4th Olympus International Conference on Supply Chains
(4th Olympus ICSC)
Katerini, September 14 & 15 2018
TEI Central Macedonia
Department of Supply Chain Management & Logistics

4th International Conference on Supply Chains
OLYMPUS ICSC2018
14.15/09
Katerini, Greece

Organized by

Technological Educational Institute Central Macedonia

Department of Supply Chain Management & Logistics

Aristotle University of Thessaloniki
Department of Mechanical Engineering

Laboratory of Quantitative Analysis Logistics and Supply Chain Management

T.E.I. Central Macedonia,
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Dear friends, colleagues and partners of the Department of Supply Chain Management & Logistics,

We gladly announce you the organisation of the 4rth Olympus International Conference in Supply Chains (4th Olympus ICSC). The Conference will take place in the city of Katerini headquarters of our Department on September 14 & 15, 2018 at Mediterranean Village Hotel (5* beach Hotel, Paralia Katerinis).

The organization will also be held this year in collaboration with the Laboratory of Quantitative Analysis and Logistics of the Department of Mechanical Engineering of the Aristotle University of Thessaloniki, while many organizations of the Greek Supply chain sector will actively participate in the co-organization of the conference.

We strongly believe that this event, 8 years after the first Olympus International Conference on Supply Chains in 2010, will provide the opportunity to all participants to present their research activities and collaborate with the real business world. On the occasion of the conference, we want to co-exist in the same space with academics, researchers, employees and professionals, to exchange knowledge, experience and develop synergies and partnerships with the constant aim of developing the Supply chain and Logistics sector , where graduates will be able to offer their knowledge and entrepreneurs will be able to work with good prospects for growth and prosperity.

This invitation is addressed to academics, researchers, entrepreneurs, decision and policy makers from public authorities, members and representatives of business associations, undergraduate and postgraduate students in the field of Supply Chain Management and Logistics Management. We are promising the high quality of the invited speakers, research papers and discussions, as well as, excellent conference facilities.

We hope to see you all in Katerini city at foot of mythical Olympus mountain and nearby the wonderful Pieria beach in the 4th Olympus ICSC at September 14 & 15, 2018.

Yours sincerely,
The Chairman of the Organizing Committee,

Prof. Dimitrios Triantafillou

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4TH OLYMPUS INTERNATIONAL CONFERENCE ON SUPPLY CHAINS

Friday, September 14th 2018
Katerini, Mediterannean Village

09:00-09:30	**Registration**	
09:30-11:00	**1st Session: Supply Chain Operations I**	
	Christos Afentoulis, Christos Zikopoulos	*Analytical and simulation methods for the configuration of an efficient inventory management system in the wholesale industry: a case study*
	Dragana Drenovac, Milorad Vidović	*Optimization of Fleet Size With Balanced Use of Vehicles: VNS Approach*
	Vasilis Loulos	*Developing supply chain strategies as practice: a business analytics approach integrating expertise inside and outside organization*
	Bui Thi Nga	*An analysis of linkages in the fresh milk supply chain in Vietnam*
	Lysandros Mavropoulos, Dimitrios Aidonis, Christos Keramydas	*Vehicle Routing Optimization in a Retail Company*
	George Malindretos, Sonia Mavrommati, Maria-Aristea Bakogianni	*City logistics models in the framework of smart cities : urban freight consolidation centers*
	Dražen Popović, Milorad Vidović, Nenad Bjelić	*A Hybrid VNS/LP Approach to Solve Production Scheduling of Fruit Juice Beverages*
11:00-11:45	**Keynote speaker**: René de Koster Professor of Logistics and Operations Management, Department of Technology and Operations Management, Rotterdam School of Management (RSM), Erasmus University, Rotterdam *“Warehouse robotization, state of the art and research opportunities”*	
11:45-12:15	**Coffee break**	
12:15-13:30	**2nd Session: Supply Chain Trends**	
	Anastasios Gialos, Vasileios Zeimpekis	*Current status and challenges on logistics 4.0 technologies in warehouse operations*
	Konstantinos Tziantopoulos, Dimitrios Vlachos, Eleftherios Iakovou	*Supply Chain Reconfiguration Opportunities Arising from Additive Manufacturing Technologies in the Digital Era*
	Branka Mikavica, Aleksandra Kostić-Ljubisavljević	*A Visible Light Communication based Indoor Positioning in Industrial Logistics Management*
	Maria Drakaki, Panagiotis Tzionas	*Modeling the Order Fulfilment Process Using Colored Petri Nets*
	Paraskevi Tsoutsa, Panos Fitsilis, Omiros Ragos	*Modeling Service Collaboration in Business Information Systems*
	Thomas Sermpinis, Christos Sermpinis	*Traceability Decentralization in Supply Chain Management Using Blockchain Technologies*

