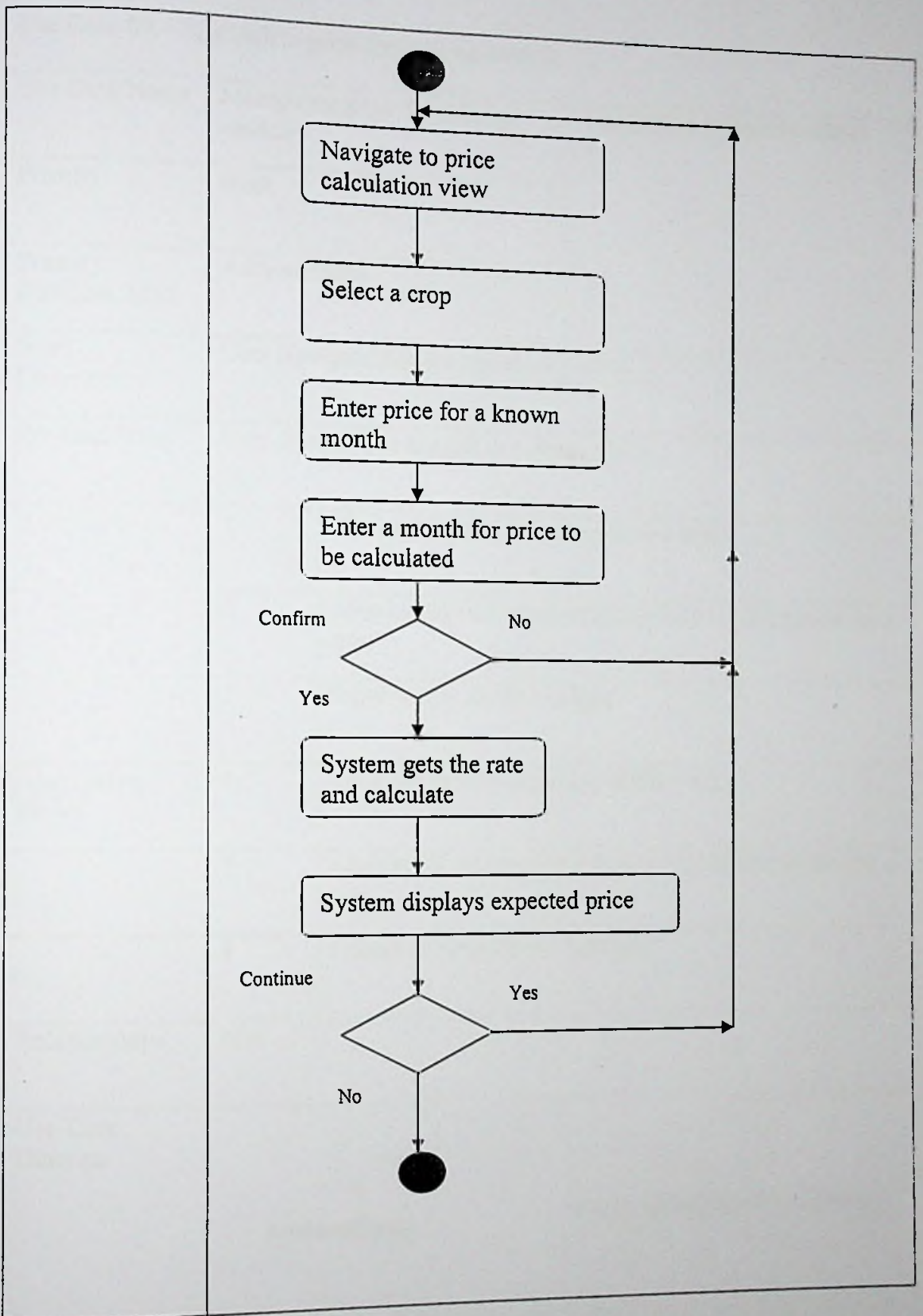
Activity Diagram



Use Case 08 – Calculate expected price

Use Case Name	Calculate expected price		Administrator Functionalities
Priority	High		
Primary Business Actor	Administrator		
Brief Description	User Navigate to seasonal index models view		
Pre-Condition	User should be in the home page		
Basic Flow	1	Click the expected price calculation view link	
	2	Select a desired crop	
	3	User enter actual prices for a known month	
	4	User enter a desired month for which price to be calculated	
	5	System get the appropriate rate and calculate the expected price	
	6	System display price for the desired month	
Alternative Flows	1	Click the expected price calculation view link	
	2	Select a desired crop	
	3	User enter actual prices for a known month	
	4	User enter a desired month for which price to be calculated	
	5	Unsuccessful. Out of range	
Relationships	N/A		

