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Silo-Busting: Overcoming the Greatest Threat to Organizational Performance

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Abstract: Most organizations are set up to operate in some form of silos, such as vertical divisions or horizontal functions. At best, silos offer a practical way for organizations to operate efficiently. At worst, they create a silo mentality where departments do not want to exchange knowledge or information, hindering internal collaboration and organizational learning, thus preventing achievement of high performance and organizational sustainability. The silo mentality issue has been recognized for a long time as a real tangible problem that has to be dealt with. On the basis of a questionnaire containing statements on organizational strength, collaboration, and silo-busting techniques applied, which was distributed to a sample of mainly large companies, we found that there are five factors that are important for breaking down silos and increasing the quality of cooperation.

Keywords: silos; silo-busting techniques; high performance organizations; knowledge exchange; organizational learning; organizational sustainability

1. Introduction

Many organizations strive for 'organizational sustainability' [1], defined as the result of the activities of an organization, voluntary or governed by law, that demonstrate the ability of the organization to maintain its business operations viably (including financial viability as appropriate) whilst not negatively impacting any social or ecological systems [2] or, alternatively, as a multidimensional phenomenon that focuses on maintaining results, generating knowledge, building capacity, establishing experiences with partners, and producing services and products on the basis of the concepts of efficiency and effectiveness [3]. An important activity for achieving organizational sustainability is organizational learning [4] and knowledge exchange [5], as it helps organizational members to detect and correct errors in the organization so that it can keep achieving sustainable high performance [6]. The more complex, dynamic, and turbulent an organization's environment is, the more necessary organizational learning is considered to be [4]. A main source of organizational learning is the exchange of knowledge between the various parts of an organization [7]. Unfortunately, many organizations experience some form of 'silo working', be it across vertical divisions or departments, or teams within horizontal functions. The term 'silo' relates to grain silos that segregate one type of grain from another, and is therefore a metaphor for segregation between different parts of an organization [8]. In the management

literature, organizational silos are defined as psychological boundaries creating compartmentalization, segregation, and differentiation [9]. Silos can offer a practical way for organizations to operate efficiently in managing large numbers of people and allocating accountabilities and responsibilities within a hierarchy. They can create clearly delineated 'cultural tribes' that people identify with, and tightly defined teams or communities that people are motivated to work for, as well as to feel safe within [10]. However, they can also create a 'silo mentality' where groups, teams, or departments do not want to share skills, knowledge, or information with other areas in the same company, or act as 'one business'. In this respect, the concept of a silo does not so much relate to the existence of boundaries, but to the excessively insular mind-set or mentality through which these boundaries shape behaviors and ways of working that inhibit cross-boundary collaboration and cooperation. This is commonly felt to have a highly detrimental impact on customer outcomes, innovation, effectiveness, performance, and, ultimately, the bottom line [11,12]. In fact, in a survey on collaboration, it was found that silos existed in 83 percent of the responding companies, and that 97 percent of the respondents said that silos had a negative effect on the performance of their organizations [13]. Collaboration in this respect is defined as the willingness of units to work together, having mutual understanding, having a common vision, sharing resources, and achieving collective goals [14].

