Managing LINKS Reconfiguration Complexity

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Randall G. Chapman, PhD

Chapman@LINKS-simulations.com

October 27, 2015

Customers want what they want and, if a firm's products|services aren't what customers prefer, obvious competitive challenges arise. The initial LINKS product|service configurations aren't necessarily well-desired by customers, so there is plentiful opportunity for improvement by LINKS firms. And, of course, adding to the complexity and challenge of LINKS students' reconfiguration management efforts is the potential for customer configuration preferences to vary by region and by customer segment ("H" and "M") in LINKS, just as in all businesses and markets.

Reconfiguration analysis and decision-making is the most complicated decision-making component in the LINKS simulations. Competitive market position, demand analysis, supply management, and cost-analysis/pricing issues all arise in reconfiguration analysis and decision-making. How can LINKS instructors manage reconfiguration complexity to best meet their instructional goals? Multiple possibilities exist in LINKS, reflecting the rich LINKS customization capabilities.

This LINKS White Paper is targeted to instructors teaching with the larger LINKS Simulations that include reconfiguration decisions.

This LINKS White Paper is organized around these topics:
- Easing Students Into Reconfigurations
- Increasing Later-Round Reconfiguration Complexity
- Decreasing Reconfiguration Complexity Throughout LINKS Events

This LINKS White Paper encompasses reconfiguration complexity in all LINKS Simulations variants. In this LINKS White Paper, the phrasing "products|services" denotes "products" in LINKS products simulations and "services" in LINKS services simulations.

Easing Students Into Reconfigurations

Given the general level of complexity in all LINKS simulations, it is prudent for instructors to craft their LINKS event schedules to initially exclude reconfigurations. For example, see the following excerpt for initialization and the early rounds from a representative LINKS Sign-Up Form for the LINKS Supply Chain Management Simulation [Extended Edition].

LINKS Schedule	Date	Time (your local time)	Special Instructions and Instructor-Optional Switches
Initialization (and advancement to M#3 and passcode e-mailing)	*March 1*	*Anytime*	*Deactivate product development and generate demand input web-screens initially.*
M#4 [round 1]	*March 8*	*13:00*	*Activate generate demand for M#5 inputs.*
M#5 [round 2]	*March 15*	*13:00*	*Activate product development for M#6 inputs.*
M#6 [round 3]	*March 29*	*13:00*	

In addition to easing students into LINKS (by reducing the initial scope of their decisions), deferring reconfiguration decisions permits students to order and analyze relevant research to make informed, fact-based reconfiguration decisions rather than just guessing at customer preferences.

Just before reconfigurations become possible within LINKS event schedules, instructors should:
- Use some in-class time to discuss configurations and reconfiguration decision making.
- Use some in-class time to work through reconfiguration-relevant research studies in their LINKS variant. "Work through" involves using the sample research study output in the LINKS manual as a springboard for reviewing purpose, design, and results interpretation of LINKS research studies.
- Assign relevant reconfiguration-related LINKS tutorials for outside-of-class completion.

The initial LINKS configurations aren't particularly well-suited to customers in any of the LINKS regions. Thus, all LINKS firms face significant decisions related to reconfigurations and, therefore, pricing. Of course, firms must detect their relatively poor "product|design" quality, perhaps via Research Study #14, before realizing their collective "configuration undesirability problem." LINKS instructors should encourage their students to ask good questions such as:
- How attractive are your "products|services" to your customers?
- Which research studies provide useful information about how your customers view your "products| services"?
- What research studies provide useful information about attractive reconfiguration options?

Increasing Later-Round Reconfiguration Complexity

To provide more market selection and targeting emphasis, activate an additional "product|service" relatively early in a LINKS event (e.g., during the M|Q#5 game run for use in M|Q#6 and beyond).[1] The additional product|service is configured as an H but it can be reconfigured to be an M at a firm's option, with all of the associated reconfiguration costs. No advance notice of the presence of an additional "product|service" to students is required; appropriate documentation about the additional "product|service" is provided at the end of the standard financial and operating reports.[2]

As a further reconfiguration decision-making enrichment, instructors teaching with LINKS products simulations might wish to designate an additional product as a private-label product (only distributed through channel 1, the retail channel).