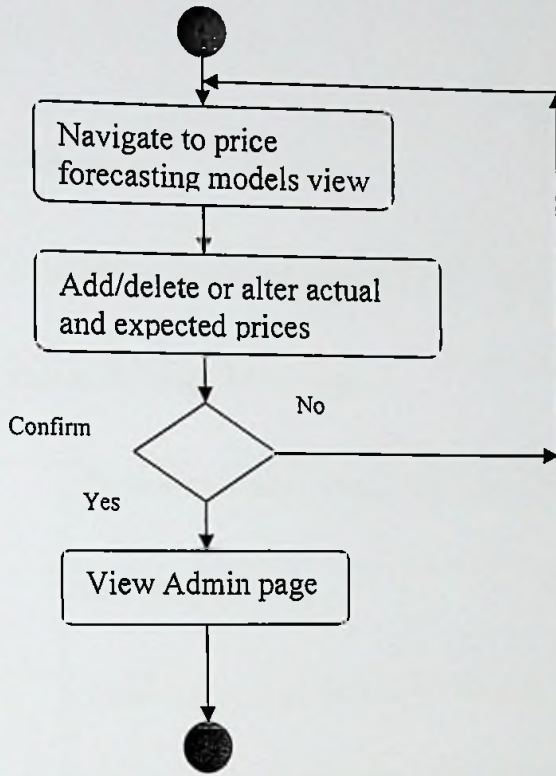
Use-Case Diagram	 <pre> graph LR Admin[Administrator] --> UC((Calculate expected price)) </pre>
Special Requirements	User may have monthly actual price for a crop
Post-Conditions	N/A
Activity Diagram	



Use Case 09 – Manipulate price forecasting models

Use Case Name	Manipulate price forecasting models	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to price forecasting view	
Pre-Condition	User should have logged as Administrator	
Basic Flow	1	Click the price forecasting models link
	2	Alter actual and expected prices for a certain period for a crop
	3	Successfully do the changes
Alternative Flows	1	Click the price forecasting models link
	2	Alter actual and expected prices for a certain period for a crop
	3	Failure of properly not updating
Relationships	N/A	
Use-Case Diagram	<pre> graph LR Admin[Administrator] --> UC((Manipulate price forecasting)) </pre>	
Special Requirements	Expected prices to be calculated prior to the process based on more appropriate trend line equation	
Post-Conditions	Any user may be selected actual and expected prices for visualization	