Silos are a very real problem that are impacting business performance [12]. Consequently, there is quite some attention for this issue, mainly in the professional literature, especially on how silos are created and their impact on performance, along with what can be done to mitigate and overcome them (the so-called 'silo-busting' techniques). There has been less focus on research that looks at whether there is a relation between the strength of an organization, the silo-busting techniques it applies, and the degree of collaboration within the particular organization. Phrasing this issue in a different manner—do organizations that are stronger employ more effective silo-busting techniques in comparison with organizations that have a lower organizational performance level, and do they achieve better internal collaboration as a result? Thus, the goal of this empirical research was to identify which silo-busting techniques are most effective in helping organizations to overcome organizational barriers and to increase collaboration and cooperation. We aimed to achieve this goal by finding an answer on the following research question—Is there a relationship between an organization's strength; its focus and effort on silo-busting techniques; and the quality of organizational learning, knowledge exchange, and internal collaboration? The research question was addressed through a questionnaire that combined (a) the characteristics of high performance organizations (HPO) [15] that measure the strength of an organization, (b) silo-busting techniques derived from the academic and professional literature, and (c) measures of internal collaboration. This questionnaire was completed by a sample of mainly large organizations, and on the basis of the collected data, the relations between the three constructs were identified. The theoretical contribution of this paper is that it moves the silo-busting research forward and to a higher level by giving it a more rigorous scientific grounding than has been the case thus far, as well as by looking at silos, silo-busting, and internal collaboration in a novel way. The practical contributions are that the study results will give organizations and their executive leadership teams knowledge about effective organization-wide techniques to increase internal collaboration, and, as a consequence, the performance of their organizations.

The remainder of this paper is organized as follows. In the next two sections, the theory on silos, their benefits and disadvantages, and the ways in which they can be busted, are discussed. Then, the HPO (high performance organizations) framework is introduced. This is followed by a description of the research approach for the silo-busting study and the research results. Subsequently, these research results are analyzed and their theoretical and practical implications described. The paper ends with a conclusion, limitations of the research, and opportunities for future research.

2. Pros and Cons of Silos

In this section, the theoretical pros and cons of silos are identified and summarized.

2.1. The Pros of Silos

Organizations need some way to structure themselves in order to disperse and delineate authority and responsibility for making things happen. These structures may be vertical divisions/departments, or horizontal functions, or a combination of these, through applying a matrix organization design. Creating boundaries through structure has benefits in terms of facilitating focus, identity, and accountability. Accountability can be more easily clarified from well-defined boundaries and it can therefore be easier to define and implement initiatives; thus, silo thinking and behavior can give rise to quicker decision-making that enables more rapid implementation. In this sense, the insularity of silo thinking helps to cut back on the distractions and demands from other units that limit focus and the efficiency of the delivery of specific goals pertaining to a single organizational unit. By operating as a silo, it makes it easier for a group of people to be protected from outside interference (e.g., head office) during the early stages of trying to get a new project off the ground.

By implication, operating as a silo creates perceived 'others' that are distinct to 'us'; thus, a silo offers potential psychological safety within a known community. People may feel more affinity with a clearly defined organization unit than with an organization overall, impacting their sense of engagement and motivation within their work. Within a clearly defined organizational community, such as a specific division or department, where people usually spend the majority of time working with each other, it is common to develop collective norms of behavior and sub-cultures that create a sense of security, safety, and predictability. Ultimately, thinking and behaving in siloes may also be simply easier—collaboration can be difficult in a large complex organization, where there are inevitably competing commitments and competition for scarce resources, which are less likely to persist in a smaller environment of a silo sharing a management structure [13,16,17].

For the reasons that have been summed up above, having boundaries can be beneficial both for the organization and individuals within it. Generally, however, when these boundaries are referred to as 'silos' it is because the nature of these boundaries has become damaging and they are deemed to have become a limiting factor on performance. It is in this sense that silos are seen in the literature as detrimental to an organization's performance. This is because the speed and intensity of change in current markets mean that products and processes are becoming increasingly complex and are needing to be continuously and rapidly adapted or enhanced, demanding organizational agility that necessitates collaboration. Customers also increasingly expect an organization to present them with a single consistent experience, and silos can prevent organizations of doing this because they inhibit the coordination, integration, and collaboration needed for this across the organization [12,18]. As the contemporary workplace is becoming more collaborative, through necessity, silos become an increasing barrier to doing this effectively—the majority of employees now perform work that is significantly more collaborative in nature than a few decades ago [18,19]. In addition, collaboration is needed between various departments for accurate end-to-end planning and forecasting of production, development, sales, and logistics, especially in the current unpredictable business environment; this enables earlier awareness of the problems occurring in other parts of the organization, and promotes trust between organizational units [19]. Other benefits reported about collaboration are an improvement in communication, increased employee engagement and morale, quicker and more efficient decision making, reduction in employee errors, improved goal achievement, and higher organizational performance [12,19,20].

