

A meta-analysis on private equity technology-driven value creation

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Abstract. A meta-analysis on private equity technology-driven value creation acquires special relevance for understanding the most effective ways to increase earnings before interest, taxes, depreciation and amortization. The goal of this research is to evaluate the diverse technology value creations used to increase earnings before interest, taxes, depreciation and amortization. The research used the methods of analysis, systematic search procedure, coding, assessment of methodological quality, statistical analysis. As a result of the research, the impact of reducing IT costs, improving operations using technologies and implementing digital technologies on the growth of earnings before interest, taxes, depreciation and amortization was proven. In addition, it is established that the use of enterprise resource planning systems contributes to the improvement of the system, as well as to the increase of automation. In turn, this improves operations and process reengineering. Emphasized the vital importance of digital capabilities as a strategy used by most private equity firms in today's world. These opportunities involve the implementation of transformations that contribute to the growth of profits and income. It was established that the growth of income affects the increase of indicators of earnings before interest, taxes, depreciation and amortization by at least 10%, which in the context of divestiture ultimately increases the value of investments. The results of the conducted research can be useful for private equity firms in view of revealing opportunities to use technology to stimulate and create value

Keywords: investment; interest; cost reduction; digital capabilities; automation

Introduction

Private equity (PE) firms are the key participants in the process of managing and investing financial resources. The main goal of PE firms is to increase the value of the companies in which they invest. After achieving this goal, PE firms usually sell their investments. The operating performance is a vital cog in value creation and can be realized through

the use of technology-driven value creations. The introduction of technology has fundamentally altered the manner through which PE firms do businesses as it aligns them towards efficiency gains. K. Lee & T. Roh (2020) study the impact of proactive divestiture of investments on the process of the company's investment activity. The researchers

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highlight that firms often divest their business with the aim of reconfiguring their asset portfolio and reducing debt. D.P. Stowell & P. Stowell (2024), exploring the fundamentals of PE, reveal the essence of reactive divestiture, which means a situation when the company divests solely due to external and internal pressures. J. Scharfman (2020) discusses key terms related to direct investment. The work of the researcher contains an overview of specific PE operations. J. Verbouw *et al.* (2021) investigate the impact of PE on their portfolio companies. The study focuses on the impact on operational activities, as well as employment after the buyout. T.S. Lohwasser (2020) studies the relationship between the attraction of venture capital, on the one hand, and the efficiency of financial firms, on the other. Among other things, the study determined whether venture capital providers can provide additional value beyond the provision of financial resources.

Blackstone expatiates that the life cycle of a PE fund is usually ten years but it can stretch to a maximum of 15 years at most (Blackstone, 2020). The life cycle only starts after the PE has raised the substantial capital in fund level from its investors or limited partners. The raising capital and development of a team occurs in the first and second years. The overarching aim of PE is to lure in investors until it reaches its funding target. A team is then created and tasked with investing and managing the portfolio entities.

The goal of this research is to estimate the different technology value creations which are used to increase earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) namely IT cost reduction, tech-enabled improvement of operations, and digital enablement. The research objectives are to identify initiatives for reducing IT operating expenses, examine the role of the Chief Information Officer/Chief Financial Officer (CIO/CFO) organization in improving EBITDA, and explore the impact of IT cost reduction on business operations.

Materials and Methods

The meta-analysis helped in the identification of the range of studies that focus on a relevant topic. Through the use of analysis, the researcher was able to overcome the limitation of small sample sizes in the individual studies, to reduce the false-negative results, to bridge the existent dearth of knowledge prevalent in PE operations studies, to identify areas that lacked adequate evidence, to overcome problems and biases of conventional systematic and narrative reviews through the application of a subjective and transparent process.

The meta-analysis implemented the use of a systematic search procedure which helped in the identification of empirical studies, opinion papers, literature reviews, journal articles that explored the various ways through which value is created through technology. The first step in the search process was marked by the use of key terms and concepts which expressed similar index terms and

keywords. The second step in the search process focused on the analysis of the reference sections of the papers that were retrieved in order to identify other studies which fit the framework. The third step involved contacting researchers and authors who were yet to publish their seminal works which were related to the topic at hand. All through the search and refinement process, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement were used.

The studies derived from the refinement process were then read, analysed, and coded. An advanced coding scheme contained divergent bits of general information ranging from CIO and/or the Chief Operating Officer (COO) involvement, effect, and moderator size as well as PE and portfolio performance. In a bid to capture the differences between the studies, the researcher coded the Pearson product-moment correlation coefficients and the bivariate factors. The methodological quality of the research was evaluated through the use of the JBI checklist for systematic reviews and meta-analyses. The tool was effective as it provided a new view on what articles count as evidence and the various methods that are used to synthesize the divergent types of evidence.