Activity Diagram

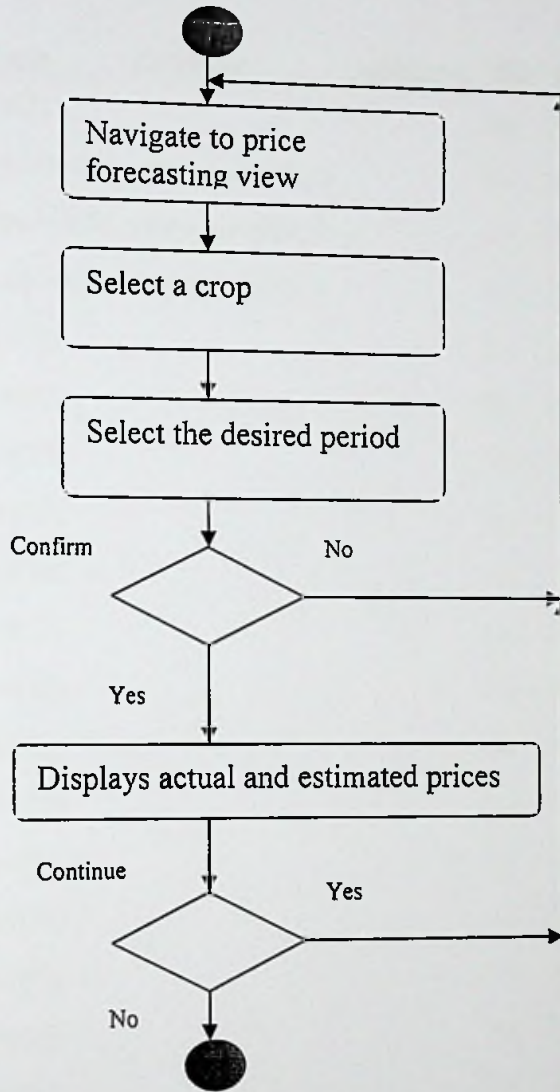


Use Case 10 – Visualize actual and estimated prices

Use Case Name	Visualize actual and estimated prices	Administrator Functionalities
Priority	High	
Primary Business Actor	Administrator	
Brief Description	User Navigate to actual and estimated prices view	
Pre-Condition	User should be in the home page	
Basic Flow	1	Click the visualize actual and estimated prices link
	2	Select a crop
	3	Select a period as desired by the user
	4	View the actual and estimated prices
Alternative Flows	1	Click the visualize actual and estimated prices link
	2	Select a crop
	3	Select a period as desired by the user
	4	Failure, unsuccessful selection
Relationships	N/A	
Use-Case Diagram	<pre> graph LR Admin[Administrator] --> UC((Visualize actual and estimated prices)) </pre>	
Special Requirements	User may have understanding of actual and estimated prices as well as required period	

Post-Conditions

Activity Diagram



Appendix H – Database and tables

Regression coefficient table (regmdls) – This contains key variables together coefficient of variable derived through the regression analysis.

#	Column	Type	Collation	Attributes	Null	Default
<input type="checkbox"/>	1 recid	int(2)			No	None
<input type="checkbox"/>	2 district	varchar(20)	latin1_swedish_ci		No	None
<input type="checkbox"/>	3 crop	varchar(20)	latin1_swedish_ci		No	None
<input type="checkbox"/>	4 season	varchar(20)	latin1_swedish_ci		No	None
<input type="checkbox"/>	5 age1	int(10)			No	None
<input type="checkbox"/>	6 edu1	int(10)			No	None
<input type="checkbox"/>	7 occu1	int(10)			No	None
<input type="checkbox"/>	8 incgrp	int(10)			No	None
<input type="checkbox"/>	9 prknow	int(10)			No	None
<input type="checkbox"/>	10 q721	int(10)			No	None
<input type="checkbox"/>	11 agrknow1	int(10)			No	None
<input type="checkbox"/>	12 promtd1	int(10)			No	None
<input type="checkbox"/>	13 ferti1	int(10)			No	None
<input type="checkbox"/>	14 q1111	int(10)			No	None
<input type="checkbox"/>	15 plottyp1	int(10)			No	None
<input type="checkbox"/>	16 plotslop1	int(10)			No	None
<input type="checkbox"/>	17 height1	int(10)			No	None
<input type="checkbox"/>	18 intensity1	int(10)			No	None
<input type="checkbox"/>	19 extnt1	int(10)			No	None
<input type="checkbox"/>	20 constant	int(10)			No	None
<input type="checkbox"/>	21 flag	int(1)			No	None

Categories of variables table (regcodes) – This contains each of the variable derived through regression analysis and pre-defined coding with discrete values.

#	Column	Type	Collation	Attributes	Null	Default
<input type="checkbox"/>	1 varno	int(2)			No	None
<input type="checkbox"/>	2 cde	int(1)			No	None
<input type="checkbox"/>	3 varname	varchar(21)	latin1_swedish_ci		No	None
<input type="checkbox"/>	4 cledes	varchar(21)	latin1_swedish_ci		No	None

Seasonal indices table (seasonalindx) – This contains type of the vegetable together indices calculated from actual retail prices of particular vegetable.