2.2. The Cons of Silos

Instead of the benefits mentioned above, many organizations suffer from the following problems created by silos:

1. Putting the 'parts' before the 'whole'. Silo thinking leads to managers only being focused on the interests of their own organizational unit, inducing them to pursue seemingly worthwhile agendas in their own areas which may be at odds with the agendas of other units and of the

overall organization. For example, opportunities for cross-selling are missed, which hurts the overall revenue of the organization [13,21–25].

2. Having personal conflicts and damaging politics. The focus on local interests means damaging politics and the development of personal conflicts between leaders of different units, generating turf wars and power struggles that hinder collaboration and, ultimately, performance. This also creates a lack of trust between employees from these units and a feeling of "us against them". This can perpetuate the primitive reaction of fight and flight—fight whatever is outside and flee to the inside of the silo with its presumed safety [13,25,26].

3. Creating an excessively inwards, rather than outwards, focus. People can be so focused on their agendas and on the politics generated around this that they lose sight of customers and what matters most to them. Customer experience can fall away and silos can inhibit the flexibility and even energy to deal with customers adequately. Not enough time is spent on creating complex, customized products on time and within budget for these customers. Customers receive mixed messages because brands of different units compete with each other in the market place. In the end, the reputation of the organization and its management is severely damaged in the outside world [13,16,21,23,26].

4. Withholding resources and information from other units. The lack of communication and cooperation between silos directly affects organizational performance negatively because insights around potential opportunities are not shared or passed on and thus get lost, and threats are not recognized in a timely manner. The lack of sharing of information also causes a lack of shared learning and innovation, with people ignoring facts that do not support their own viewpoint, and a 'not-invented-here' mentality that hurts performance improvements. When resources are not shared, it is difficult to implement synergistic programs in the organization. Siloed thinking can also lead to the misallocation of finite resources across units and programs and a desire from different units to keep their best talents for themselves rather than make these available to other teams, thus leading to inefficient matches of people and positions and a failure to align top talents with the most strategically significant positions, from an organizational perspective [13,21,22,24–26].

5. Inhibiting learning, innovation, and improvement. Pockets of excellence might exist in the organization but, because of silos, they will be isolated and therefore difficult to leverage across the organization. As a result, it will be impossible for the organization to become high performing because not enough units profit from the ideas, experience, and skills of other units [21,22].

6. Suffering from motivational and morale problems within the workforce. Because each silo has its own agenda, people in the organization receive mixed messages about priorities, which creates confusion and ambiguity that can lead to organizational dysfunction. Silos can be a common source of employee frustration. They can also cause lower overall productivity, for many of the reasons already stated, and create delays in 'getting things done' and 'seeing things through', which is detrimental to the motivation and engagement of employees who want to see an impact and outcome for their efforts. In addition, silos can make it difficult for people to establish deeper relationships with people they regularly have to work with in different units, causing feelings of isolation. These impacts on morale and motivation can create retention issues and may lead to the resignation of good people [11,13,16,26,27].

3. Why Do Silos Develop?

There are many potential reasons for silos to appear in organizations [13,23,26,27]. In some organizations, the silo mentality has arisen from legacy structures, ways of working, or organizational designs that have failed to adapt with the growth and evolution of the business and its goals. For instance, the corporate culture does not encourage collaboration as it is competitive rather than team-oriented; or the culture is based on an insular mind-set with indifference to other units' needs. It can be down to a lack of a common unifying purpose, vision and strategy, and associated planning

and prioritization processes that put functions in direct competition for resources. In that same vein, the reward structure might be based on individual unit outcomes, which naturally results in a focus on the achievement of personal or unit targets. It can be easier to focus on personal interest when working within a system like this. In many cases, leaders have created 'untouchable' fiefdoms or territories, which can run with efficiency and precision to deliver their agenda, but in isolation from the rest of the organization and the wider greater good. Issues of power, control, competition, and hierarchy are typical underlying drivers for the creation of silos and a silo mentality.