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Friday, September 14th 2018

13:30-14:15	**Keynote speaker:** Till Riedel Lab leader of TECO research group at the University of Karlsruhe Lecturer at the Karlsruhe Institute of Technology *"Why Industry 4.0 needs more data driven innovation"*	
14:15-15:00	**Lunch Break**	
15:00-16:30	**3rd Session: Supply Chain Operations II**	
	Dejan Krstev, Radmil Polenakovik	*Dynamic systems in the supply of pellets and distribution of the pellet production process*
	Volha Yakavenka, Ioannis Mallidis, Ioannis Siamas, Dimitrios Vlachos, Eleftherios Iakovou	*Evaluation and Strategic Network Design in Cold Supply Chain*
	Theo Faruna, Dimitris Folinas	*Evaluating a humanitarian supply chain network: Empirical findings from the HIV/AIDS program in Nigeria*
	Assunta Di Vaio, Mihail Diakomihalis	*Cruise ship supply chain: a field study on outsourcing decisions in Italy*
	T. Spyropoulos	*Benefits of shift automation systems in logistics & transportation – an integrated business approach*
	Anastasia Paraschoudi, Adrian Solomon, Panayiotis Ketikidis	*Exploring the use of added-value services in supply chains: The case of Greek fresh food sector*
	Panagiotis Kotsios, Dimitris Folinas, Konstantinos Papadopoulos	*Cost analysis and comparison of road freight transport cost in 20 European countries*
16:30-17:00	**Coffee break**	
17:00-17:45	**Session: Sponsors' Workshop** *Sponsors present their products, services and activities in supply chain management*	
17:45-18:30	**Session: Alumni Workshop** *Graduates present themselves*	
19:00-19:45	**Official Conference Opening**	
19:45-20:30	**Keynote speaker:** Leonidas Ntziachristos Laboratory of Heat Transfer and Environmental Engineering, Department of Mechanical Engineering, Aristotle University of Thessaloniki, Greece *"Trends in Transportation – Environmental Impacts on Supply Chain Management"*	

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Saturday, September 15th 2018

