

From NWFP to wild forest products: the secondary member of the forest family becomes adult

**Results of the WP on Economics and Marketing of
the StarTree project**

**COST Action NWFP meeting
Antalya, 18 February 2016**

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Multipurpose trees and non-wood forest products, a challenge and opportunity www.star-tree.eu



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Outlines

- Product and context definition
- Theoretical framework
- Methodology
- The main results



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NWFP definition (better diction)

The concept/acronym of NWFP
is recognized by forest
researchers and practitioners,
**but not by the NWFP
customers!**



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NWFP “*definition*” (better diction)

A *slight convergence* in the definition of NWFPs comes from national *laws* and *standards* proposed by certain countries.

Today, the concept of “*wild product*” is recognized by the NWFP customers! Consulting the *definition* of *wild product* from the *EU Reg. 2092/91*; see Kilchling et al. (2009)



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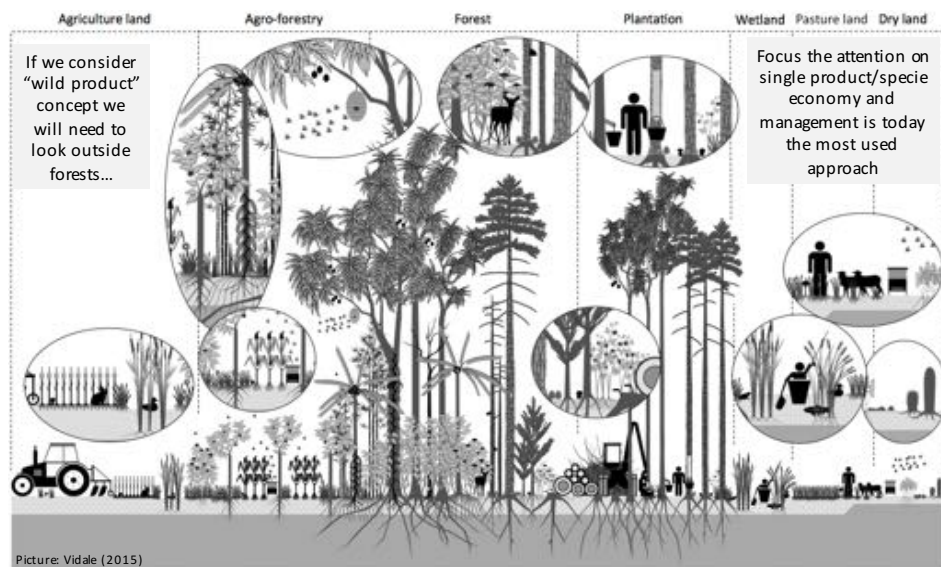
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NWFP or Wild Forest Products (WFP)?



NWFP classification

- Product/commodity **classification** system (HS, SITC, CN, FAO, WB etc.)
- **Aggregation** level of the product information
 - By **species**
 - by level of processing (raw, processed, end product)
 - by commercial categories (size, fresh, dry, purity, etc.)
 - by origin (wild, cultivated, forest, agriculture, physical or chemical extract)
 - By **commodity** refinement
- Functional classification
 - ecological, trade, market behaviours, property right, etc.



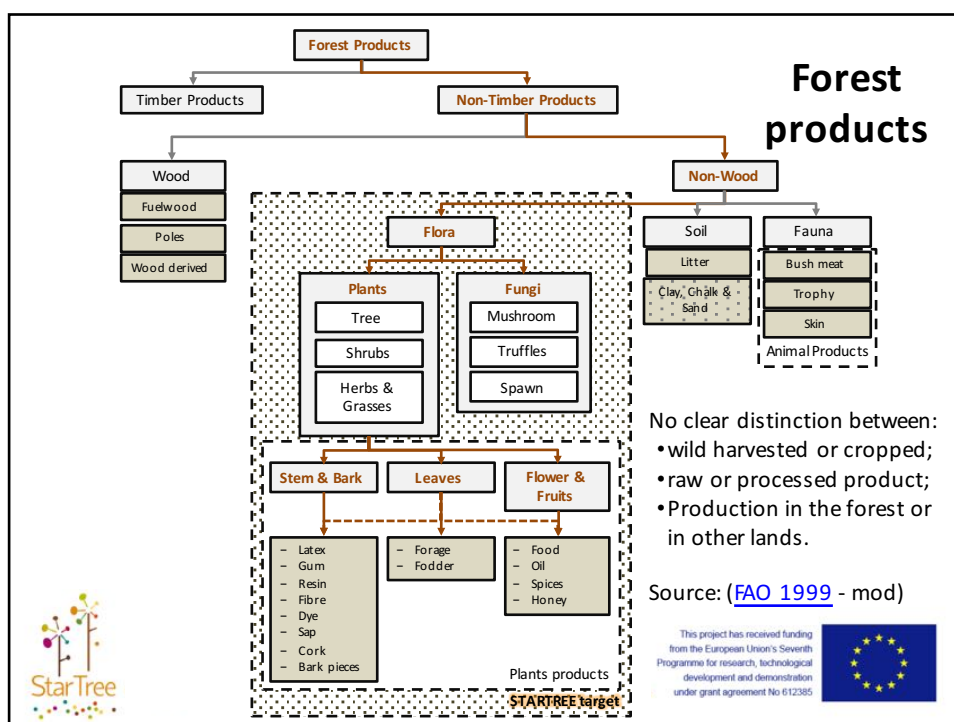
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Functional classification used in Star-Tree