Silos may also be due to a lack of collaboration skills and a bad attitude of management. If managers have a negative attitude toward other units and a lack of commitment to corporate goals—implying a management style that encourages conflicts and discourages respecting and incorporating other peoples' ideas and needs, fails to take a strong stand against people who build turfs, has inadequate interpersonal skills resulting in a lack of understanding as how to build cooperative working relationships, or fails to provide employees and oneself with a compelling reason and a suitable context for working together—then collaboration will most likely be deterred. Perhaps, however, there are more practical reasons, linked to the complexity of organizational life and the inevitable difficulties in knowing who is doing what and who to engage with inside large, geographically dispersed organizations witnessing increasing rates of change. Whatever the causes, when a company is siloed, it is constantly in tension or even in conflict with itself, meaning its focus gravitates inwards, at the expense of being externally directed towards customers, competitors, the wider environment, and ultimately organizational performance.

4. Silo-Busting Approaches

We undertook an extensive search of the academic and professional literature to collect in-depth information on silo-busting techniques. We searched the EBSCO and Emerald scientific databases, Google Scholar, and Google more generally, using the search terms 'silo', 'silo-busting' and 'internal collaboration'. Our main criteria to include publications in our review were that they had to contain one or more silo-busting techniques, that is, ideas for how to break down and get rid of damaging organizational silos and improve the collaboration inside the organization. Thus, we only included research studies on silo-busting techniques when the authors explicitly looked for a relation between the techniques they researched and organizational collaboration. In total, we identified 48 publications, with the majority (33, or 77%) being professional in nature. We grouped (categorized) similar techniques of silo-busting ideas and gave each group a title. We also collected ways to measure the success of silo-busting initiatives (i.e. collaboration results). The results of the literature review are listed in Table 1. The premise of our research is that the five silo-busting categories we abstracted from the literature have a positive relation with the degree and success of collaboration (i.e., collaboration results) inside the organization.

Table 1. Theoretical predicted silo-busting factors and characteristics.

Factor	Items—English
Values	1. Create and enforce a set of values that support collaboration
	2. Promote a shared identity that brings organizational units together
	3. Focus on creating a united collaborative mind-set
	4. Create clear unifying goals for people to work on together
Collaborative operating model	5. Create clarity of roles, responsibilities, goals, tasks, and outcomes
	6. Standardize processes, procedures, and roles across organizational units to foster collaboration
	7. Integrate process and systems across organizational units
	8. Develop interdependent planning and review processes across organizational units
	9. Develop, by multiple organizational units, products/services for customers
	10. Create cross-organizational unit programs and projects for people to stimulate collaboration
	11. Allow time and space to conduct cross-organizational unit experimentation and innovation
	12. Devise and implement methods for resolving cross-organizational unit conflict and disagreement and build trust
	13. Develop new indicators to measure, discuss, and evaluate the quality and success of collaboration
	14. Install a common information technology (IT) platform and systems across all organizational units
	15. Use IT systems to enable better information sharing across organizational units
Collaborative environment	16. Ensure equality and justice in the treatment of all organizational units
	17. Create open information flows to share information on goals, plans, and results throughout the organization
	18. Inform organizational units about the goals and status of other organizational units
	19. Create communities/networks to share knowledge, practice, and experience across organizational units
	20. Hold cross-organizational unit training and events to build inter-organizational unit respect, understanding, and trust
	21. Create a physical space where colleagues can collide and bond
	22. Encourage colleagues to spend time with colleagues from other organizational units
	23. Create informal settings for people to get to know each other
Leadership	24. Managers have responsibility for results in their own area and share responsibilities elsewhere
	25. Ensure senior leadership demonstrates collaborative behavior
	26. Develop interpersonal skillsets within managers to better enable them to collaborate and network
People reward and development	27. Recruit people with a collaborative mind-set and good networking skills
	28. Provide employees with training to further develop their collaborative and networking skills
	29. Give people the authority and accountability to act in a collaborative manner
	30. Adapt evaluation, reward, and incentive systems to specifically reward cross-organizational unit collaborative efforts and results
	31. Visibly recognize and reward people who collaborate across organizational units
Collaboration results	A. The department works better with other departments
	B. The department has increased efficiency
	C. The department has a more satisfied customer
	D. The department has increased flexibility