09:30-11:00	**4st Session: Supply Chain Case Studies**	
	Bui Duc Tinh and Pham Xuan Hung	*Regional economic integration and risks for agricultural products: a banana value chain analysis in Huong Hoa district, Quang Tri province, Vietnam*
	Evagelos D. Lioutas, Chrysanthi Charatsari, Marcello De Rosa, Giuseppe La Rocca	*Knowledge systems in the agrifood supply chains: A cross-country study*
	Judmir Dervishaj, Dimitris Folinas	*Assessing the importance of Public Private Partnerships in the Albanian railway transportation sector*
	Ioannis P. Siamas, Panagiota A. Tsantili	*Risk Analysis on General Data Protection Regulation (GDPR): The Case of "The Smile of the Child"*
	Soumela E. Chatziantoniou, Panayotis D. Karayannakidis, Maria Chrysopoulou, Dimitrios J. Triantafillou	*A quick method to monitor virgin olive oil adulteration across food supply chains*
	Bakalopoulos Konstantinos,Tsarouhas Panagiotis	*Evaluation of service satisfaction in the microbiology laboratory of the public hospital, according to the principles of Total Quality Management (TQM): Case study*
	Chrysanthi Charatsari, Fotis Kitsios, Evagelos D. Lioutas	*Developing short food supply chains: The dual role of farmers' competencies*
11:00-11:45	**Keynote speaker:** Pietro Evangelista Senior Researcher in Logistics and SCM Institute for Research on Innovation and Services for Development (IRISS) National Research Council (CNR), ITALY *"Environmental management in logistics service providers: current practices and future developments"*	
11:45-12:00	**Coffee break**	
12:00-13:00	**Round Table** Emerging new technologies in supply chains	
13:00-14:30	**5th Session: Environmental and Social Issues in Supply Chains**	
	Abdul Salam Khan	*Total Quality Management of Green Logistics and Perishability in Supply Chains*
	Christina C. Karadimou, Antigoni E. Koletti, Alexandra Moschona, Helen G. Gika, Dimitrios Vlachos, Andreana N. Assimopoulou	*Sustainable exploitation of peach industries' by-products for the recovery of bioactive constituents*
	Afroditi Anagnostopoulou, Aggelos Aggelakakis, Alkiviadis Tromaras, Eleni Mavropoulou, Maria Boile	*Freight Transport Sustainability: Perspectives of Public and Private Sector*
	MariaTsourela, Dimitris Paschaloudis, Dafni-Maria Nerantzaki	*Issues of logistics and supply chain education: a case study of programme development in Greece*
	Dimitris Folinas, Dimitris Mylonas, Paraskevas Kourtis	*Teaching warehousing: Why not using a simulation tool?*
14:30-15:00	**Closing and Conference Conclusions**	

Dynamic systems in the supply of pellets and distribution of the pellet production process

Dejan Krstev*, Radmil Polenakovik**
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Abstract

System archetypes are models of behavior of a system, understood as generic structures or as an overview of typical systems. There are recognized structures that show repetition in many different situations. Archetypes are depicted as appearances of common combinations through amplifying and balancing feedback loops. They are constantly used to facilitate a quick understanding of the system and their knowledge and already learned features, their insight and insight. As analytical features, they help people change their thinking for a much larger systemic perspective to understand a phenomenon or dynamic, and in some situations when real corrective action is not taken.

Introduction

In order to plan and define the future perspectives for wood energy, it is important to include all the basic parts in the modeling process that determine how the choice will be formed in favor of the application of a certain type of wood SDPP - (Sustainable Development of Pellets Production). Three types of energy wood are mentioned in a firewood production plant: sawdust, pellets and briquettes.

To show the most important components of the system and their common connections, CLD (causal loop diagram) is applied, Figure 1. It helps to understand and characterize the functioning of the system. The dynamic system diagram in Figure 1. shows four gain nodes and one balance node.

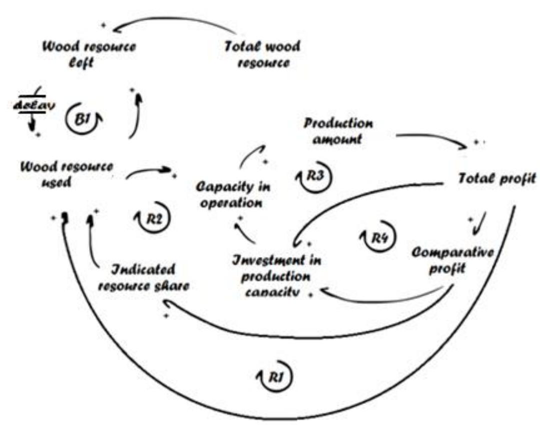

Figure 1.Causal loop diagram of production of briquetting / shaving from sawdust

Increased use of forest resources is delayed by balancing node B1. The total amount of forest resources for large industries is limited. If more resources are used, for example, in the

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production of briquettes, the remaining resources will be left for the production of firewood and pellets. The amount of required resources used to produce a product may not exceed the total amount of resources available. Initially, booster nodes will promote rapid output growth, but as it approaches the limit of available resources, the effects of the balancing node will increase and the rate of production will decrease.