Ecological classification					Commercial classification of WFP					
Ecological position	WFP category	WFP types	Score	HS Codes	WFP type	Category	Commodity group	HS Code	Period of validity	
Products of the stem, leaves or tree reproductive system	Stem-based Products (stem to cut)	Chimney tree	2	0601 90*	Essential oils	Essential oils	Essential oils	3301 10	2001-2005	
		Fibre	2	4601 91, 4601 20, 4601 94, 4601 99, 4602 18				3302 10	2006-2011	
		Non-woody	1	0808 90, 0809 10				3303 10	2012-2015	
		Flora	5	0201 00, 0201 20, 0201 90, 0201 91				3304 10	2016-2020	
		Flora	5	0201 00, 0201 20, 0201 90, 0201 91				3305 10	2021-2025	
	Leaf based products (branches are removed from the plant)	Barbican and medicinal	2	2905 43, 2905 44, 2924 80	Essential oils		Essential oils	3306 10	2001-2005	
		Essential oils	15	3302 10, 3302 20, 3302 30, 3302 40, 3302 50, 3302 60, 3302 70, 3302 80, 3302 90, 3302 91, 3302 92, 3302 93, 3302 94, 3302 95, 3302 96, 3302 97, 3302 98, 3302 99				3307 10	2006-2011	
		Phytochemicals	5	2905 43, 2905 44, 2924 80				3308 10	2012-2015	
		Pigments	5	3204 17				3309 10	2016-2020	
		Phenols	11	2904 20*, 2904 30*, 2904 40*, 2904 50*				3310 10	2021-2025	
Tree dependent product	Bark and cork	Tree	1	0902 20*	Bark products	Bark products	Bark products	0902 20	2001-2005	
		Natural gums and resins	2	1302 10, 1302 20, 1302 30, 1302 40, 1302 50, 1302 60, 1302 70, 1302 80, 1302 90, 1302 91, 1302 92, 1302 93, 1302 94, 1302 95, 1302 96, 1302 97, 1302 98, 1302 99				0902 30	2006-2011	
		Essentials	9	3302 10, 3302 20, 3302 30, 3302 40, 3302 50, 3302 60, 3302 70, 3302 80, 3302 90, 3302 91, 3302 92, 3302 93, 3302 94, 3302 95, 3302 96, 3302 97, 3302 98, 3302 99				0902 40	2012-2015	
		Bark products	18	4502 10, 4502 90, 4503 00, 4503 10, 4503 20, 4503 30, 4503 40, 4503 50, 4503 60, 4503 70, 4503 80, 4503 90, 4504 10, 4504 20, 4504 30, 4504 40, 4504 50, 4504 60, 4504 70, 4504 80, 4504 90				0902 50	2016-2020	
		Tree flowers	2	0810 90, 0811 90, 0812 90, 0813 90, 0814 90, 0815 90, 0816 90, 0817 90, 0818 90, 0819 90, 0820 90, 0821 90, 0822 90, 0823 90, 0824 90, 0825 90, 0826 90, 0827 90, 0828 90, 0829 90, 0830 90, 0831 90, 0832 90, 0833 90, 0834 90, 0835 90, 0836 90, 0837 90, 0838 90, 0839 90, 0840 90, 0841 90, 0842 90, 0843 90, 0844 90, 0845 90, 0846 90, 0847 90, 0848 90, 0849 90, 0850 90, 0851 90, 0852 90, 0853 90, 0854 90, 0855 90, 0856 90, 0857 90, 0858 90, 0859 90, 0860 90, 0861 90, 0862 90, 0863 90, 0864 90, 0865 90, 0866 90, 0867 90, 0868 90, 0869 90, 0870 90, 0871 90, 0872 90, 0873 90, 0874 90, 0875 90, 0876 90, 0877 90, 0878 90, 0879 90, 0880 90, 0881 90, 0882 90, 0883 90, 0884 90, 0885 90, 0886 90, 0887 90, 0888 90, 0889 90, 0890 90, 0891 90, 0892 90, 0893 90, 0894 90, 0895 90, 0896 90, 0897 90, 0898 90, 0899 90, 0900 90, 0901 90, 0902 90, 0903 90, 0904 90, 0905 90, 0906 90, 0907 90, 0908 90, 0909 90, 0910 90, 0911 90, 0912 90, 0913 90, 0914 90, 0915 90, 0916 90, 0917 90, 0918 90, 0919 90, 0920 90, 0921 90, 0922 90, 0923 90, 0924 90, 0925 90, 0926 90, 0927 90, 0928 90, 0929 90, 0930 90, 0931 90, 0932 90, 0933 90, 0934 90, 0935 90, 0936 90, 0937 90, 0938 90, 0939 90, 0940 90, 0941 90, 0942 90, 0943 90, 0944 90, 0945 90, 0946 90, 0947 90, 0948 90, 0949 90, 0950 90, 0951 90, 0952 90, 0953 90, 0954 90, 0955 90, 0956 90, 0957 90, 0958 90, 0959 90, 0960 90, 0961 90, 0962 90, 0963 90, 0964 90, 0965 90, 0966 90, 0967 90, 0968 90, 0969 90, 0970 90, 0971 90, 0972 90, 0973 90, 0974 90, 0975 90, 0976 90, 0977 90, 0978 90, 0979 90, 0980 90, 0981 90, 0982 90, 0983 90, 0984 90, 0985 90, 0986 90, 0987 90, 0988 90, 0989 90, 0990 90, 0991 90, 0992 90, 0993 90, 0994 90, 0995 90, 0996 90, 0997 90, 0998 90, 0999 90				0902 60	2021-2025	
	Fruits & flowers	Fruits	15	0810 90, 0811 90, 0812 90, 0813 90, 0814 90, 0815 90, 0816 90, 0817 90, 0818 90, 0819 90, 0820 90, 0821 90, 0822 90, 0823 90, 0824 90, 0825 90, 0826 90, 0827 90, 0828 90, 0829 90, 0830 90, 0831 90, 0832 90, 0833 90, 0834 90, 0835 90, 0836 90, 0837 90, 0838 90, 0839 90, 0840 90, 0841 90, 0842 90, 0843 90, 0844 90, 0845 90, 0846 90, 0847 90, 0848 90, 0849 90, 0850 90, 0851 90, 0852 90, 0853 90, 0854 90, 0855 90, 0856 90, 0857 90, 0858 90, 0859 90, 0860 90, 0861 90, 0862 90, 0863 90, 0864 90, 0865 90, 0866 90, 0867 90, 0868 90, 0869 90, 0870 90, 0871 90, 0872 90, 0873 90, 0874 90, 0875 90, 0876 90, 0877 90, 0878 90, 0879 90, 0880 90, 0881 90, 0882 90, 0883 90, 0884 90, 0885 90, 0886 90, 0887 90, 0888 90, 0889 90, 0890 90, 0891 90, 0892 90, 0893 90, 0894 90, 0895 90, 0896 90, 0897 90, 0898 90, 0899 90, 0900 90, 0901 90, 0902 90, 0903 90, 0904 90, 0905 90, 0906 90, 0907 90, 0908 90, 0909 90, 0910 90, 0911 90, 0912 90, 0913 90, 0914 90, 0915 90, 0916 90, 0917 90, 0918 90, 0919 90, 0920 90, 0921 90, 0922 90, 0923 90, 0924 90, 0925 90, 0926 90, 0927 90, 0928 90, 0929 90, 0930 90, 0931 90, 0932 90, 0933 90, 0934 90, 0935 90, 0936 90, 0937 90, 0938 90, 0939 90, 0940 90, 0941 90, 0942 90, 0943 90, 0944 90, 0945 90, 0946 90, 0947 90, 0948 90, 0949 90, 0950 90, 0951 90, 0952 90, 0953 90, 0954 90, 0955 90, 0956 90, 0957 90, 0958 90, 0959 90, 0960 90, 0961 90, 0962 90, 0963 90, 0964 90, 0965 90, 0966 90, 0967 90, 0968 90, 0969 90, 0970 90, 0971 90, 0972 90, 0973 90, 0974 90, 0975 90, 0976 90, 0977 90, 0978 90, 0979 90, 0980 90, 0981 90, 0982 90, 0983 90, 0984 90, 0985 90, 0986 90, 0987 90, 0988 90, 0989 90, 0990 90, 0991 90, 0992 90, 0993 90, 0994 90, 0995 90, 0996 90, 0997 90, 0998 90, 0999 90				0902 70	2021-2025	
		Subfruits	18	0802 40, 0802 50, 0802 60, 0802 70, 0802 80, 0802 90, 0803 40, 0803 50, 0803 60, 0803 70, 0803 80, 0803 90, 0804 40, 0804 50, 0804 60, 0804 70, 0804 80, 0804 90, 0805 40, 0805 50, 0805 60, 0805 70, 0805 80, 0805 90, 0806 40, 0806 50, 0806 60, 0806 70, 0806 80, 0806 90, 0807 40, 0807 50, 0807 60, 0807 70, 0807 80, 0807 90, 0808 40, 0808 50, 0808 60, 0808 70, 0808 80, 0808 90, 0809 40, 0809 50, 0809 60, 0809 70, 0809 80, 0809 90, 0810 40, 0810 50, 0810 60, 0810 70, 0810 80, 0810 90, 0811 40, 0811 50, 0811 60, 0811 70, 0811 80, 0811 90, 0812 40, 0812 50, 0812 60, 0812 70, 0812 80, 0812 90, 0813 40, 0813 50, 0813 60, 0813 70, 0813 80, 0813 90, 0814 40, 0814 50, 0814 60, 0814 70, 0814 80, 0814 90, 0815 40, 0815 50, 0815 60, 0815 70, 0815 80, 0815 90, 0816 40, 0816 50, 0816 60, 0816 70, 0816 80, 0816 90, 0817 40, 0817 50, 0817 60, 0817 70, 0817 80, 0817 90, 0818 40, 0818 50, 0818 60, 0818 70, 0818 80, 0818 90, 0819 40, 0819 50, 0819 60, 0819 70, 0819 80, 0819 90, 0820 40, 0820 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Theoretical framework: definitions