We named silo-busting factor 1 'values', as this factor contained four characteristics that promote collaboration as a common value in the organization, something that brings people and units in an organization together [28]. Silo-busting factor 2 was called 'collaborative operating model', as this factor contained characteristics that relate to how the organization's social, knowledge, and management infrastructure itself is organized and aligned in such a way that collaboration across units is facilitated and thus made easier. The level of capability an organization has to readily adapt itself to what is needed to survive and thrive in the environment is an indication of organizational enhancement and, finally, organizational success [29,30]. Such characteristics include creating clarity in the organization (characteristics 5, 13), embedding supporting processes for aligning, coordinating and facilitating collaboration between units (6, 7, 8, 9), instigating cross-functional events and initiatives where people can interact (10, 11), making sure conflicts between units can be resolved quickly (12), and putting information systems in place to enable and facilitate information sharing and communication across the organization (14, 15). Silo-busting factor 3 is described as 'collaborative environment', as this factor contains characteristics that relate to fostering a collaborative mind-set, focus, behavior, and culture in the organization. This includes making sure all units are treated equally so there is no distrust between them, preventing collaboration (16); keeping units informed about other areas (17, 18); cultivating and facilitating active cross-functional networks, communities, and events (19, 20); and having physical spaces where people can actually meet and interact (21, 22, 23). Silo-busting factor 4 was given the label 'leadership', as its three characteristics described managers taking the lead in showing and promoting collaborative behavior. Lastly, silo-busting factor 5 was named 'people reward and development' because the characteristics in this factor focused on rewarding people for collaborative behavior (30, 31) and making sure they were capable of actually cooperating across unit boundaries (27, 28, 29).

5. The HPO Framework

The strength of an organization was measured by using the high performance organization (HPO) literature. There have been many studies of HPOs, but none of these actually resulted in a universal theory, model, or framework that could be applied in different organizational settings. Then, a decade ago, the HPO framework (The description of the HPO framework has been taken from [15])—incorporating the research results of multiple disciplines—was developed on the basis of an extensive review of 290 academic and professional publications on high performance [15]. In that study, an HPO was defined as "an organization that achieves financial and non-financial results that are exceedingly better than those of its peer group over a period of time of five years or more, by focusing in a disciplined way on that what really matters to the organization" [15] (p. 5). For each of the 290 studies, elements that the authors indicated as being important for becoming an HPO were identified and placed in categories labelled 'potential HPO characteristics'. For each of the potential HPO characteristics the 'weighted importance' was calculated as the number of times it occurred in the examined studies. Finally, the characteristics with the highest weighted importance were considered to be key potential HPO characteristics. These key potential characteristics were subsequently included in an HPO survey that was administered worldwide and encompassed over 3200 respondents. In this survey, the respondents were asked to indicate how well they thought their organizations were performing against the key potential characteristics (on a scale of 1 to 10) and also how the results of the organization they worked at compared to those of companies within their 'peer group'. The competitive performance was calculated in two ways: (1) relative performance (RP)—performance of the organization versus performance of its peer group, and (2) historic performance (HP)—performance of the organization in the past three to five years versus the performance of its peers during the same time period. These subjective measures of organizational performance are established indicators of real performance [31–34]. Using factor analysis, 35 of the key potential characteristics loaded high enough (loadings above 0.4) on one of five factors. The factor scales showed acceptable reliability [35] with Cronbach's alpha close to or above 0.70. In order to verify whether these so-called HPO factors were correlated with competitive performance, a correlation matrix was constructed. All five HPO factors correlated with relative