The analysis of operational value creation in the divestment context focused on three dimensions: IT cost reduction, tech-enabled improvement of operations, and digital enablement, all of which were commingled with the EBITDA dependent variable. For all three variables, the researcher measured the impact on EBITDA based on the application of technologies. The measurement of the independent variables helped in the mitigation of any potential biases. The researcher adopted a random-effects model for the meta-analysis of the differences between the sample studies. The random-effects method helps in determining the variations in the studies by checking whether there are any related intervention effects. For the moderators, the researcher utilized meta-regressions and subgroup analyses. The meta-regressions on the random-effects model permitted the researcher to avoid artificial dichotomization through the inclusion of all three moderator variables.

Results

Blackstone (2020) highlights that the raising capital stage is the most defining phase as it determines the resourcefulness, aptitude, and capability of the PE. The second stage in the lifecycle is the sourcing of deals which takes between two to five years at most. During this stage, the PE stages the time horizon through capital calls, investment periods, and the harvest period. The PE begins to incrementally call the capital after the limited partners have committed capital during the initial stage. The capital is then deployed through investment opportunities that are selected by the general partner from years three to five as highlighted in Figure 1. PEs are required to create records of the performance rates in order to determine how the investment returns can be accentuated as per the investor expectations.

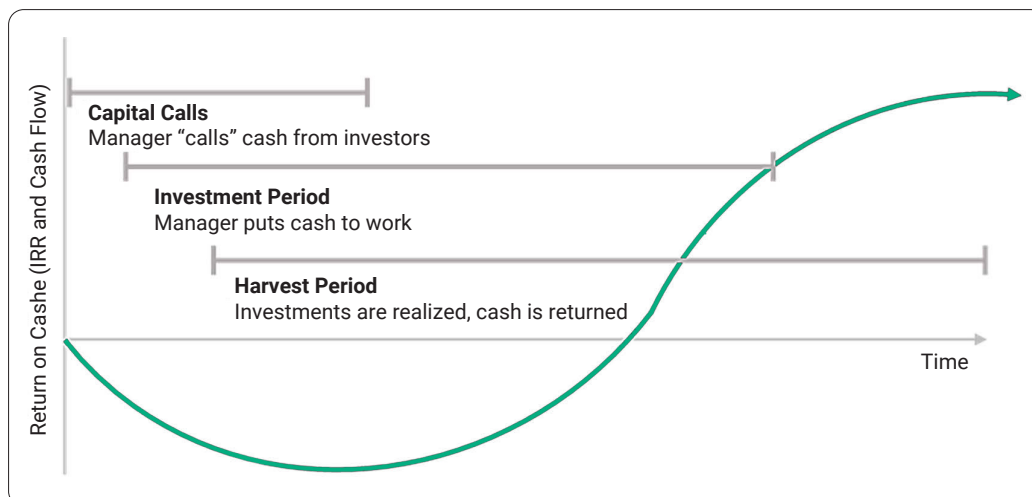


Figure 1. Private equity fund lifecycle

Source: compiled by the author based on Blackstone (2020)

The third stage is the harvesting period whereby the fund returns the cash to the investors after the investments have been realized. The harvesting period occurs between years five through eight or nine. During this period, PE has to analyse performance using the J-curve effect. The curve defines the potential performance experience of an investor all through the life cycle. Investors dole out capital

in the initial years while also paying management fees. The deployment of capital by the fund can lead to negative returns since the expected performance rates are not enough to settle the fees (Jules *et al.*, 2021). On the contrary, returns are bound to improve over time because the investments are inherently successful. Figure 2 shows the J-curve effect at work.

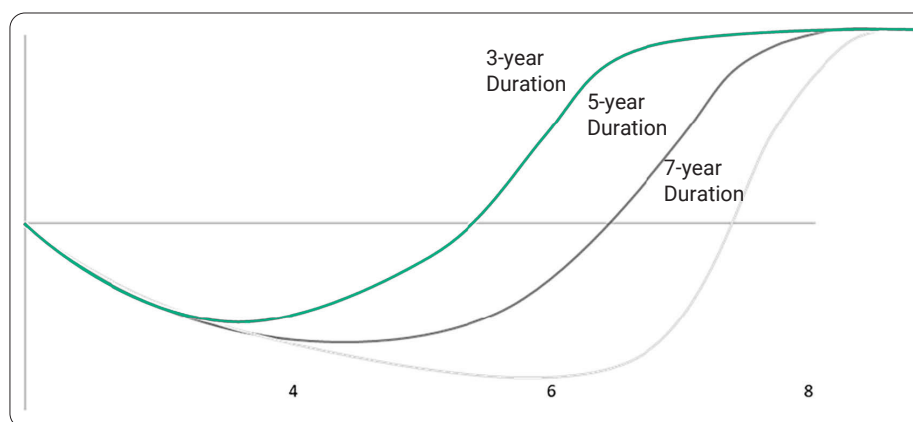


Figure 2. J-curve effect

Source: compiled by the author based on "The life cycle of private equity" (2020)

The final stage is exiting the market or investment with the time frames varying. The final phase is marked by divestment whereby the PE firm realizes profits and values in monetary terms. Researchers adumbrate that the exit can occur in six months after the investment in the case that the right economic conditions and strategic buyers are present. On the contrary, the exit can take up to ten to 15 years if the economy is not performing as expected (Wirtz, 2010; Møller & Sørensen, 2019). A good exit is one that contains a myriad of buyers who exhibit heightened demand for the portfolio. This minimizes situations whereby PE funds are forced to sell or hold fire sales.