NWFP economy, market, sector, value or **supply chain** are terms frequently used in our works as synonymous, but each one have different meanings.

Anyhow they have some common features that help the comparability:

- to the considered **products**;
- to the end **user distribution** and the **suppliers boundaries** and barriers;
- to the **legal status** of the market, which allows formal or informal transfer of the products from the production site to the end user;
- to the **economic and non-economic actors** directly or indirectly involved;
- to the **contextual framework**



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Theoretical framework: SC and SCM definition

Definition	Source
<i>Supply chain is a system whose constituent parts include material suppliers, production facilities, distribution services and customers linked together via the feed forward flow of materials and the feedback flow of information.</i>	Gunasekaran (2001) based on Steven (1989)
<i>The supply chain is the network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate customer.</i>	Stevenson and Spring (2007) based on Christopher (1998)
Definition	Source
<i>"Supply Chain Management is the integrated planning, implementation, coordination and control of all business processes and activities necessary to produce and deliver, as efficiently as possible, products that satisfy market requirements"</i>	(Van Der Vorst et al., 2007) based on Christopher (1999)
<i>"Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Supply Chain Management integrates supply and demand management within and across companies"</i>	Gibson et al. (2005) based on Council of Logistics Management (2003)

Theoretical framework: why definitions?

Level	Performance metrics	F	N-F
Strategic (mid-long horizon)	Selling price	X	X
	Total supply chain cycle time	X	X
	Total cash flow time	X	X
Tactical (short-mid horizon)	Customer query time	X	X
	Level of customer perceived value of product	X	X
	Net profit vs. productivity ratio	X	X
Operational (short horizon)	Rate of return on investment	X	X
	Range of product and services	X	X
	Variations against budget	X	X
Strategic	Order lead time	X	X
	Flexibility of service systems to meet customer needs	X	X
	Buyer-supplier partnership level	X	X
Tactical	Supplier lead time against industry norm	X	X
	Level of supplier's defect free deliveries	X	X
	Delivery lead time	X	X
Operational	Delivery performance	X	X
	Level and degree of buyer-supplier partnership	X	X
	Product/service variety	X	X
Strategic	Perceived quality	X	X
	Value added	X	X
		X	X



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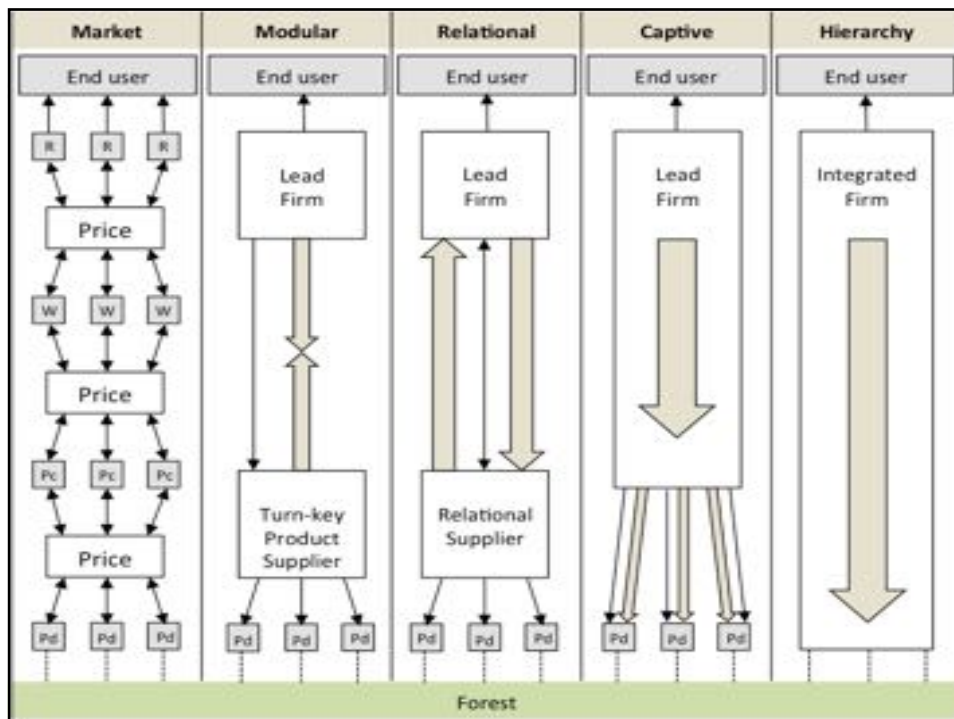