#	Column	Type	Collation	Attributes	Null	Default
<input type="checkbox"/>	1 crop	varchar(20)	latin1_swedish_ci		No	None
<input type="checkbox"/>	2 jan	decimal(10,2)			No	None
<input type="checkbox"/>	3 feb	decimal(10,2)			No	None
<input type="checkbox"/>	4 mar	decimal(10,2)			No	None
<input type="checkbox"/>	5 apr	decimal(10,2)			No	None
<input type="checkbox"/>	6 may	decimal(10,2)			No	None
<input type="checkbox"/>	7 jun	decimal(10,2)			No	None
<input type="checkbox"/>	8 jul	decimal(10,2)			No	None
<input type="checkbox"/>	9 aug	decimal(10,2)			No	None
<input type="checkbox"/>	10 sep	decimal(10,2)			No	None
<input type="checkbox"/>	11 oct	decimal(10,2)			No	None
<input type="checkbox"/>	12 nov	decimal(10,2)			No	None
<input type="checkbox"/>	13 dec	decimal(10,2)			No	None

Actual and estimated price table (prcefle) – This contains type of the vegetable together actual prices and estimated prices. The estimated prices were calculated by using most appropriate forecasting models. The records in the table has been identified by the type of vegetable, year and a month number, which is a sequential number given to locate a record easily.

#	Column	Type	Collation	Attributes	Null	Default
<input type="checkbox"/> 1	cropcode	int(2)			Yes	NULL
<input type="checkbox"/> 2	crop	varchar(14)	utf8_general_ci		No	
<input type="checkbox"/> 3	yr	int(4)			Yes	NULL
<input type="checkbox"/> 4	mnth	varchar(9)	utf8_general_ci		Yes	NULL
<input type="checkbox"/> 5	mserno	int(2)			Yes	NULL
<input type="checkbox"/> 6	ym	varchar(5)	utf8_general_ci		Yes	NULL
<input type="checkbox"/> 7	mno	int(3)			No	0
<input type="checkbox"/> 8	actprce	decimal(8,2)			Yes	NULL
<input type="checkbox"/> 9	estprce	decimal(8,2)			Yes	NULL

Appendix I – login and home page

Login page

Login
User Name*:
user
Password*:
.....
Submit

Enhancing upcountry vegetable cultivation in Sri Lanka - Through a Decision Support system

Abstract

Sri Lanka is one of the developing countries in South-Asian region where Agriculture remains the mainstay of economy and approximately 33% of the total labor force is engaged in Agriculture. Production of rice is the most important activity and cultivation of other cereals, vegetables and fruits are also prominently in the economy of Sri Lanka. Therefore it is very important to analyze the pattern or deviation of the Agriculture with currently available information for the purpose of formulating policies and also enhancing the knowledge of farmers to encourage them to be in the Agriculture. In this context, production, price fluctuations, forecasting, seasonal indices and the factors which could affect for these variables are highly important. In this project, four upcountry vegetables namely potatoes, beans, carrot and cabbage were selected and, an attempt was made to develop a web-based information system, which can be used for effective decision making on expected harvest of selected crops with the utilization of lands, according to Agro-ecological measures and demographic characteristics and also on seasonal indices and time series forecasting to educate farmers, consumers and other interested parties as well. The regression models for estimated harvest were developed with the use of SPSS statistical software from the raw data collected from a sample survey conducted in Matale, Kandy, Nuwara-eliya and Badulla districts. The information system will provide

Home page

Dynamic Information

- Varieties
- requirement
- Diseases
- Marketing
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Enhancing upcountry vegetable cultivation in Sri Lanka - Through a Decision Support system

Home About Estimated Production Seasonal indices Price Forecasting

Abstract

Sri Lanka is one of the developing countries in South-Asian region where Agriculture remains the mainstay of economy and approximately 33% of the total labor force is engaged in Agriculture. Production of rice is the most important activity and cultivation of other cereals, vegetables and fruits are also prominently in the economy of Sri Lanka. Therefore it is very important to analyze the pattern or deviation of the Agriculture with currently available information for the purpose of formulating policies and also enhancing the knowledge of farmers to encourage them to be in the Agriculture. In this context, production, price fluctuations, forecasting, seasonal indices and the factors which could affect for these variables are highly important. In this project, four upcountry vegetables namely potatoes, beans, carrot and cabbage were selected and, an attempt was made to develop a web-based information system, which can be used for effective decision making on expected harvest of selected crops with the utilization of lands, according to Agro-ecological measures and demographic characteristics and also on seasonal indices and time series forecasting to educate farmers, consumers and other interested parties as well. The regression models for estimated harvest were developed with