The divestment context serves as the crux for this paper. Traditionally, the context has been focused on serving as a financial tool and mechanism that improves the efficiency of a firm. By definition, divesting is the process through which an organization sells off its assets. Moreover, understanding the context is key in mitigating the impact of retreating errors that can influence the strategic purposeful action of a PE fund. During the divestiture process, PE funds often follow a series of steps. The first step is the monitoring of the portfolio with every business unit being evaluated based on its relevance to the long-term business strategy. This is followed by buyer identification after the

business unit has been flagged for divestiture (Haynes *et al.*, 2002; Wetzler, 2017). The success of the deal is reliant on the identification of a viable buyer. The identification process further comes in handy in the extraction of value from the divestiture which sets a price for the portfolio. The price should be equal to the opportunity cost that might be incurred if the PE firm decides to hold onto the business unit.

The divestiture is performed in the third step with a myriad of aspects being involved. The PE fund determines legal ownership of the business unit after which valuation is conducted. Thereafter, the PE fund manages the transition by evaluating the strategy and the costs incurred. All through the four steps, PE funds are allowed to either act proactively or reactively to divestiture (Fig. 3).

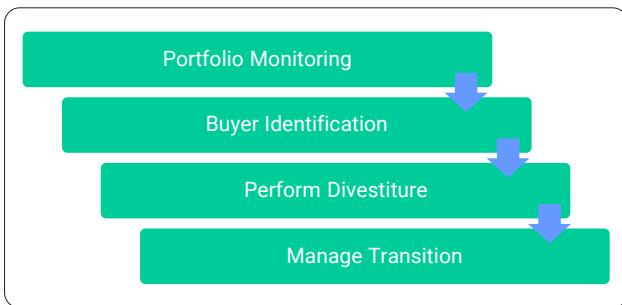


Figure 3. Divestment context steps

Source: compiled by the author

Reactive divestiture is defined as a situation where the company divests solely due to external and internal pressures like low profitability (Suciani & Setyawan, 2022). The reactive response is brought about by heightened reluctance on the portfolio on whether it can generate the requisite cash flow and also bring market advantages. Instead, firms are forced to divest in the last phase whenever there is an increase in financial pressure and a decrease in company performance.

There are numerous valuation models in existence that can be used to determine the profitability or performance of a company. The best fit method, however, is the Comparable Company Analysis which drives the notion that similar entities in the same industry have similar multiples. The valuation process requires researchers to search for similar companies to the target valuation and check the value using firm multiples. It is also marked by the identification of the operations, industry, and size of the organization. This helps in the establishment of a peer group of entities that share similar characteristics. The multiples of every company are collected and then the industry average is calculated. The EBITDA multiple is often used as it explores the net income of an organization adjusted for amortization, depreciation, taxes, and interests. F. Müller (2010) argues that the EBITDA serves as an approximate measure of the company cash flow with the preferred formula (1) being:

$$\begin{aligned} &\text{Value of target firm} = \\ &= \text{Multiple (M)} \times \text{EBITDA of the target firm}, \quad (1) \end{aligned}$$

where M – enterprise value average of comparable firms; EBITDA – for the target firm which is oft predicted for the next 12 months.

The EBITDA is important in PE as it aligns with the ameliorative mandate of funds which is to create value. The value creation process is conducted through the implementation of changes that help improve top-line revenue as well as operating efficiency. The EBITDA predictions allow PE funds to deviate from relying on clever deal structuring, multiple arbitrages, or even financial engineering. Even though the aforementioned strategies can generate returns, they expose the PE fund and portfolio companies to a myriad of risks such as declined ability to achieve the target return in the case that the pre-investment assumptions do not go according to plan.

IT cost reduction is at the core of value creation in the divestment context by most PE firms. IT cost reduction is termed as the process through which sources of waste, underutilization as well as low business values are identified and eliminated. The reduction process is geared towards yielding savings which can reduce the IT budget size while reinvesting resources into other areas in a bid to drive business growth after divestment. The technology-driven value creation allows PE firms to identify initiatives that can reduce information technology operating expenses such as sourcing optimization. Sourcing optimization involves the introduction of schemes that make the best use of a resource or situation (Dalal, 2022; Hammer *et al.*, 2022). The sourcing optimization allows companies to find the most effective resources, cost, and quality as well as time restrictions.