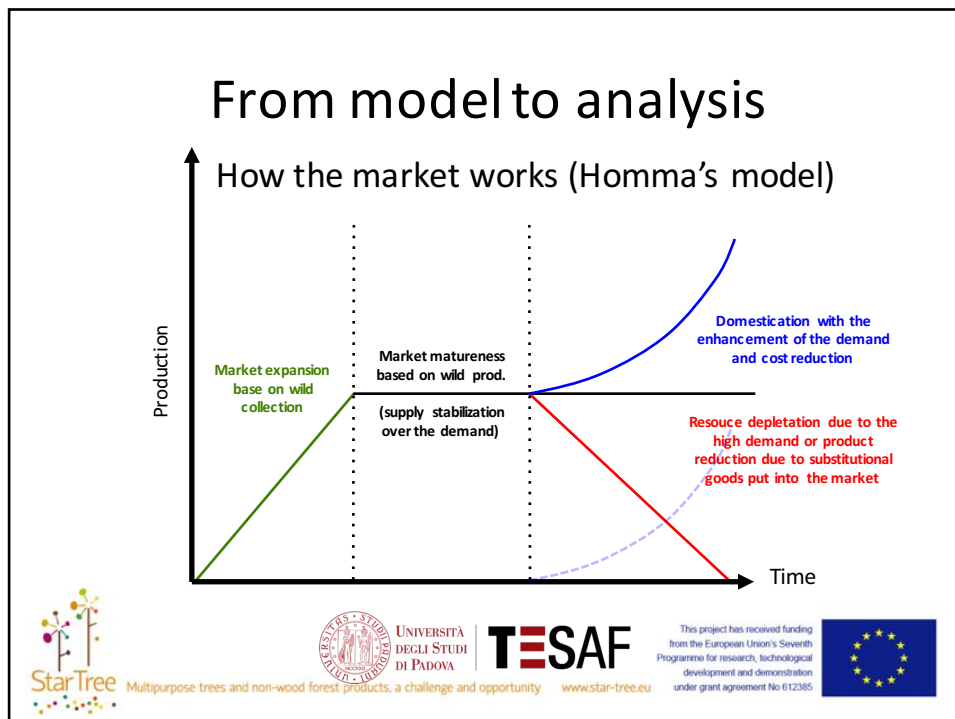
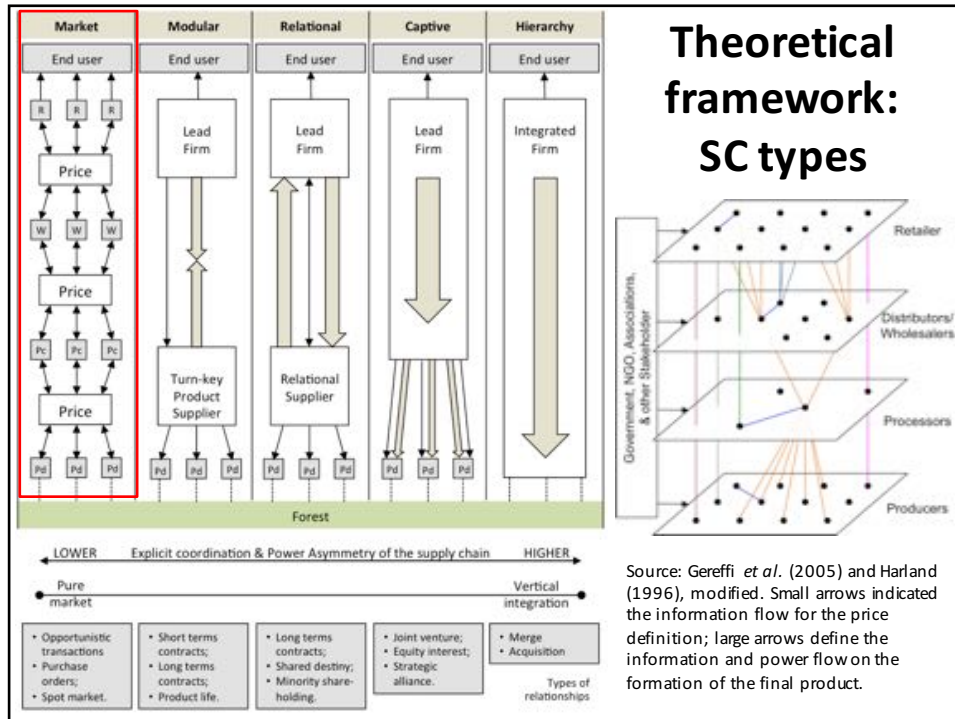
Theoretical framework: indicators for measuring the performance in the SC

Phase	Performance measure	
	Financial	Non-Financial
Plan	Return on investment Selling price of good and services	Labour efficiency Perceived value of product Product development cycle time Bidding management cycle time Compliance to regulations Forecasting accuracy Supply chain response time
Source	Scrap/obsolescence cost Inventory cost Selling price of goods and service	Labour efficiency Product development time Lead time for procurement including supplier development time Delivery reliability
Make	Scrap/obsolescence cost Overhead cost Inventory cost Selling price of goods and service Value added	Labour efficiency Labour comfort Product development time Capacity utilization Lead-time for manufacturing Production flexibility Process cycle time Accuracy of scheduling Product and service variety Value added
Deliver	Overhead cost Value added Inventory cost Stock-out cost Transportation cost Warranty cost	Labour efficiency Delivery reliability Perceived value of product Value added Product and service variety Perceived quality

Indicators used for
measuring the
FINANCIAL
performances

Indicators used for measuring the
production policies





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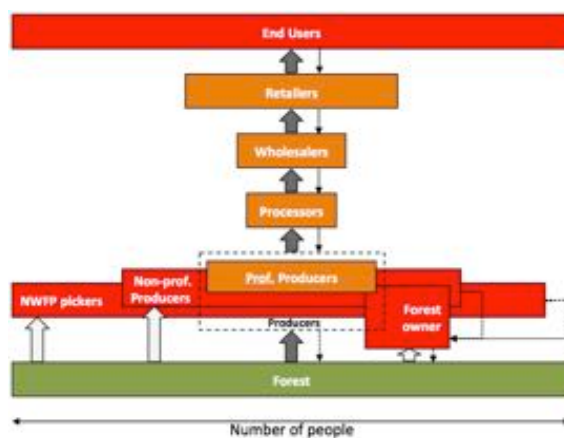
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Methodology: key actors



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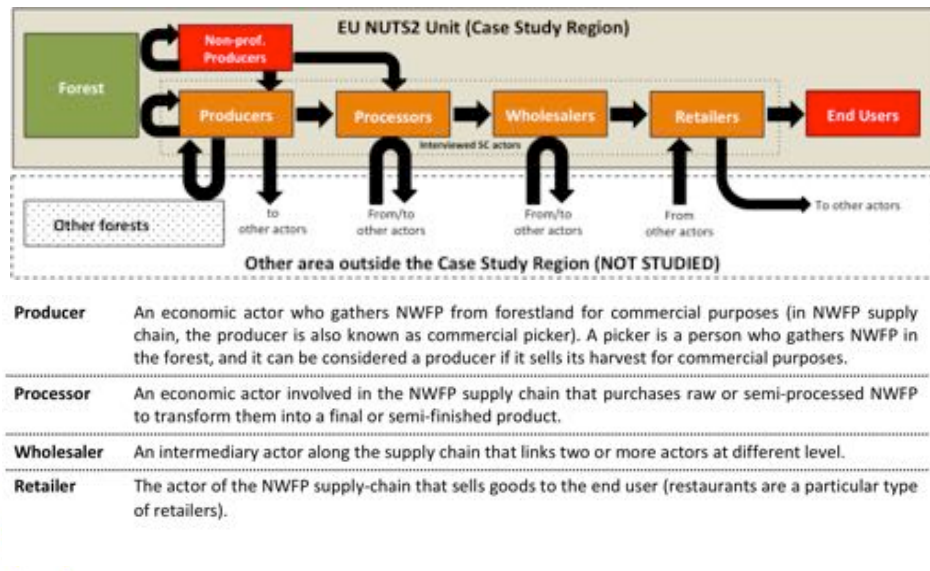
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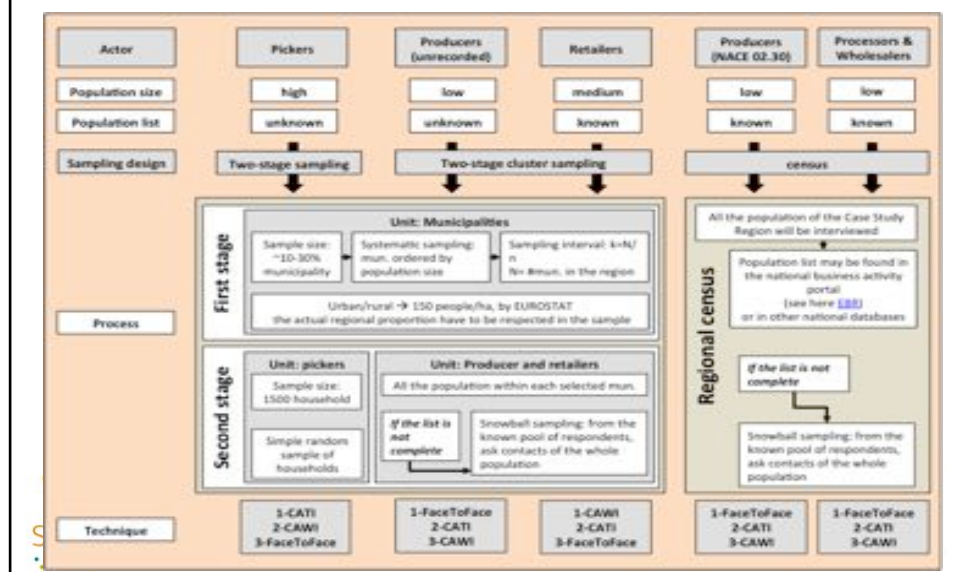
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Methodology: sampling strategy