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Calculation of estimation production

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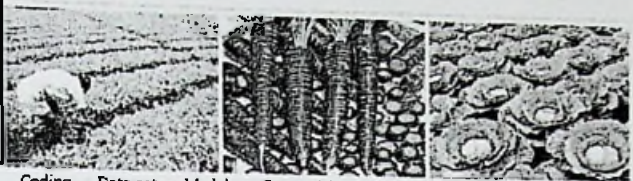
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Address http://localhost/indprod.php

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Enhancing upcountry vegetable cultivation in Sri Lanka - Through a Decision Support system



Home questionnaire Coding Data set Models Comparison Production process

System Information This web based information system was developed with the use of mySQL and php software applications. The sample data gathered and analyzed with the use of statistical software application generally known as SPSS. The models derived from this statistical packages were applied to this system. This is just a sample information only for testing.
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UserName*:

Password*:

Enhancing upcountry vegetable cultivation in Sri Lanka - Through a Decision Support system



Home questionnaire Coding Data set Models Comparison Production process

Estimation of Production - Selection of identification variables

District: Vegetable: Season:

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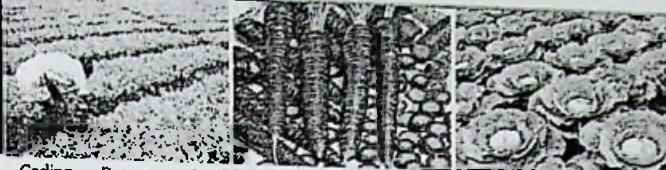
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Address: http://localhost/reqpara.php

Submit



Home questionnaire Coding Data set Models Comparision Production process

Estimation of Production - Selection of identification variables

District : Matale Vegetable : Beans Season : Maha

Age Group	Age<=35	Level of education	High
Main occupation	Vegetable cultivation	Income group	Low
Knowledge on AGRO problems	Not known	Trainings attended	Yes
Sources of Agricultural Knowledge	Government officers	Awareness about protective measures	No
Knowledge about use of fertilizer	No	Awareness on soil acidity	Yes
Type of plot	High Level	Slope of the plot	Flat Land
Height of the Top soil extent cultivated	Less than 0.25	Soil erosion intensity	Excess

Submit Query

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User Name*:
user

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Enhancing upcountry vegetable cultivation in Sri Lanka - Through a Decision Support system



Home questionnaire Coding Data set Models Comparision Production process

Estimated production of Beans in Maha season in Matale district under the following conditions

Age group	Age<=35
Income group	Low
Knowledge on AGRO problems	Not known
Awareness about protective measures	No
Knowledge about use of fertilizer	No
Awareness on soil acidity	Yes
Slope of plot	Flat Land
Soil erosion intensity	Excess
Extent cultivated	Less than 0.25

Estimated production is 9149t

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Visualizing seasonal indices

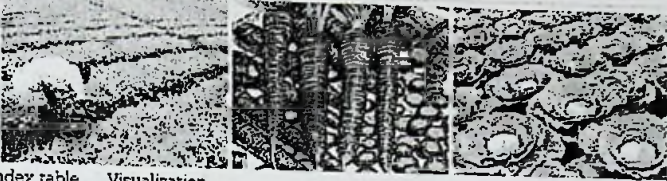
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Home Price data Index table Visualization