With sourcing optimization, PE firms will be able to increase savings potential, accentuate collaboration and transparency, increase adoption rates well as enhance strategic insight and control. The optimization evaluates drives of infrastructure costs across the fund and portfolio level with underutilized assets being retired (Kaplan & Strömberg, 2009; Lee, 2019). IT cost reduction processes focus solely on optimizing IT costs, rather than other costs or revenue. The focus allows the PE firm to create a nexus between the decreased IT costs and increased EBITDA. Furthermore, they are oft driven by the CFI/CIO with minimal impact on business operations being recorded. Instead of this, this type of value creation serves the following hypothesis: H1: reducing IT costs is crucial in creating value and enhancing EBITDA for Private Equities when evaluating for divestment.

PE firms can create value through information technology system enhancements that increase automation and drive operational improvement. For instance, the adoption of enterprise resource planning (ERP) systems improves business performance and operational efficiency during proactive divestment. Operating efficiency helps PE firms determine the ratio of the business output and input ergo gaining insight on the overall system performance (Leslie & Oyer, 2009). In light of this, PE firms are able to allocate set resources which optimize the portfolio outcome. They are also able to reduce the resources that are required in

a bid to execute proficient functions. Proactive divestment permits PE firms to conduct process re-engineering which aligns the entities with new system functionalities. The primary focus is to optimize the other costs which create a positive EBITDA for the organization. The CFO/CIO is at the helm of the reengineering process as they place a high standard that helps promote efficiency and functionality. Additionally, the management cross-examines operational costs with the peers in a bid to determine the position of the PE firm. Every system is assessed in terms of functionality and its role in increasing the other costs incurred. The guiding hypothesis therefore is: H2: Tech-driven enhancement of operations is used in value creation and rising EBITDA and reducing other costs for Private Equities when evaluating for divestment.

Digital enablement is a form of value creation that explores the divergent strategies that utilize technology in a bid to improve the reach, performance, and operational efficiency of an entity. The main aim of the technologies is to create flexibility and ease through the streamlining of processes. Furthermore, they improve data management and stakeholder communication all of which are connected to the organizational revenue (Schnellbacher & Weise, 2020). The value creation strategy requires PE firms to incorporate new digital capabilities and initiatives that improve top-line growth and accentuate customer engagement. PE firms are required to plan an onboarding process that modifies the structure of the portfolio and its operations. Furthermore, the plan has to communicate the core message with new interaction models and interfaces being introduced for the teams.

The organization has to be aligned around the new processes and goals prior to valuation. This can involve the use of a lean governance model that supports the increased pace of digital structures. Digital enablement takes into account source optimization and returns on investment. A good digital enablement program reduces the cost and time taken when adopting new technology (Jafari, 2014;

Hersh, 2018). Moreover, it minimizes reliance on information technology teams and improves the ability of a firm to attain high EBITDA. The lack of a digital enablement strategy means that a company will be unable to oversee the digital transformation. Digital enablement value creation is touted by practitioners as a holistic approach that enables entities to champion digital excellence and attain greater agility which ultimately scales the business faster (Dutta & Folta, 2016; Dent *et al.*, 2021). The adoption of new business models requires direct input from the Head of Strategy at the PE firm. Furthermore, the digital enablement process is marked by the introduction of initiatives that span multiple business functions and are transformative by nature. The focus of the digital enablement value creation scheme is on revenue which has to be optimized in a bid to increase the EBITDA: H3: Digital-driven initiatives are applied in value creation and rising EBITDA/revenue for Private Equities when evaluating for divestment.

The success and ingenuity of a meta-analysis are determined by its ability to determine the effects that moderate results. The guiding argument is that during the investment lifecycle, PEs aim to increase EBITDA to improve valuation in the divestment context. The PE entities often use three technology-driven value creations namely IT cost reduction, tech-enabled improvement of operations, and digital enablement. The three all act as moderators in the research collection process. The general structure of a PE firm contains a fund and company level as shown in Figure 4. At the fund level, general partners control the company operations through their investment fund. The general partners receive interest and a predefined fee for their role in managing the investment fund (Axelson *et al.*, 2013). The monies found in the investment fund are raised from limited partners. Figure 1 highlights that the PE firm commits capital to the investment fund which generates returns of the investors or limited partners. The investors then agree on a fee with the general partner for the management process.