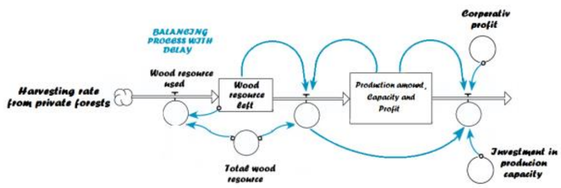

Figure 2. stock and flow diagram of production of briquetting / shaving from sawdust

At the very beginning of the production of pellets, the machine is filled with wood shavings. The sawdust, ie the resources that are in stock are reduced, which re-starts the process of finding resources to continue the production of pellets.

The first amplifier node R1 shows: more forest resources used to produce a particular product (firewood, briquettes or pellets), which raises the need to install a larger production plant, which would allow sales to increase and thus the relative profit would be greater. All this would result in increased use of forest resources for the production of individual products.

The second amplifier node R2 is similar to R1, for example, a larger amount of resources means more installed capacity, larger production volumes and an increase in total profit. Higher profits mean extra research resources. It takes time to research, and thus the increase in relative profit will occur with a delay, which means that most of the total resources will be used to produce a particular product, thus increasing the amount of resources provided for the process. of production. This process also occurs with a delay

The third reinforcement node R3 is part of the newly installed capacity, which is intended exclusively for the production of pellets. The installed capacity is higher than the others (because the demand for pellets is much higher than the demand for briquettes), and this results in more products being produced, which leads to higher profits. If the profit obtained from the new production plant is greater than the profit that is a result of the operation of the other plants, then part of the profit can be used for the construction of new production facilities intended for pellets.

If the relative profit obtained from the production and sale of pellets is less than the profit obtained from the production and sale of other products from chemical resources (firewood, briquettes) the profit could not be used to build new facilities, because the resources would be used to produce other products, so the existing facilities would not be operating at full load. There is a delay between the investments intended for the construction of new facilities and the facilities that are currently operating, because it takes time to make decisions and to purchase and install facilities.

The fourth reinforcement node R4 works in a similar way to R3, but in this case, as in the case of R2, part of the gain is used for research, promoting an increase in relative gain, and that increase in relative gain, compared to the gain from others. production plants, enables investment in new facilities.

In the text above which is used from the doctoral dissertation entitled "SUSTAINABLE DEVELOPMENT OF PELLETS PRODUCTION" by Haralds Vigants, we can see which archetypes are covered, and they are explained below.

1. BALANCING PROCESS WITH DELAY

Archetype description: At the beginning of the production of pellets, the machine is empty, so the difference between the required amount of sawdust (the machine is empty) and the desired amount of sawdust (the machine is full) is maximum.

When the machine is filled with sawdust, the difference between the current amount of sawdust and the desired amount of sawdust continues to decrease. In the beginning, the machine fills up quickly, it is obvious that enough sawdust is missing, so then the difference is that it reduces the intensity of the sawdust flow. At the moment of achieving the desired amount of sawdust, there is no further motivation to continue filling the machine. The desired state is converted to the achieved state, the process is removed.

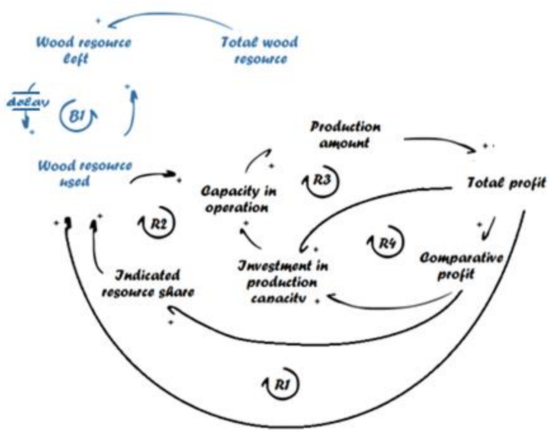

Figure 3. The archetype Balancing process with delay (B1) shown in Causal loop diagram for production of briquetting / pelleting from sawdust

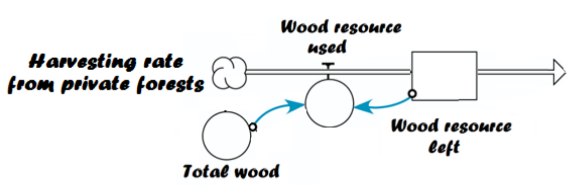

Figure 4. The archetype Balancing process with delay (B1) shown in stock and flow diagram for production of briquetting / pelleting from sawdust

What does this archetype recognize?

