Segmentation of Medical Items in Humanitarian Supply Chains

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Motivation / Background

> Large numbers of consumable medical items either are:
  – in rupture or risk of rupture (29%)
  – in overstock (58%)

> Apparently a common situation for the organization:
  – product forecasts result in stock out or overstock (60%)

> The organization's supply chain objectives are not met:
  – 'that quality and service correspond to the needs of humanitarian operations, whilst guaranteeing appropriate costs.'

Key Question / Hypothesis

Q: *How can common operating policies be developed for medical items in ongoing humanitarian operations?*

Relevant Literature

Allain, Linda, et al. (2010) *Reengineering Public Health Supply Chains for Improved Performance – Guide for Applying Supply Chain Segmentation Framework*. USAID.

Godsell, Janet et al. (2011) 'Enabling supply chain segmentation through demand profiling' *International Journal of Physical Distribution & Logistics Management* Vol 41 No. 3 pp.296-314

McGuire, George (2015) *Handbook of Humanitarian Health Care Logistics:* Humanitarian Health Care Logistics.

Protopappa-Sieke, M. *et al.* eds. (2017) *Supply Chain Segmentation Best-in-Class Cases, Practical Insights and Foundations*. Cham, Switzerland: Springer International Press.

Van Kampen et al. (2012) 'SKU Classification: a literature review and conceptual framework.' *International Journal of Operations and Production Management*. 32(7). 850-876
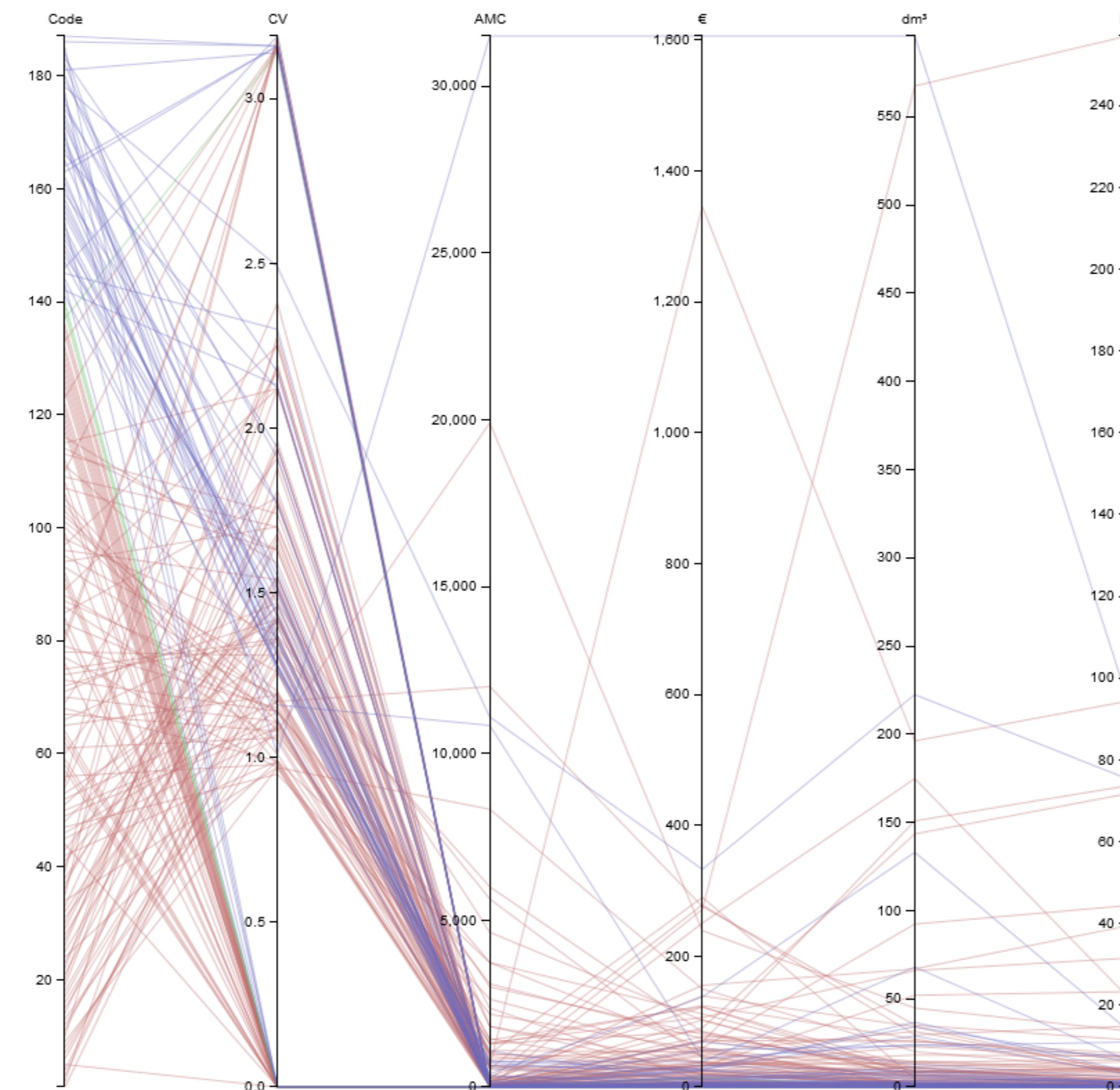

Figure 1 – Medical Items (n=187) categorized as (D)rugs (1-136) [red] ; M(E)dical Equipment (137-140) [green]; and (S)upplies (141-187) [blue], by 'driver'

The Problem

> There is no differentiation in when these consumable medical products are replenished nor how the quantity is calculated.

> All consumable medical products are managed with a single (periodic review) inventory policy (R,S).

Methodology

> Obtain a list of medical items to stock
> Determine the drivers
> Assess the driver's value for each medical stock item
> Determine the respective value's relative position within the driver
> Balance the possible combinations of drivers again the practical number of classes
> Assign the policy and its parameters per segment
> Evaluate these common operating policies

Initial Results

> Medical dispensary 'Standard List ' of 187 medical items (Jan-Nov 2017)

> Proposed drivers after discussion:
  – consumable/non-consumable
  – 'essential'
  – demand variability (the coefficient of variation – CV or σ/μ)
  – average monthly consumption (AMC or μ)
  – cost (€)
  – volume (dm³) and weight (kg)
  – lead time and its variability

> The parallel coordinates, multivariate graph in Figure 1:
  – categorizes medical items by article code and number
  – presents the respective value of the driver
  – visually links the driver values by lines (CV, AMC, €, dm³, and kg)

Expected Contribution

> Better meet the organization's *stated objective*:
  – right product in the right place
  – at the right time
  – whilst guaranteeing appropriate costs
  – in other words, fewer ruptures and less overstock

> Address the concern that Stock Keeping Unit (SKU) classification has not received *sufficient academic attention* given the implications of the decision-making in this area.

> Provide a more *holistic segmentation framework*, particularly for humanitarian supply chains.

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