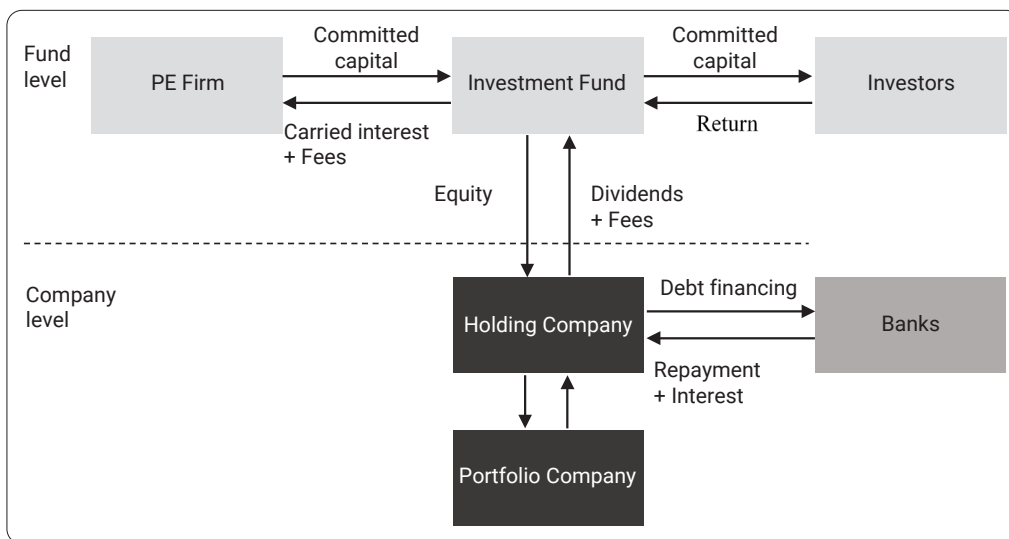


Figure 4. Structure of private equity firms

Source: compiled by the author based on D. Schlegel (2019)

The company level in the structure contains the holding and portfolio companies as well as the banks. D. Schlegel (2019) expatiates that PE firms often locate the portfolio companies at the company level after which a holding entity is created and funded with equity prior to acquisition. The funding process can also include the use of debt from banks in the form of debt financing. The holding company then acquires the portfolio company and uses

the revenue accrued to pay for the interest incurred in the form of debt. Moreover, PE firms have a tendency of outperforming the market through the creation of an alpha. The creation process relies on the firm's ability to tailor its processes based on market conditions. The tailoring process involves the use of a valuation model which takes into account three input factors namely the multiple, EBITDA, and net debt as shown in Figure 5.

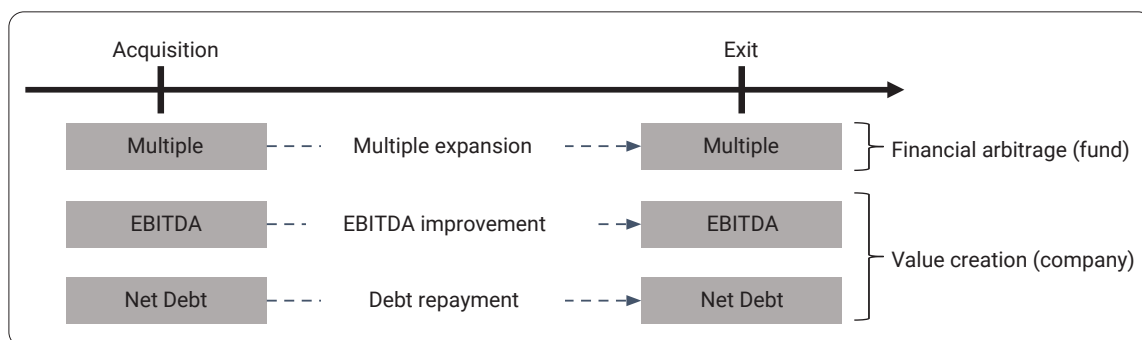


Figure 5. Value creation analysis

Source: compiled by the author based on D. Schlegel (2019)

D. Schlegel (2019) indicates that an influx in the multiple causes a multiple expansion. The expansion is marked by the purchasing of security at low levels of valuation multiples after which it is sold at a higher valuation multiple. The overarching aim of the multiple input is to accentuate the operational efficiency and cash flow generation during an investment lifecycle. Furthermore, it aids in monitoring the current valuation multiples and determining the best exit time for the PE firm (van Binsbergen *et al.*, 2011; Biesinger *et al.*, 2020). From an economic perspective, the multiple expansion occurs as a result of top-tier negotiation skills as well as positive market timing. Furthermore, it is an indicator that the PE fund has attained a high sales price per unit of profit for the entity compared to the original purchase price. In lieu of this, the value is derived at the fund level instead of the company level which is classified as a financial arbitrage.

The meta-analysis synthesized at least 50 samples from 14 independent studies written in the past 30 years. The researcher noted that the aggregate sample size is set at 100 entities all of which are correlated to the three hypotheses mentioned area. Despite the apparent lack of knowledge about technology-driven value creation, most

of the studies do provide a sense of scale to the research topic. Many of them explain the link between technology and value creation as well as how it improves EBITDA and firm performance. The researcher conducted manual analyses into the studies with congruent denotations showing an apparent heterogeneity in the samples even among the ones measuring similar outcome variables. The elimination of outliers helped offer insight into the EBITDA and firm performance effects which varied between -0.53 to 0.80 ergo meaning that at least 50% of the samples were positive.

Generally speaking, the analyses of the hypotheses show statistically significant Cochran's Q data. This confirms that there is an absolute amount of heterogeneity in the studies as shown in Table 1. The I² test focuses on the relative level of heterogeneity in the studies with summations highlighting that the amounts are at 72%, 50%, and 80% respectively for the three hypotheses. Finally, the researcher noted that there were non-zero estimates in the between studies variation r² thereby confirming the assumption that there is a presence of the moderating effects. In light of this, the researcher alluded that the heterogeneity of studies is largely driven by underlying moderators.