• recognizes that the balancing node adjusts the system to ensure stability and, on the other hand, to resist change.

2. LIMITS TO GROWTH

Archetype Description: In this structure, investment in production capacity affects the resources used to produce pellets. The resources used affect the investment in production capacity, this is a reinforcing node. While this cycle is active, the resources used correlate with the total amount of available resources and affect the resources that are left.

When the resources used reach a certain level, the resources that are left for production hinder the growth of the resources used for the production of pellets. Because the focus is on the amplifier node, which has influenced the production of something desired, the slowdown in results is usually confusing. The normal action is to put more emphasis on investing in production capacity, which then strives to use more resources. The Limits to Growth structure reaches the point where the resources used tend to be used more.

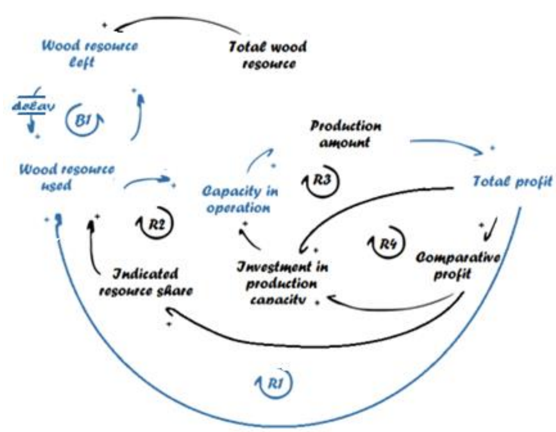

Figure 5. Limits to growth (B1 and R1) in the production of briquetting / pelleting from sawdust

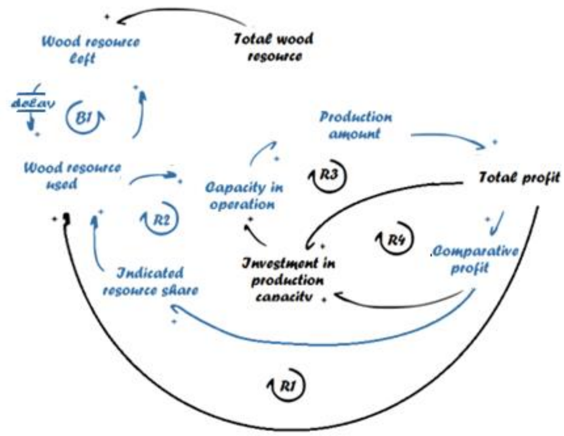

Figure 6. Limits to growth (B1 and R2) in the production of briquetting / pelleting from sawdust

This archetype can be used for data indicating increased demand for pellets. As the demand for pellets increases, more resources are needed for their production. The need for resources is disproportionately increasing compared to the available resources on the planet. Growth is limited and cannot be infinite.

The amplifying nodes from R1 to R4 in relation to the balancing node B1 aim to increase the production capacity, the total production profit, capture the profit in the investment capacity, as well as capture the relative profit in research.

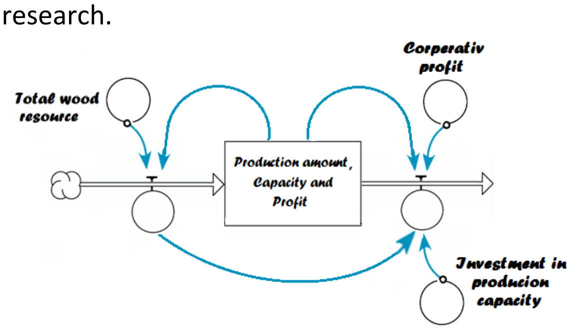

Figure 7. The archetype Limits to Growth (R1-R4) shown in stock and flow diagram for production of briquetting / pelleting from sawdust

What does this archetype recognize?

