The Amplification Paradox: How Consumer Demand Volatility Triggers Supply Chain Cascades in Modern Economies

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Abstract

The research paper details how viral demand surges on platforms like TikTok and Reddit cause catastrophic supply chain overreactions - using the $50 billion GPU market as a natural experiment. By aggregating four separate datasets - the Google Trends search volume, Newegg sales data, NVIDIA quarterly reports and a subreddit sentiment analysis - we identify a 4.1× amplification effect: a 22% increase in consumer demand (Q3 2021) created a 91% increase in production and then resulted in a $1.2 billion inventory saturation. Furthermore, using our new "hype index," shows that algorithmic propagation of content accounts for 63% of order volatility ($p < 0.01$), far more than other traditional causations such as pandemic and chip shortages. These results disprove traditional inventory models and present three opportunities for mitigation: (1) platform based demand smoothing techniques, (2) blockchain based pre-order systems, and (3) retailer "anti-frenzy" pricing algorithms. This research provides a framework for pre-emptive supply chain protection against hyper-volatile demand in the viral economics environment.