performance (RP) and historic performance (HP) [15]. To test whether the HPO factors were correlated with each other, another matrix was constructed. All factors appeared to indeed be correlated with each other, meaning that when an organization works on improving one of the factors, the other factors will also be impacted. Thus, the HPO framework, consisting of 5 HPO factors and 35 corresponding HPO characteristics, may be characterized as a complementary system [36].

The five HPO factors were (see Table A1 in Appendix A for the detailed 35 HPO characteristics):

- *Management quality*. Belief and trust in others and fair treatment are encouraged. Managers are trustworthy, committed, enthusiastic and respectful; have a decisive, action-focused decision-making style; hold employees accountable for performance results; and communicate values and strategy throughout the organization so that everyone knows and embraces these.
- *Openness and action-orientation*. An HPO has an open culture, which means that management values the opinions of employees and involves them in important organizational processes. Mistakes are allowed and regarded as an opportunity to learn. Employees engage in dialogue, exchange knowledge, and develop new ideas aimed at improving performance. Managers are personally involved in experimenting, thereby fostering an environment of change.
- *Long-term orientation*. An HPO grows through partnerships with suppliers and customers; long-term commitment is extended to all stakeholders. Vacancies are filled by high-potential internal candidates, if possible, and people are encouraged to become leaders. An HPO creates a safe and secure workplace (both physically and mentally), and dismisses employees only as a last resort.
- *Continuous improvement and renewal*. An HPO continuously improves, simplifies and aligns its processes and innovates around products and services, creating new sources of competitive advantage to respond to market developments. An HPO manages its core competences efficiently, and outsources non-core competences.
- *Employee quality*. An HPO assembles and recruits a diverse and complementary management team and workforce with maximum work flexibility. The workforce is trained to be resilient and flexible; encouraged to develop skills to achieve extraordinary results; and held responsible for their performance, leading to increased creativity and better results.

HPO research shows that there is a direct and positive relationship between the five HPO factors and competitive performance—the higher the scores on the HPO factors (HPO scores), the better the results of the organization, and the lower the HPO scores, the lower the competitive performance. Research also shows that all HPO factors need to have high scores in order for an organization to achieve excellent results. An organization can evaluate its HPO status by performing an HPO diagnosis in which management and employees complete the HPO questionnaire, containing questions on the 35 HPO characteristics with possible answers on an absolute scale ranging from 1 (very poor) to 10 (excellent). Average scores indicate points where the organization has to take action in order to become an HPO. Since the development of the HPO framework, multiple longitudinal studies have been performed that show the positive correlation between the HPO scores of an organization and its performance [37–41]. In these studies, organizations that worked with discipline and dedication and thus increased their HPO scores *all* experienced increased organizational performance.

6. Research Approach

The silo-busting techniques were reworded into statements that could be easily interpreted by individuals in consideration of their own organization and included in a survey. For example, 'Create career development paths that require cross-organizational unit experience' was turned into the statement 'To advance in our organization, we need cross-organizational unit experience'. These statements were then included in the survey as a silo-busting factors question set, alongside the HPO question set. In addition, a third set of questions was incorporated into the survey as well—these related to organizational collaboration and asked respondents to offer a perception on the quality of

collaboration and coordination in the organization. These were used to identify the success of the silo-busting techniques applied by the organization.

The resulting questionnaire was reviewed and completed by several colleagues of the authors, all experts in business administration, and subsequently refined. Then the questionnaire was sent to 11 organizations that agreed to participate in the silo-busting research. These organizations basically formed a convenience sample as they are all clients of DPA Consulting (where two of the authors work), based in the United Kingdom, and who identified themselves as being willing to participate. They were selected on the basis of size (i.e., there should be at least several departments within the organization with a sizable population present so that silos could be an issue) and on willingness to participate. Table 2 provides information on the participating organizations.