- Recognizes that every growth is not constant,
- Be aware of future obstacles and pressures that may be caused and
- Growth support is often looking for ways to reduce or eliminate all constraints, rather than complicating the growth cycle

3. SA in pellet supply and distribution

This section will show a C-L (causal loop) example in the analysis of pellet supply and distribution. The diagram below shows two balancing (B1 and B2) and two amplifying nodes (R3 and R4). Where balancing node B1 represents the need for pellets in the urban environment, whereas balancing node B2 represents the distribution of pellets.

The amplifier node R3 represents the policy of a pellet factory, which determines the need to direct pellets in urban or rural areas depending on the demand of the population. The R4 node represents the connection between B1 and B2, ie the satisfaction of the need for pellets to be done through the appropriate road infrastructure for the distribution to be satisfied.

Systems analysis of wood supply and distribution system (WSDS). Each labeled loop indicates an individual flow of information and / or materials. Well-known systemic structures, or archetypes, can be identified considering synergistic actions of the loops: drifting goals (B1 and B2); fixes that backfire (B2 and R3), and limits to growth (B2 and R4), where natural resources capacity represents the system-carrying capacity.

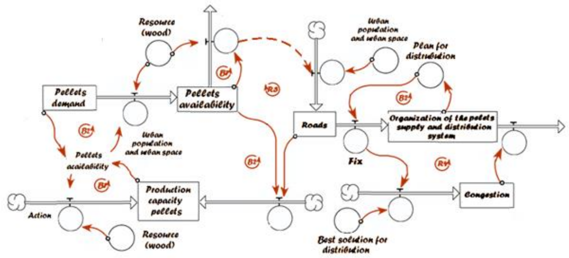

Figure 8. Stock and flow diagram of supply of pellets and distribution

To be sustainable, food policies have to be directed toward efficient AGNR management, including the supporting infrastructure of the food system (e.g., technology, organizational quality, roads, urban planning, etc.) and will have to be based on minimizing food gaps and maximizing food resilience. The pressure or temptation to lower food security and food system resiliency goals (e.g., 100% to 90% of food gaps closed by 2050) will be immense, leading to “drifting goals” behaviors among policymakers likely to support food resiliency for some albeit to the exclusion of others through the persistence of the food availability gap (Figure 8). The food availability gap varies due to two primary drivers: food demand (B1; which is the desired goal) and current food supplies provided by the system (B2; representing urban and rural resources). Rash policies directed towards infrastructure development in order to facilitate exchanges and food distribution (e.g., road building to generate greater accessibility) might be effective in the short-term but will incentivize continued urbanization, exacerbating congestion of the infrastructure and thereby eroding the ability to deliver food supplies, creating a “fix that backfires” (loops B2 and R3). Policies on resource use should account for natural limits to the system and respect the “limits to growth” (i.e., natural resources capacity; B2 and R4). In this context, it should be identified and emphasized that policies that degrade natural resource capacity (the carrying capacity of the system) might negatively affect food system production and increase the food gap. It indicates that food policy design should be oriented to maintain the system’s capacity to produce and distribute food, taking into account the current socioeconomic structures and the nation-state as a whole in order to support their human developmental capacity while respecting the natural constraints enforced by the local environmental and biophysical limits.

4.. DRIFTING GOALS

Archetype Description: The "Drifting goals" archetype was first identified. This archetypal structure has two important equilibrium nodes. One equilibrium node shows the pressure to reach the target, while the second equilibrium displays the actions to improve the conditions for doing so.

In this case, the equilibrium nodes are characterized as follows: (B1) the demand for pellets, and (B2) the supply and distribution of pellets. Node B1 appears as an equilibrium node when it is considered that increasing the availability of pellets increases their attractiveness to humans, which in turn increases the need for pellets. In turn, this reduces the availability of pellets.

Also, this dynamic can be driven by other reasons that can make cities more attractive. At node B2, low pellet availability increases the need for pellet policy, seen as investment in production, processing, transport and retail, both in rural and urban areas.

It improves the quality of the organization in the pellet supply and distribution system, and also improves the availability of pellets, favoring urban growth and attractiveness.