Methodology: sampling strategy



Methodology: questionnaire

- An **introduction**: general information about companies and individual actors were aimed to be collected;
- a **specific part on the raw** (fresh and sorted) products: detailed information about the two most important species collected in the wild;
- a part on **traded and processed products**: detailed information about the two most important products;
- and the final part, where the respondent is asked to provide **information about other enterprises** conducting the same type of activity in the region.



Multipurpose trees and non-wood forest products, a challenge and opportunity



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Methodology: data collection

Case Study	Actors	Population list	Sampling	Final Sample	Interview technique	Reliability
Trentino Alto Adige (chestnuts)	Prod	All chestnuts producers (both small and big ones) belong to associations or consortiums. There are 10 Associations in Trentino and 3 in Alto Adige, with 40-200 producers each.	2-4 interviews per Association. Producers were ordered by production size, and selected through a systematic sampling.	19+23*	Face-to-face	Representative
	Proc	Few bigger producers are also processors; no formal list. Big processors are out the Region	Snowball sampling	3+7	Face-to-face	Unknown the representativeness (but it should be good), and data is reliable.
	Whol	In formal registers, nominated by producers.	Census	5+13	Face-to-face	Representative
	Ret	Selection of municipalities, and the list has been created directly in the field	Two-stage cluster sampling: all small retailers within selected municipalities have been interviewed + 2 big supermarkets	21+18	Face-to-face	Representative



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Outline

- Product and context and context definition
- Theoretical framework
- Methodology
- **The main results (only some examples)**



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EU-World. Trade balance

	Code	Level of processing	Part of wild harvest?	World 2011	From EU28 2011	To EU28 2011	EU28 balance	World-EU28 Exp. %	Imp. %
Honey	040900	Raw	Yes	1906	616	1019	-403	32.34	53.48
Mosses	060410	Raw	Yes	58	33	37	-4	55.98	62.61
Fresh foliage	060491	Raw	Yes	1210	729	887	-157	60.29	73.28
Dry foliage	060499	Raw	Yes	367	170	231	-61	46.33	63.06
Fresh & frozen Agaricus	070951	Raw	No	1302	1102	972	129	84.63	74.68
Fresh & frozen truffles	070952	Raw	Yes	-	-	-	-	-	-
Fresh & frozen mushrooms	070959	Raw	Yes	785	414	480	-66	52.69	61.12
Preserved Agaricus	071151	Processed	No	101	32	53	-21	32.07	52.99
Preserved mushrooms	071159	Processed	Yes	119	17	85	-68	14.45	71.68
Dried mushrooms	071230	Raw	Yes	-	-	-	-	-	-
Dried Agaricus	071231	Raw	No	116	41	58	-17	35.32	49.94
Dried Auricularia	071232	Raw	Yes	196	4	16	-12	1.95	8.12
Dried Tremella	071233	Raw	Yes	55	1	2	-1	2.30	3.08
Dried mushrooms	071239	Raw	Yes	1370	71	170	-100	5.17	12.44
Almonds	080211	Raw	No	1043	36	55	-19	3.41	5.28
Shelled almonds	080212	Processed	No	3369	671	1710	-1038	19.93	50.75
Hazelnuts	080221	Raw	No	180	25	41	-17	13.61	23.00
Shelled hazelnuts	080222	Processed	No	1782	296	1342	-1046	16.60	75.32
Walnuts	080231	Raw	No	987	164	308	-144	16.61	31.23
Shelled walnuts	080232	Processed	No	1545	219	678	-459	14.15	43.88
Chestnuts	080240	Raw	Yes	299	153	121	-31	51.05	40.60
Peanutshells	080249	Raw	No	3013	524	1287	-763	17.38	42.70
Fresh strawberries	081010	Raw	No	2579	1604	1533	-71	62.18	59.41
Fresh raspberries	081020	Raw	No	1173	410	442	-32	34.97	37.70
Fresh currants	081030	Raw	No	-	-	-	-	-	-
Fresh cranberries	081040	Raw	Yes	1428	345	488	-143	24.14	34.18
Fresh other	081090	Raw	No	2948	713	914	-201	24.19	30.99
Frozen strawberries	081110	Raw	No	1090	479	706	-227	43.95	64.73
Frozen raspberries	081120	Raw	No	951	416	694	-278	43.72	73.00
Frozen fruits and nuts	081190	Raw	Yes	2530	1033	1484	-451	40.82	58.66
Prepared Agaricus	200310	Processed	No	1179	572	568	4	48.48	48.17
Prepared truffles	200320	Processed	Yes	29	24	17	7	82.02	59.62
Prepared mushrooms	200390	Processed	Yes	228	84	87	-3	36.77	38.20
Quebracho tannins	320110	Raw	Yes	85	7	32	-25	8.27	37.07
Wattle tannins	320120	Raw	Yes	130	4	24	-19	3.37	18.25
Other tannins	320190	Raw	Yes	195	92	57	35	47.05	29.12
Natural Cork	450110	Raw	Yes	147	140	132	8	94.88	89.67
Cork in pieces	450190	Processed	Yes	93	79	69	10	84.94	74.10
Cork squared	450200	Processed	Yes	72	63	42	21	87.82	58.45
Cork Stopper	450310	Processed	Yes	743	705	299	406	94.92	54.71
Total overview				35403	12086	17247	-5161	34.14	48.72
Total overview (only raw and partially wild sourced products)				10761	3811	5180	-1369	35.42	48.13

