Oleh Ustymenko, Postgraduate Student
at the Department of Management
National Technical University "Kharkiv Polytechnic Institute"
Kharkiv, Ukraine
ORCID: https://orcid.org/0009-0002-2012-4951

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APPLICATION OF THE HODRICK–PRESCOTT FILTER FOR DIAGNOSING LONG-TERM TRAJECTORIES OF STRATEGIC MANAGEMENT TRANSFORMATION IN INTERNATIONAL IT COMPANIES

The paper substantiates the possibility of using the Hodrick–Prescott filter as an auxiliary tool for separating the long-term trajectory of strategic management transformation from short-term annual fluctuations. The empirical illustration is based on the contour-index profiles of "Accenture", "IBM", "Capgemini" and "Cognizant".

It is proposed to interpret the trend component as a stable direction of transformation, while deviations from the trend are treated as temporary responses to external shocks, market changes or one-off strategic events.

International IT companies operate under conditions of technological, market and organisational turbulence. Therefore, their strategic management should be analysed not only through individual decisions or annual changes, but also as a multi-contour dynamic system. Such a system is described through contours, indices and phases of transformation.

At the same time, annual index series may contain short-term jumps that do not always indicate a stable change in the management architecture. This creates the need for an additional tool for smoothing and identifying the long-term trend [1; 2].

The Hodrick–Prescott filter is used to decompose an annual index series into trend and short-term components. In this study, it does not replace the qualitative analysis of corporate texts, but complements the contour-index model, which combines the substantive interpretation of strategic markers with the quantitative indicators of CCI, Shift, Activated Contours and CBI [4; 5; 6].

$$\min_{\{\tau_t\}} \left\{ \sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2 \right\} \qquad (1)$$

Where: y_t is the actual value of the index in year t; τ_t is the trend component; $(y_t - \tau_t)$ is the short-term deviation from the trend; and λ is the smoothing parameter. For annual data, λ should be selected carefully.

The literature discusses different approaches to scaling the observation frequency, including $\lambda = 6.25$ when recalculating the classical quarterly value $\lambda = 1600$, as well as the practical use of more smoothed variants as a sensitivity-checking instrument [2; 3].

For the conference illustration, four companies are used, representing two key trajectories: consultancy-ecosystem and platform-intellectual (See Table 1).

Table 1

Company	Contour core	Index profile	Phase interpretation
Accenture	C5: consultancy-oriented transformation; supported by C3, C4 and C6	CCI – high; Shift – medium; Activated Contours – 7–8; CBI – high	P4 with elements of P3: strategic consolidation; client-consulting trajectory; consultancy-ecosystem type.
IBM	C3: platform-cloud architecture; C4: AI, data and automation	CCI – high; Shift – high; Activated Contours – 6–7; CBI – medium-high	P3–P4: configurational transformation with architectural consolidation; platform-intellectual type.
Capgemini	C5: consultancy-oriented transformation; supported by C3, C4 and C6	CCI – medium-high; Shift – high; Activated Contours – 6–7; CBI – medium-high	P3–P4: integrated acceleration with a tendency towards consolidation; consultancy-ecosystem type.
Cognizant	C3: platform-cloud architecture with the increasing role of C4	CCI – high; Shift – medium-high; Activated Contours – 5–6; CBI – medium	P3: configurational-transformational phase; platform-intellectual type.

Source: summarized by the author based on the results of cross-company analysis

The application of the Hodrick–Prescott filter makes it possible to clarify whether the identified index changes represent a stable trajectory or only a short-term deviation.

For “Accenture”, the expected trend component should reflect not a one-off jump, but the gradual consolidation of the company’s role as an orchestrator of client transformation.

For “IBM”, the filter is useful for separating the one-off effects of large-scale strategic restructuring from the long-term architectural consolidation of hybrid-cloud and intelligent logic.

For “Capgemini”, it helps verify whether a high Shift is a sign of stable multi-contour restructuring rather than only intensive changes within a particular period. For “Cognizant”, the filter helps determine whether platform modernisation is moving towards sustainable intelligent acceleration based on AI, data and automation.

The methodological significance of the proposed approach lies in combining contour-phase interpretation with a time-series smoothing instrument. This makes it possible to avoid drawing conclusions solely from individual annual jumps and to see a longer trajectory of change in the strategic process. [4; 5; 6].

The Hodrick–Prescott filter can be used as an auxiliary quantitative tool for identifying long-term trend components in the annual index series of international IT companies.

Its main value is not the automatic “proof” of phases, but the strengthening of argumentation: it helps distinguish the stable transformation of strategic management from short-term fluctuations. Using the examples of “Accenture”, “IBM”,” Capgemini” and “Cognizant”, it is shown that consultancy-ecosystem and platform-intellectual trajectories may have different levels of structural shift, breadth of activated contours and profile balance, but all of them are suitable for trend diagnostics within the contour-phase model.

References:

1. Hodrick R. J., Prescott E. C. Postwar U.S. (1997) Business Cycles: An Empirical Investigation. *Journal of Money, Credit and Banking*, vol. 29, no. 1, pp. 1–16. DOI: https://doi.org/10.2307/2953682.

2. Ravn M. O., Uhlig H. (2002) On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations. *The Review of Economics and Statistics*, vol. 84, no. 2, pp. 371–376. DOI: https://doi.org/10.1162/003465302317411604.

3. Baxter M., King R. G. (1995) Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series. *NBER Working Paper* No. 50221995. DOI: https://doi.org/10.3386/w5022.

4. Teece D. J., Pisano G., Shuen A. (1997) Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, vol. 18, no. 7, pp. 509–533. DOI: https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.

5. Teece D. J. (2007) Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*, vol. 28, no. 13, pp. 1319–1350. DOI: https://doi.org/10.1002/smj.640.

6. Eisenhardt K. M., Martin J. A. (2000) Dynamic Capabilities: What Are They? *Strategic Management Journal*, vol. 21, no. 10–11, pp. 1105–1121. DOI: https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E.

7. Mintzberg H. (1978) Patterns in Strategy Formation. *Management Science*, vol. 24, no. 9, pp. 934–948. DOI: https://doi.org/10.1287/mnsc.24.9.934.

8. Whittington R. (1996) Strategy as Practice. *Long Range Planning*, vol. 29, no. 5, pp. 731–735. DOI: https://doi.org/10.1016/0024-6301(96)00068-4.

9. Gioia D. A., Corley K. G., Hamilton A. L. (2013) Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods*, vol. 16, no. 1, pp. 15–31. DOI: https://doi.org/10.1177/1094428112452151.

10. Porter M. E. (1996) What Is Strategy? Harvard Business Review, vol. 74, no. 6, pp. 61–78.

11. Accenture, IBM, Capgemini, Cognizant. Annual reports, Form 10-K / Universal Registration Documents and investor materials, 2015–2024.