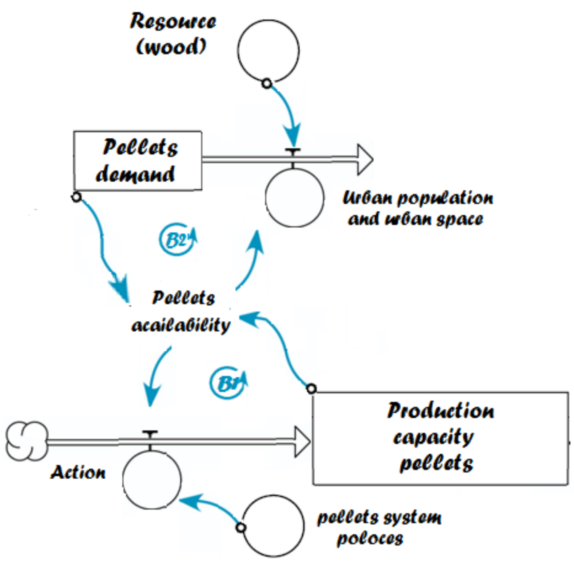

Figure 9. The archetype Drifting goals (B1 and B2) shown in the stock and flow diagram for pellet supply and distribution

Several mechanisms indicate that meeting targets in pellet supply (supply chains) is a limiting behavior. Governments tend to think about building infrastructure (roads and highways) that will mitigate distribution activities and boost the economy, but in the long run this measure makes the system much more inefficient, as these activities reduce production space and markets, with which increase congestion. The previous situation, which refers to urban dynamics, introduces two paradigms for an amplifying node, which can limit the success of the system.

What does this archetype recognize?

- Seeks goals that are contrary to the stated goal.
- Recognizes standard valve closing procedures. Do they inadvertently contribute to the failure of the goal?
- To anchor the target to an external reference,
- Clarify the relevant vision that will involve everyone.

5. SHIFTING THE BURDEN

Archetype Description: The amplifying node R3 is an example of the "Shifting the burden" archetype. It is a collision between a fundamental and a symptomatic solution.

The effects of the progressive implementation of a symptomatic solution have significant negative effects on the state of the system in the long run. Urban growth, regardless of the cause, increases congestion and traffic, which in turn limit the organization of the supply of pellets and their distribution, thus reducing the availability of pellets.

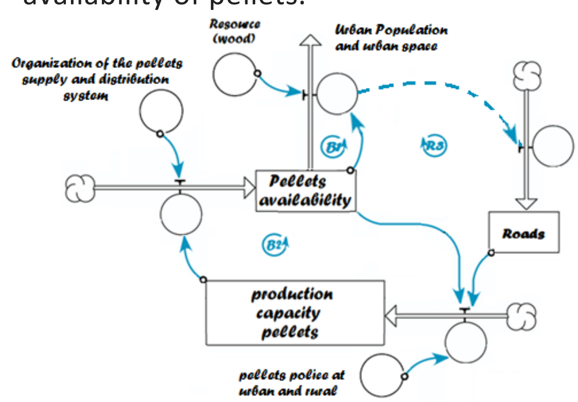

Figure 10. Archetype “Shifting the burden” (B2 and R3) shown in stock and flow diagram for pellet supply and distribution

Shifting the burden structure consists of two balancing nodes (B1 and B2) and one reinforcing node (R3). In the diagram above for the availability of pellets can be acted through a fundamental solution and through a symptomatic solution. The symptomatic solution of action, in fact, represents the urban outlets. The problem with the availability of pellets affects the need of the urban population to be satisfied with pellets from urban outlets. While the fundamental solution, ie. the policies of a pellet factory determine the need to direct pellets to urban or rural areas depending on demand.

What does this archetype recognize?
• Recognizes the original problem of the symptom (s),
• Draws "quick fixes" that appear to keep problems under control,
• Recognizes influence from others. What are the implications of these solutions for other players in the company?
• Recognizes fundamental solutions. Looks at the situation from both perspectives to find a systematic,
• I recognized high-level stocks for both perspectives.