Key products in EU

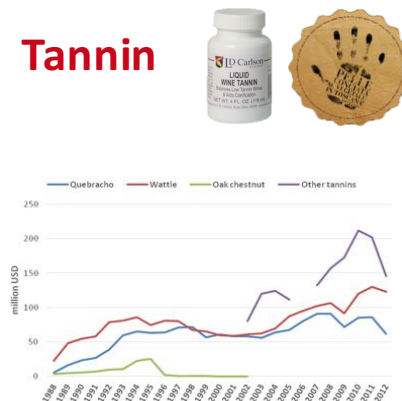
Key products for the EU industry in which there is an international leadership:

- Tannins (refinement)
- Cork
- Chestnuts
- Truffle



Tannin

- 3 major importers (~80% world trade)
- Future **availability**?
- An increased consumption in the future by skin working industry



Exports (million USD)				
2000	2005	2010	2011	
Argentina 49	Argentina 46	Argentina 68	Argentina 69	
Brazil 25	South Africa 34	South Africa 50	Brazil 57	
South Africa 20	Brazil 31	Brazil 49	South Africa 53	
Hong Kong 6	USA 8	USA 5	USA 6	
Kenya 3	Zimbabwe 4	Zimbabwe 4	Zimbabwe 5	

Imports (million USD)				
2000	2005	2010	2011	
Italy 25	Italy 22	India 28	India 29	
Mexico 12	India 18	China 27	Italy 28	
India 10	Mexico 16	Italy 23	China 26	
China 9	China 12	Mexico 18	Mexico 22	
USA 6	USA 6	USA 8	USA 8	



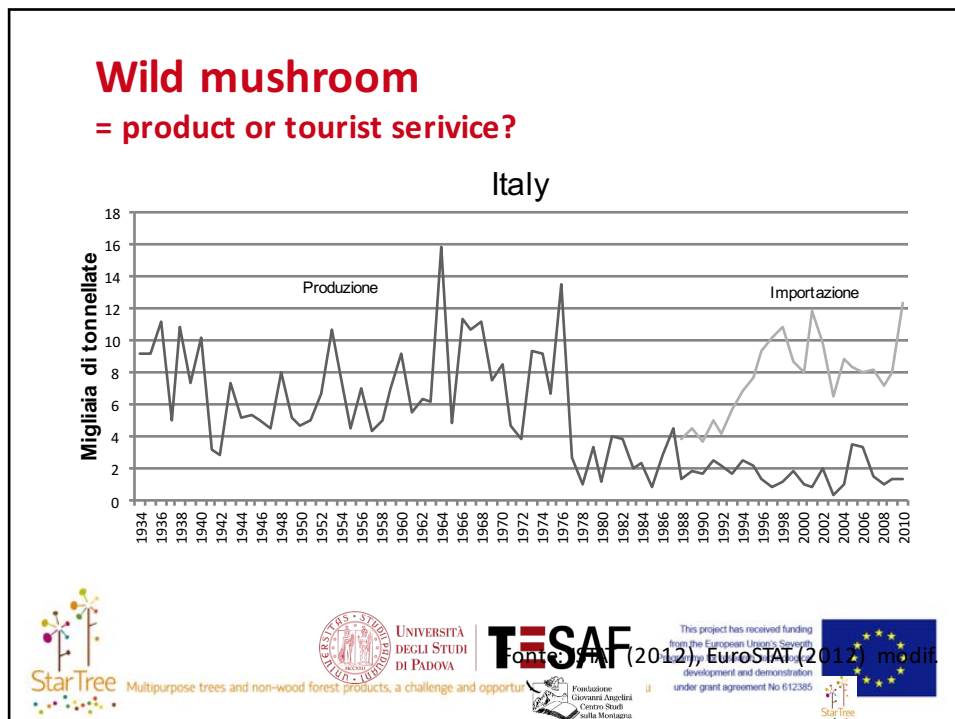
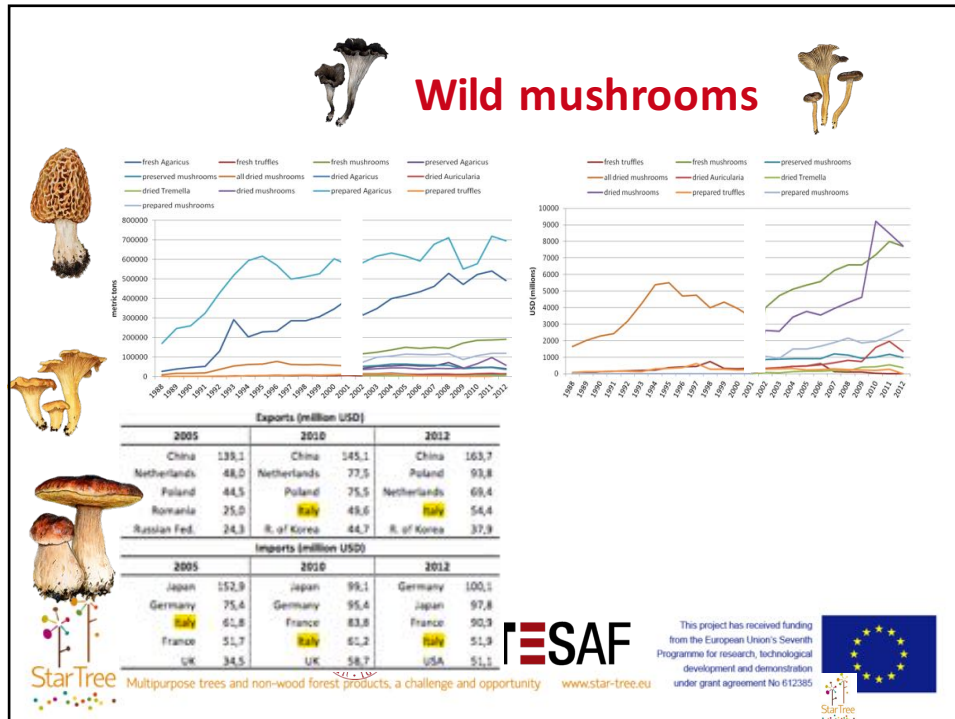
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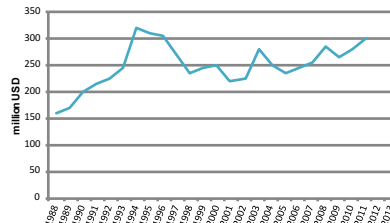
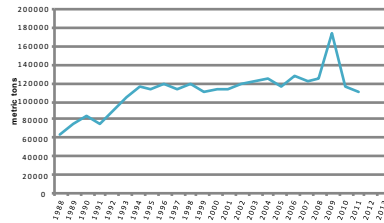
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Chestnuts (outputs as example)