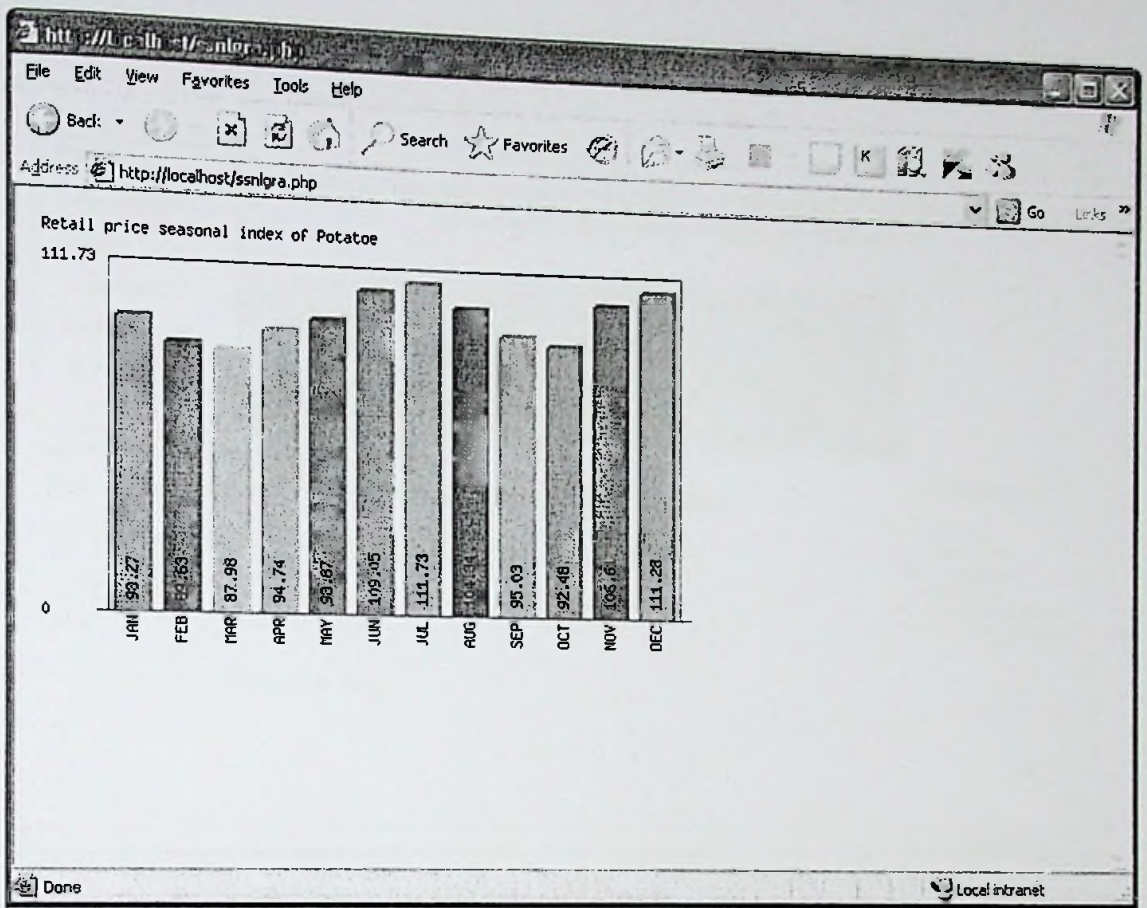
Visualization of seasonal index - Selection of crops

Vegetable:

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Visualization of price forecasting

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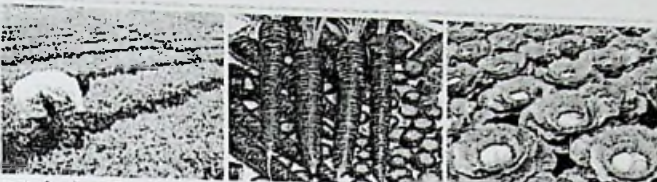
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Enhancing upcountry vegetable cultivation in Sri Lanka - Through a Decision Support system



[Home](#) [Forecast models](#) [selected prices](#) [Visualization](#)