Table 1. Mean effect sizes and heterogeneity strata

	Confidence intervals (95%)	Number of study samples	Aggregate number of firms	Cochrane's Q	I ²	T ²
IT cost reduction	[-0.016; 0.057]	6	25	220.32***	72%	0.0271
Tech-enabled improvement	[-0.02; 0.05]	5	30	87.763**	50%	0.018
Digital enablement initiatives	[-0.016; 0.057]	3	45	178.9**	80%	0.004

Note: I² – percentage variation caused by heterogeneity; T² – between-study variance

Source: compiled by the author

The results are interpreted in relation to the theoretical framework with the section being structured in line with the hypotheses. In the H1, the studies revealed that PE funds oft implement tech-driven methods like IT expense minimization in order to fuel operational value creation. As shown in Table 2, the results are for the most part support the

hypothesis. The primary focus of enhancing through implementing initiatives that decrease IT operating costs leads to an influx in the EBITDA rates from the current state to the desired one. By implementing initiatives that decrease IT operational costs, there is a rise in EBITDA rates, transitioning from the current state (As-Is) to the desired state (To-Be).

Table 2. Moderating effects

Published	Cohen's d		
	Hypothesis 1	Hypothesis 2	Hypothesis 3
Measurement controls	Yes	Yes	Yes
Methodological controls	Yes	Yes	Yes
Number of samples	25	30	45
Adjusted R ²	0.219	0.183	0.239

Source: compiled by the author

A random-effects meta-regression was conducted for this hypothesis with the primal emphasis being drawn on the divestment context and the lifecycle of the PE. On the contrary, some of the studies do not even mention the use of sourcing optimization tools to reduce IT costs. In such situations, the researcher labelled the effects as being measured more than the EBITDA rates. There were however positive effect sizes for the EBITDA brought about by the source optimizing strategies and tools as well as CFO/CIO influence.

The tech-enabled improvement of operations is a vital variable for subsequent EBITDA gains (H2). The results from the meta-analysis revealed that there is support for the H2 as the coefficient for the proportion of value creation in the divestment context. Additionally, the studies specify that the sharp increases of EBITDA were set at a solid 20% which increased the expected effect size by 70% from the previous value. Additionally, using previous works of erudition, the researcher noted that there is a positive moderate relationship between the adoption of new tech-

nologies with the EBITDA rates and improved revenues (H3). The individualistic digital enablement initiatives positively moderate the nexus between PE and value creation levels. Even though the initiatives might be risky, one can note that they increase the revenue and overall operating performance. The inclusion of the Head of Strategy and Head of Department in the implementation process comes in handy in attributing success and performance.

Considering the impact of publication bias on seminal works of erudition, the researcher tackled it through a number of strategies. The first strategy involved controlling the publication status of the various samples in every article. This helped narrow down the best-fit articles that fit the mould. The second strategy included the identification of repeat or imitated articles although the results yielded nothing. A funnel plot was used in the analysis process which highlighted that there were some research asymmetries that were not related to the bias but rather the heterogeneity mentioned prior. Table 3 indicates the summary of empirical results for the three hypotheses.

Table 3. Summary of empirical results

No.	Hypothesis	Evidence
H1	Reducing IT costs is crucial in creating value and enhancing EBITDA for Private Equities when evaluating for divestment.	Available
H2	Tech-driven enhancement of operations is used in value creation and rising EBITDA and reducing other costs for Private Equities when evaluating for divestment.	Available
H3	Digital-driven initiatives are applied in value creation and rising EBITDA/Revenue for Private Equities when evaluating for divestment.	Available

Source: compiled by the author

The researcher additionally conducted robustness checks and publication bias analyses aimed at gauging the efficiency of the papers. J. Verbouw *et al.* (2021) indicate that publication bias is brought about by the author's failure to highlight or publish the results of a study based on the strength and direction. This inadvertently undermines the ability of other researchers to accurately synthesize and describe the evidence in the provided scope or area of focus.

Discussion

Using the coding scheme, the researcher narrowed down the results and connected them to the hypotheses and sub-groups. The first coding scheme focused on IT cost reduction applied in the divestment context by PE firms. T. Meyer (2014) highlights that the investment environment can be quite challenging with PE firms being forced to implement initiatives that cut down the cost and improve the

value of their portfolio. Suffice to say that the application of sourcing optimization tools has signified a shift from the traditional tool kit for cutting costs and improving processes. The sourcing optimization tools are part and parcel of the digital business model which focuses on value proposition through EBITDA improvement.