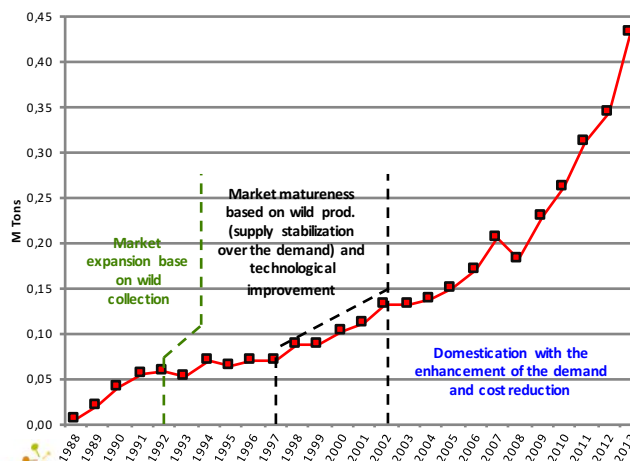
Exports (million USD)			
2000	2005	2010	2011
China 85.4	China 66.5	Italy 73.2	Italy 79.7
R. of Korea 84.3	Italy 64.1	China 70.1	China 78.4
Italy 40.2	R. of Korea 53.0	R. of Korea 45.4	R. of Korea 48.1
Portugal 13.1	Portugal 11.8	Portugal 22.5	Portugal 25.8
Spain 9.0	Turkey 9.4	Spain 16.6	Spain 20.0

Imports (million USD)			
2000	2005	2010	2011
Japan 149.6	Japan 72.5	Japan 54.4	Japan 59.0
France 13.8	China 21.9	China 23.1	France 28.6
USA 11.5	USA 16.0	France 21.7	Italy 24.2
Asia, nes 9.8	France 13.9	USA 19.9	Switzerland 19.5
Switzerland 6.8	Switzerland 10.5	Germany 17.8	China 19.1

- Italy is (probably was) the largest traders in the world (~26% of world trade)
- Quite stable economy with an average global price of 2€/kg
- There is a new trend on import and this is due to the Asian Gall-Wasp
- Italy, France and Japan are the largest processing countries for chestnuts



Examples: cranberry



Hand gathering
VS
industrial production



Cranberry production became increasingly automated in the 19th and 20th centuries, partly thanks to a series of ever-more-efficient mechanical harvesters. But the key main innovations came from observing the natural properties of the fruit. Cranberries bounce. According to folklore, the discovery was made by John Walcott. The first cranberry grower in New Jersey and also the unfortunate possessor of a wooden leg. His leg made it difficult to carry boxes of cranberries down to the cellar where they were graded and preserved. So he rolled them down. The good berries all bounced to the bottom. Split or damaged ones went up on the first couple of steps. Armed with more sophisticated equipment, this bouncing procedure is still used for the automatic sorting of cranberries.



Vaccinium oxycoccos & V. macrocarpum production in US

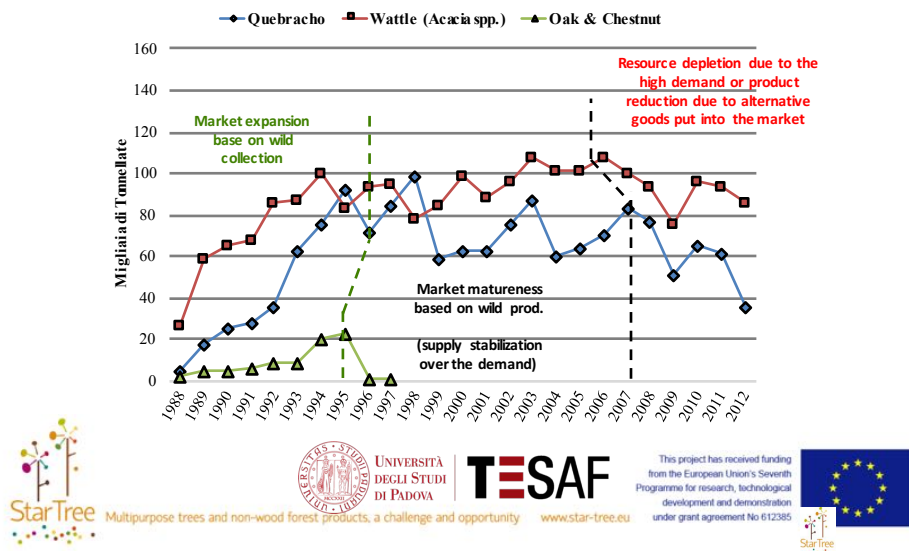


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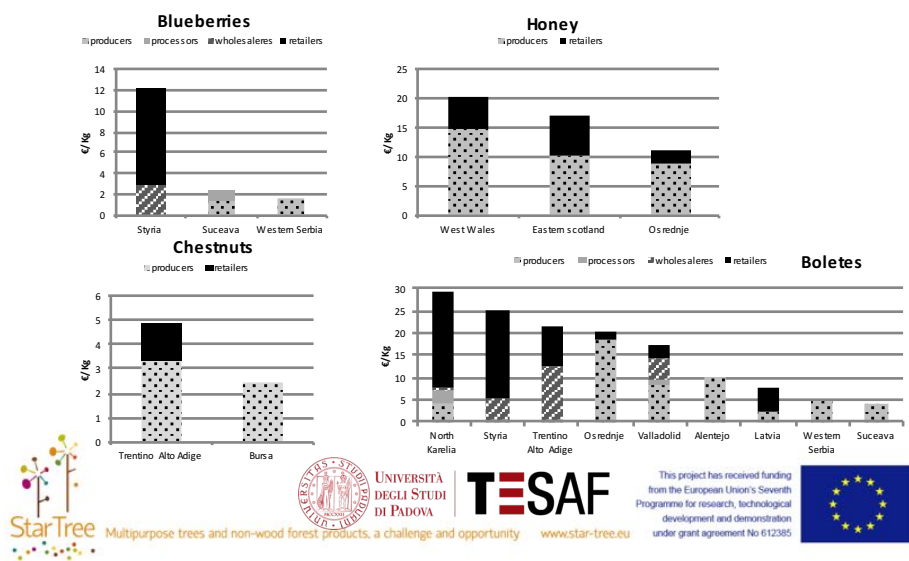