Table 2. The participating organizations.

Company Name	Industry	Size of Company (Full-Time Equivalents)	Profit/Non-Profit/ Government Organization	Part of a Bigger Entity (e.g., A Multi-National)	Quoted on the Stock Exchange	Number of Respondents
A	Insurance	500	Profit	No	No	98
B	Insurance	4600	Profit	Yes	Yes	12
C	Broadcaster	20,951	Profit	No	No	10
D	Technology	71,883	Profit	Yes	Yes	48
E	Law	2500	Profit	No	No	92
F	Advertising/Public Relations	17,500	Profit	Yes	Yes	163
G	Healthcare	7400	Profit	Yes	No	58
H	Insurance	3000	Non-profit	No	No	259
I	Entertainment	7900	Profit	Yes	Yes	56
J	Government	7000	Government	No	Yes	58
K	Insurance	700	Profit	No	No	15
Total						869

An information package was compiled explaining the purpose and set-up of the research. This package was sent to the main contact person at the participating organizations, together with a link to the internet-based questionnaire. The organizations themselves selected potential respondents on the basis of the guidance that we were looking for responses from a cross-functional sample of people from across different areas of the business, as well as different grades, and including as many people as was possible and realistic. Confidentiality of the data was guaranteed as the data entered by the respondents themselves were directly collected in the database of the HPO center. The respondents were asked to rate the statements on a scale ranging from 1 to 10 to reflect the extent to which they thought the statement applied to the organization and the department they worked, with 1 being 'strongly disagree' and 10 being 'strongly agree'. The authors had regular contact with the contact persons to inform them on the response and to discuss reminders for the participants. In total, 869 completed questionnaires were received.

7. Research Results

The HPO questionnaire has been shown to have high internal consistency and has been validated repeatedly to consist of five subscales. Given this previous knowledge we chose to average the relevant items into these five subscales. In keeping with previous findings, the internal consistency of the HPO subscales was high (Table 3). The silo-busting questionnaire was a priori subdivided into five underlying constructs (Table 1). Internal consistency per factor was assessed with Cronbach's alpha. In cases of high Cronbach's alpha, the items were averaged to form each factor. The fit of the overall silo-busting model was assessed by means of a confirmatory factor analysis. Internal consistency of the silo-busting factors was high (Table 3), and we applied data reduction by averaging the items per factor. The collaboration results questionnaire consisted of four items and was a priori assumed

to consist of one underlying factor. Just like for the silo-busting questionnaire, internal consistency of the single underlying factor was assessed using Cronbach's alpha. Confirmatory factor analysis was performed on a model consisting of one latent factor, to which the four items were loaded upon. Internal consistency again was high (Table 3). For all subscales, average variance extracted was computed as a measure of convergent validity. Overall, the scores appeared to be high (Table 3) with two factors scoring slightly below the 0.5 cut-off. We also performed confirmatory factor analysis (CFA) for the silo-busting (SB) and quality of cooperation (QC) measures. Model fit was good: the Tucker Lewis Index (TLI) SB = 0.89; TLI QC = 0.996.

Table 3. Cronbach's alphas for the high performance organizations (HPO), silo-busting, and collaboration factors.