W. Schnellbacher & D. Weise (2020) state that sourcing optimization is used in the digitalization agenda of organizations as it determines optimal award allocations through scenario-based analyses and mathematical modelling. In light of this, sourcing optimization helps PE firms analyse events through the provision of instant data. Moreover, it draws comparisons across suppliers, event phases as well as items with various feedback options being provided. PE firms apply sourcing optimization to build and analyses scenarios while being provided with better support for negotiation on the prices. In most cases, the CIO/CFO is included in determining which type or form of sourcing optimization is the best fit for the PE firm. G.H. Smart *et al.* (2000) show that the CFO/CIO enjoys a sustainable relationship that is determined by their abilities and capabilities to execute against their investment theses. The CFOs are required to use their “financial playbook” when conducting IT cost reduction processes (Jules *et al.*, 2021). The playbooks offer insight on how they can drive operating excellence on top of supporting their strategic decisions as the entity grows (Dalmácio & Nossa, 2004).

The PE CFO straddles the line between strategic and operational oversight. Furthermore, they serve as the thought partner across the divisional and functional aspects of the business. The multi-pronged nature of the CFO allows the CIO to glean information and undertake a singular role which is to recommend which areas require technologies that can reduce costs and improve overall EBITDA. The CIO appraises the CFO who acts as the link between the portfolio company and the investors. R.D. Banker *et al.* (2011) indicate that the CIO position has become significant in PE contexts owing to the role played by information technology in influencing the overall strategy of an entity. The CIO acts as a relationship builder as well as a business leader with their clout allowing them to influence the organizational budget. The CFO communicates financial results as well as manages the capital structure issues while interfacing with the company board on strategic issues or matters. In Layman’s terms, the CFO has full financial accountability of an entity ergo they directly determine how an investment EBITDA rate can be improved.

The application of IT cost reduction rarely has a major impact on business operations although it tends to be surgical by nature. It allows the company to grow and evolve in new and divergent ways with CFOs and CIOs adopting a build. The mentality aligns the PE firm to appropriately drive major initiatives that are focused on change management. This in turn accentuates a willingness to facilitate continuous improvement that increases the EBITDA while challenging existing ideas. The second part of the coding scheme explored the tech-enabled improvement of operations.

V. Gupta *et al.* (2021) allude that the implementation of IT system enhancements increases automation and instantaneously drives operational improvement. In most cases, the enhancements serve as disruptive technologies which help manage other costs in the organizational context. The technologies merit the reengineering of processes in the PE firms with the aim of aligning them with new system functionalities. Spearheaded by the CFO/CIO, the improvement allows PE firms to carefully manage costs during strong and weak economic periods (Zhang *et al.*, 2021; Vdovenko *et al.*, 2023). Denote that most top PE firms are highly cost-conscious whenever the investment returns are soaring.

Even though the other costs rise during the strong economic periods, the influxes are approximately equal to the investment returns. The variable costs are treated as fixed expenses with the CFO avoiding any strategies or pushes for more spending. During weak economic periods, the cost reduction efforts are accelerated by changing or reengineering the processes. The fixed costs are treated like variable costs which allow for the reduction of other costs. The emergence of Disruption 2.0 has added urgency to the need of managing costs. The integration of technology-enabled processes is momentous in generating productivity gains. V. Gupta *et al.* (2021) cite that the automation of knowledge work addendum to the digitization of supply chains is key in improving EBITDA rates. What is more, the application of industrial internet of things improves predictive maintenance which minimizes both variable and fixed costs in the future. The improvement of core performance also requires measuring the absolute change in EBITDA not deltas in cost. The other costs have to be monitored with the focus being drawn on the unexpected headwinds (Lutz & Achleitner, 2009). The utilization of enterprise resource planning aids PE firms to manage and integrate their financials, supply chain, operations, commerce, manufacturing as well as reporting activities. Y. He (2009) indicates that ERPs have phased out the burden of manual processes through automation. The automated workflows greatly reduce administrative overhead so that the organization can drop more to the bottom line. During the implementation process, however, firms have to keep in mind that the internal processes evolve in an organic manner and are highly reflective of the people at the helm. This correlates with the assertion made prior that the influence of the CIO/COO influences the cost reduction and operational improvement process.

The third part of the coding scheme focused on digital enablement and the various strategies that be used to improve revenue. W. Schnellbacher & D. Weise (2020) introduces digital enablement as a process that helps in the realization of digital transformation through the use of digital tools. Firms that utilize digital enablement are granted the first adaptor advantage. This is because they are accorded a front-line view into how they can improve top-line growth by revamping their business models (Jules *et al.*, 2021). The Head of Strategy or Head of Department is required to undertake tech due diligence when evaluating a new deal opportunity. This means that they have to incorporate key

findings and apply critical thinking while creating a value creation plan that permits them to continue to refine once they have invested. Accelerated technology enablement or adoption is something that most PE firms have adopted in the divestment context. The initiatives have to be designed in a manner that augments existing services while developing new ones. Furthermore, digital enablement is transformative by nature as it prompts PE funds to shift from their fear of changing frontline sales organization, especially in the early periods of the lifecycle specifically the ownership period. The fear causes them to worry about disruptions to the revenue flows.