6. FIXES THAT FAILS

Archetype Description: The amplifier node (R4) shows the archetypal structure "Fixes that fails". The archetype "Fixes that fails" explains how a reductionist view of remedial measures can contribute to the symptoms of the problem by increasing the apparent pressure for that solution, while also creating unintended consequences.

As mentioned before, which exacerbate symptomatic problems and distract from the fundamental solution. In this case, it is shown that roads are not the only solution to increase the supply of pellets in cities. It is a confirmation that the availability of pellets is an issue that belongs to the overall structure of the supply of pellets and distribution.

The additional R4 reinforcement node can be used for policies that seek to increase production and industrial processing without compromising the standards of social exchange and sustainability of natural resources, as you run the risk of using natural resources and obtaining larger quantities. of pellet waste during the distribution process.

In the long run, the structure of the pellet supply and distribution structure may fail and the availability of pellets at the urban level may decrease, as highlighted above.

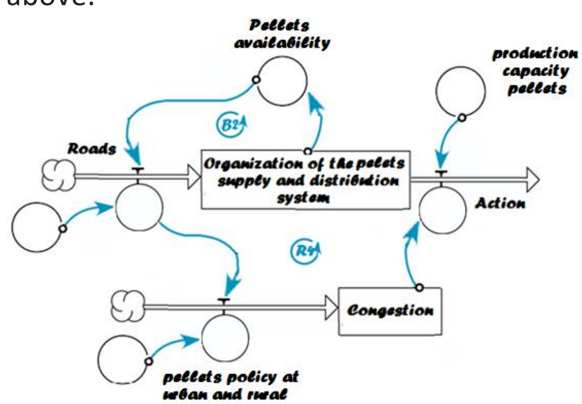

Figure 11. The archetype "Fixes that fails" (B2 and R4) shown in stock and flow diagram for pellet supply and distribution

What does this archetype recognize?
• Recognizes a problem symptom,
• Outlines ongoing interventions and how they would be expected to fix the problem,

• Outlines unintended consequences of interventions,
• Recognizes fundamental causes of problem symptoms,
• Finds connections between two sets of nodes. Are the measures and the fundamental reasons related?
• Recognizes high level interventions. Adds or stops links in the diagram to create structural interventions,
• Outlines potential side-effects for each intervention, in order to prepare for them (or to avoid them all together).

CONCLUSION

Based on historical data, a prediction was made that the applicability of firewood will decrease significantly by 2030, which would stimulate growth in the production of pellets and sawdust. Historical data show that in the last 10 years, there has been a significant increase in the production of sawdust and pellets, while the production of firewood is already declining sharply. Reduction of firewood production and increase of production in sawdust can be explained by the increased need for sawdust in cogeneration plants and houses with built-in boiler. The production of sawdust from forest residues has evolved. The decrease in the production of firewood is related to the increase in the production of pellets.

To define future perspectives on wood energy, it is important to include all the basic components in the modeling process that determine how the choice will be made in favor of applying a particular type of SDPP - (Sustainable Development of Pellets Production). The three applicable types of wood that are mentioned are: firewood, wood shavings and pellets. To show the most important components of the system and its common connections, a causal node diagram (CLD) is used to help understand and characterize the operation of the system.

The Casual loop diagram shows four gain nodes and one balance node. Increased use of forest resources is delayed by Balancing Node B1 and where the archetype Balancing Process with Delay can be seen. The amplifying nodes from R1 to R4 in relation to the balancing node B1 described by the archetype Limits of Growth, aim to increase the production capacity, the total production profit, capture the profit in investing the capacity, as well as capture the relative profit in research.

The second example shows a Sausal loop diagram showing the supply of pellets and their distribution. Two balancing nodes (B1 and B2) and two amplifying nodes (R3 and R4) can be identified. Collectively, B1 and B2 represent the major equilibrium nodes in the common Drifting goal archetype. Amplifier nodes B2 and R3 show the effect of the amplifier node inside the "Shifting the burden" archetype. While B2 and R4 show a possible archetype "Fixes that fails".

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