Advanced options for increasing later-round reconfiguration complexity are catalogued below:

Increase Product Development Complexity	Bandwidth Technology Expansion (maximum of 9) Firm-Specific Bandwidth Technology Limits Firm-Specific Memory Capacity Technology Limits Modify Patent Royalties Packaging Technology Expansion (add "luxury packaging") Permit Multiple Reconfigurations Product Attribute Extension ("Memory Capacity" and "Upgrades") Warranty Technology Expansion (maximum of 6)
Increase Service Design Complexity	Permit Multiple Reconfigurations Service Design Attribute Extension ("Upgrades")

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[1] In the LINKS supply chain management simulations, additional products also provide further possible business value for postponement, since postponed production can be "shared" among more products.
[2] Reminder: The LINKS software includes a maximum of five "products|services".

Decreasing Reconfiguration Complexity Throughout LINKS Events

A LINKS instructor might wish to decrease reconfiguration complexity throughout a LINKS event to downsize the scope of LINKS in the instructor's course or to reduce the configuration/reconfiguration emphasis in a particular LINKS simulation variant while still retaining reconfiguration analysis and decision-making presence. And, of course, the most "extreme" form of decreasing reconfiguration complexity would involve deactivating the "product development|service design" input web-screen throughout a LINKS event so that reconfigurations are never possible.

Removing patent royalties (i.e., setting patent royalties to zero) in the LINKS products variants reduces reconfiguration complexity a notch, especially for minor reconfigurations of original-product configurations that might violate multiple competitors' existing patent zones. For further discussion about removing LINKS patent royalties, see the Jan-Feb 2015 Professor's Column: Brent Moritz (Pennsylvania State University): "Eliminating Patent Royalties in LINKS?"

Similarly, reconfiguration costs could be removed (i.e., set equal to zero) to simplify reconfiguration complexity.   Although, this might have the unintended side-effect of encouraging minor reconfigurations without much or any thoughtful analysis since there would be little cost consequences to reconfigurations (except for inventory disposal charges in the LINKS products versions).

By fixing some configuration elements at their initial starting values, the reconfiguration process is simplified for LINKS students. Fewer "product|service" attributes need to be considered and analyzed in reconfiguration decision-making, given fixed values of some configuration attributes. In the LINKS products simulations, examples include:
- Only bandwidth and packaging may be changed while other product attributes are fixed at their original values. This results in only two "more-is-better" product attributes being changeable.
- Only permit one of the raw materials (say Alpha), bandwidth, and packaging to be changed during reconfigurations while fixing other product attributes at their original values.

And, these "configuration fixes" could be relaxed later in a LINKS event to provide further reconfiguration complexity for LINKS students. For further discussion about limited reconfigurations, see the Nov-Dec 2013 Professor's Column: Verda Blythe (University of Wisconsin - Madison): "Adding Limited Reconfigurations To LINKS" Revisited.

Recommended Approach: *To reduce LINKS reconfiguration complexity a meaningful amount while still retaining the challenge of reconfiguration analysis and management by LINKS students, the recommended approach is as follows:*
- *For LINKS products variants: only permit the Alpha raw material, bandwidth, and packaging to be changed during reconfigurations while fixing other product attributes at their original values.*
- *For LINKS services variants: only permit reconfiguration changes in three of the six service design attributes (CSR technical training, service appointment scheduling, and service call duration) while fixing other service design attributes at their original values.*

Postscript

For further conversation about these reconfiguration options in your LINKS event, please contact the LINKS author, Randy Chapman (Chapman@LINKS-simulations.com).