Price forecasting - Selection of crops and the period

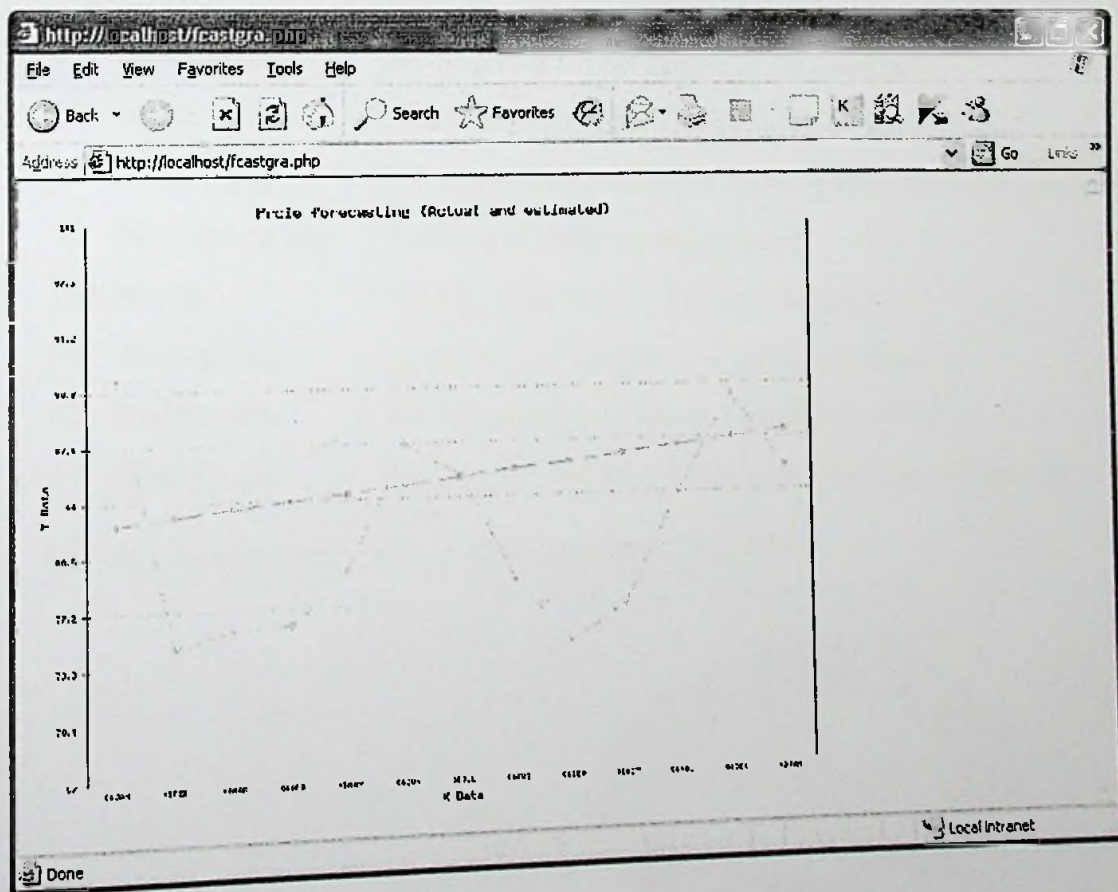
Vegetable: Potatoe Period from: January 2000 To: January 2000

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Appendix J –PHP codes

01	Index.php	Initial code to start the web site
02	Indhome.php	Home page
03	Indsys.php	About the system and guidelines for working with system
04	Indprc.php	Opening page for the process of production calculation
01	prdques.php	Preview sample questionnaire
02	prdcde.php	List of codes – questionnaire
03	prddata.php	Actual data set collected from the sample
04	prdcoef.php	Coefficients of variables of the regression models
05	prdcomp.php	Document containing actual production and estimated production
06	Regkey.php	Opening page for variable selection page
06	01 Regpara.php	Selection of key variables
	02 Regprdn.php	Calculating and displaying of estimated production
05	Indssnl.php	Opening page for seasonal indices
01	ssnldata.php	Retail prices for the period of 10 years time
02	ssnltble.php	Seasonal index table
03	ssnlkey.php	Selection of vegetable for drawing seasonal index graph
03	01 ssnlgra.php	Drawing of seasonal index graph
06	Indfast.php	Opening page for price forecasting model
01	fcastequ.php	Equation for calculating of estimated price
02	fcastdat.php	Table containing actual and estimated prices
03	fcastkey.php	Selection of variable for drawing actual and estimated prices
03	01 fcastgra.php	Drawing of forecasting graphs