www.star-tree.eu

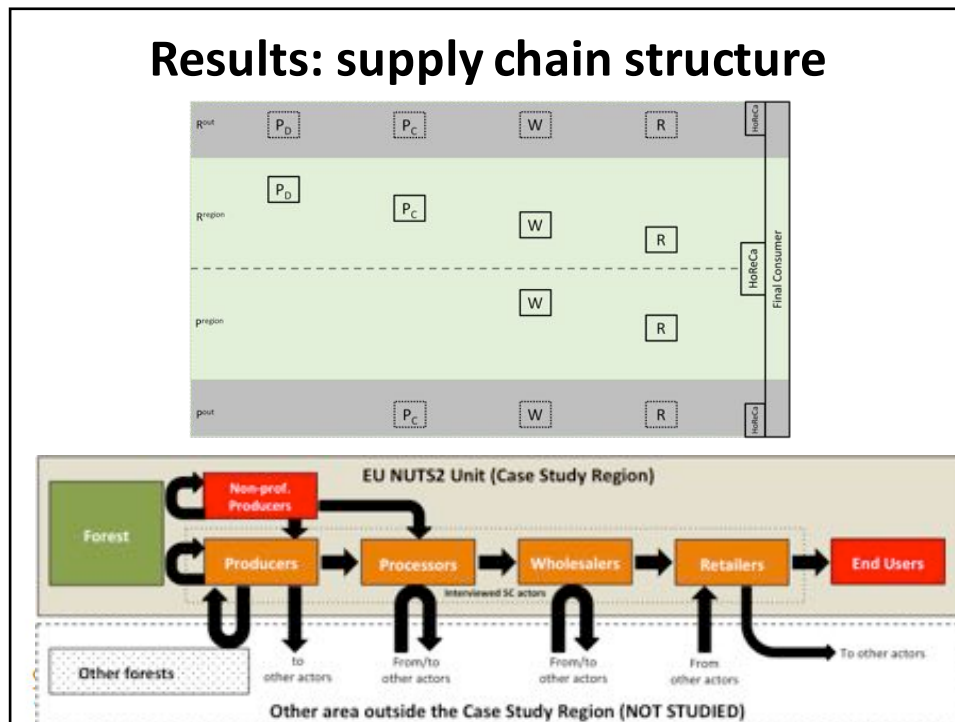
Example: tannins



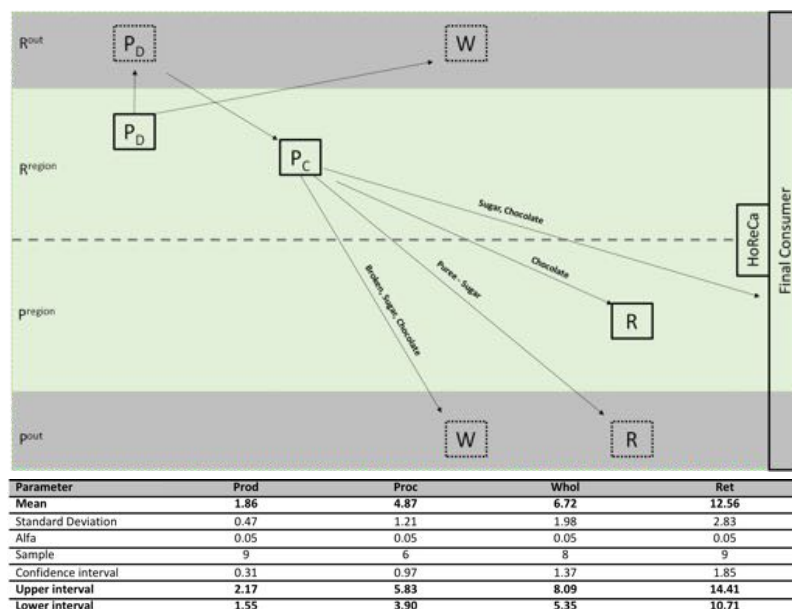
Results: added value and selling price



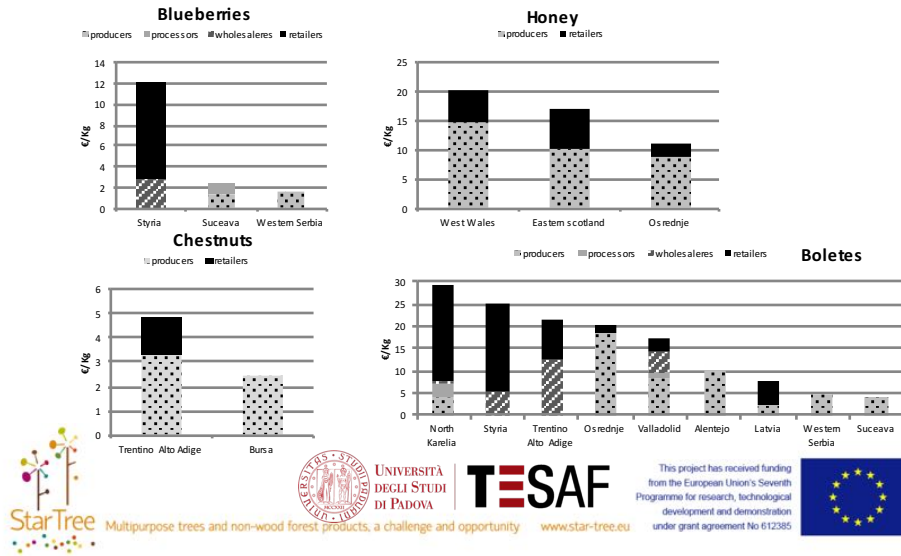
Results: supply chain structure



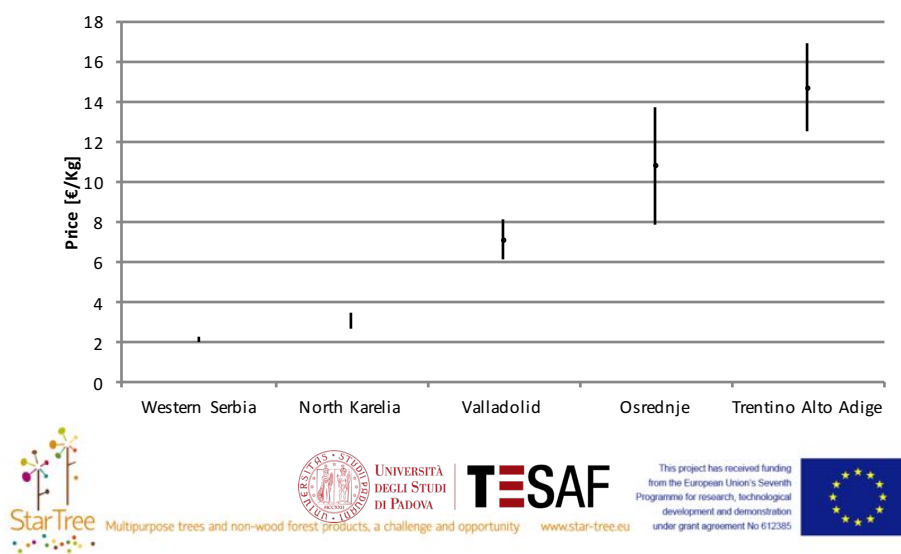
Results: Chestnut SC



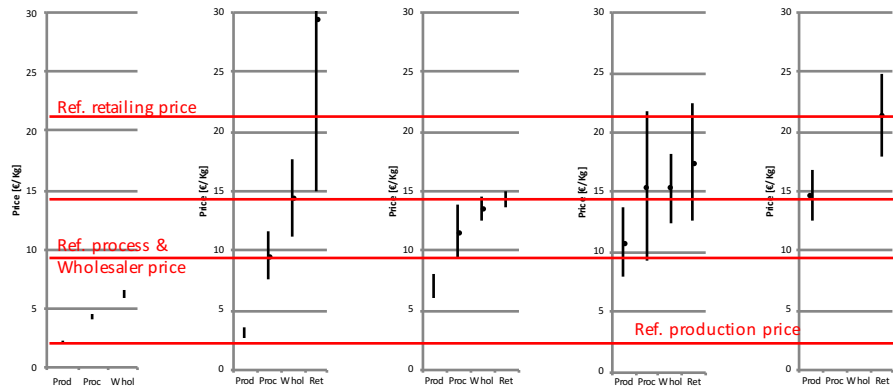
Results: added value and selling price



Key results: pickers' selling prices



Key results: added value



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Thank you
berry much



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