By applying digital enablement, portfolio companies are able to push the revenue growth past the industry average (Ross *et al.*, 2019). The digital enablement schemes help them determine whether the potential investment or portfolio entity has the right mix of field and virtual sales. The determination process allows them to recognize that virtual sales are becoming increasingly effective. Subsequently, digital enablement sharpens the execution of a strategy by allowing PE firms to adopt play-based selling techniques (Schnellbacher & Weise, 2020). The techniques assist in prescribing how resources will be orchestrated in an organization. At the end of the day, revenue influxes measure the sales of a firm which increases the profitability or EBITDA rates at a margin of 10% or more.

The study makes significant contributions to the current debate on the role of PEs in increasing EBITDA in a bid to improve divestment valuation. First, it quantitatively synthesizes the impact of PE on operating performance and how it can enhance the portfolio companies. Subsequently, it determines the mechanism for transferring value from investors to portfolio companies using information technology. Additionally, the paper contributes to current research by distinguishing the value creation process in terms of medium and long-term processes. Conclusive denotations highlight that while sourcing optimization reduces short-term IT operational costs, strategic reshaping at the start of the PE ownership should take hold in the medium-to-long term (Zeisberger *et al.*, 2016). The introduction of value creation or additional activities like enhanced governance, management assistance, and monitoring can help accentuate performance.

The third contribution made by the paper is the analysis of the divestment context. The context is useful in defining the operations of portfolio companies and how the CIO/CFO organization can help improve valuation and profitability. The paper highlights that the agency theory can be applied in both formal and informal institutional

contexts. The aggregation of extant empirical work, journals, articles, and opinion papers allows the researcher to differentiate among the three technology-driven value creations. The synthesis of empirical findings from research spanning over 25 years allows for the creation of a holistic view of the impact of PE.

Conclusions

The preceding research paper is a testament to how firms improve valuation for divestment towards tech-driven value creation. The study indicates that the application of IT expenses reduction, technology-enabled enhancement of operations, as well as digital enablement, accentuates EBITDA. The IT cost reduction schemes focus highly on the IT costs as the primary focus of optimization. Research denotations show that a decline in IT costs is commingled with an increase in the EBITDA.

The research further shows that the application of ERP systems improves systems and increases automation. This drives operational improvement as well as process reengineering. The reengineering is correlated with a growth mind-set which increases the EBITDA rates substantially. Furthermore, digital enablement is touted as a vital strategy that prompts transformative methodologies that improve growth and revenue. An increase in the revenue accentuates EBITDA rates by at least 10% which then improves the value of an investment in the divestment context. Based on the summary, the research notes that there is an existent dearth of knowledge with regards to the use of technologies in the divestment context by PE firms. This gap might be attributed to the wary nature of PE firms since most technologies are influenced by the economic environment. On the contrary, the research shows that using technology to drive and create value can help PE firms carve out a niche for themselves.

There is a need for future researchers to explore how technology-driven value creation can be applied in the raising capital stage, sourcing of deals, and harvesting periods of the PE lifecycle rather than the divestment context solely. This insight will help improve knowledge and awareness of technology and its role in value creation. Additionally, more seminal works and meta-analyses should be conducted on the research topic.

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Conflict of Interest

None.

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Мета-аналіз створення вартості за допомогою технологій у приватному акціонерному капіталі

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Анотація. Мета-аналіз створення вартості за допомогою технологій у сфері прямих інвестицій набуває особливої актуальності для розуміння найефективніших способів збільшення прибутку до сплати відсотків, податків та амортизації. Метою цього дослідження є оцінка різноманітних технологій створення вартості, що використовуються для збільшення прибутку до сплати відсотків, податків, зносу та амортизації. У дослідженні використано методи аналізу, систематичного пошуку, кодування, оцінки методологічної якості, статистичного аналізу. В результаті дослідження доведено вплив скорочення витрат на ІТ, вдосконалення операцій з використанням технологій та впровадження цифрових технологій на зростання прибутку до сплати відсотків, податків, зносу та амортизації. Крім того, встановлено, що використання систем планування ресурсів підприємства сприяє вдосконаленню системи, а також підвищенню рівня автоматизації. У свою чергу, це покращує операційну діяльність та реінжиніринг процесів. Підкреслено життєво важливе значення цифрових можливостей як стратегії, що використовується більшістю фірм прямих інвестицій у сучасному світі. Ці можливості передбачають здійснення трансформацій, які сприяють зростанню прибутків та доходів. Встановлено, що зростання доходу впливає на збільшення показників прибутку до вирахування відсотків, податків, зносу та амортизації щонайменше на 10%, що в умовах дивестування в кінцевому підсумку збільшує вартість інвестицій. Результати проведеного дослідження можуть бути корисними для фірм прямих інвестицій з огляду на виявлення можливостей використання технологій для стимулювання та створення вартості

Ключові слова: інвестиції; інтерес; зниження витрат; цифрові можливості; автоматизація