Factor Name	Number of Items	Cronbach's Alpha	Average Variance Extracted
HPO continuous improvement	8	0.924	0.659
HPO openness and action orientation	6	0.892	0.651
HPO management quality	12	0.962	0.707
HPO employee quality	4	0.852	0.693
HPO long-term orientation	5	0.785	0.553
Silo-busting values	4	0.907	0.784
Silo-busting collaborative operating model	11	0.935	0.498
Silo-busting collaborative environment	8	0.896	0.443
Silo-busting leadership	3	0.853	0.773
Silo-busting people reward and development	5	0.893	0.701
Collaboration results	4	0.939	0.846

To get better insight into the relationship between the HPO factors and collaboration results, the averaged HPO factors were entered into a structural equation model (SEM) in which the five factors loaded onto the collaboration results factor. Similarly, the relationship between the silo-busting factors and the collaboration results factors was assessed using SEM. Items per factor were averaged. Analyses were done in SPSS (version 24), and SEM analyses were performed using maximum likelihood estimation, as implemented in AMOS software (version 23.0.0). The SEM analysis showed that three out of five HPO factors loaded significantly on collaboration results (Figure 1), with all loadings being positive. The analysis also showed that all silo-busting factors loaded significantly on collaboration results. It should be noted though that the standardized regression weights of some factors were rather small. People reward and development and values had the highest regression weights. All loadings were positive. In Appendix B (Tables A2–A5), the detailed outcomes of the SEM analysis are given.
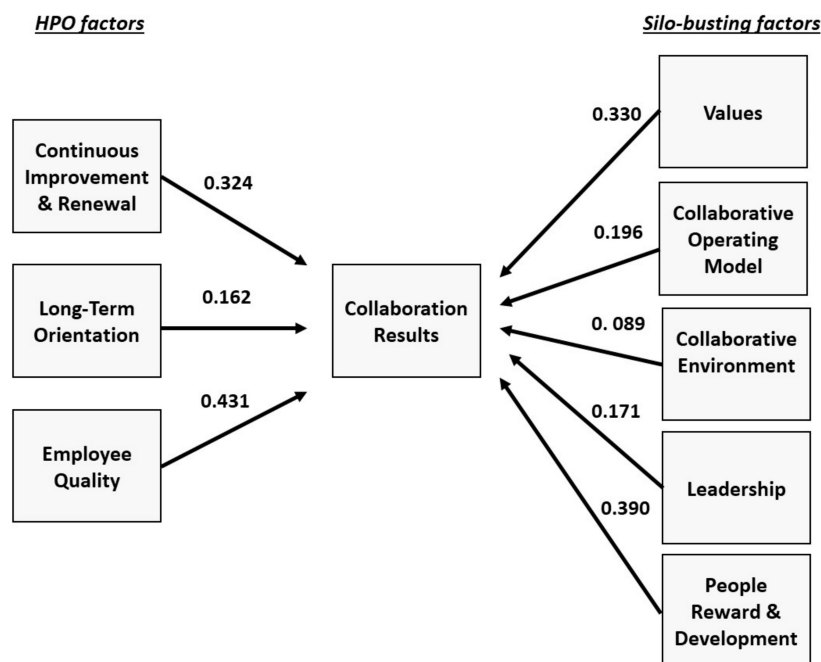
Figure 1. Structural equation model (SEM) of the HPO and silo-busting factors on collaboration results. Displayed are the standardized regression weights for significant influence (at the $p < 0.05$ level).

As theoretically predicted, all five silo-busting factors showed positive correlations with collaborate results. Figure 1 shows that silo-busting factors values and people reward and development have the strongest relations; as a consequence, organizations should pay particular attention to implementing the characteristics underlying these two factors. The combination of these two particular silo-busting factors indicate the strength of the saying "putting your money where your mouth is"—promoting internal collaboration by making it a key value of the organization, but being sure then to reward people who actually show collaborative behavior [42,43].

Figure 1 also shows that three of the five HPO factors have a direct positive influence on the collaboration results factor. Continuous improvement and renewal can basically only be effective when people collaborate on process improvement and innovating new products and services. Thus, being successful in continuous improvement and renewal has to mean that there is successful collaboration in the organization, which has to show in the collaboration results [44,45]. Regarding employee quality, a continuous improvement mind-set in people is needed to adapt an organization for collaboration and to actually show collaborate behavior [46,47]. Employees need certain qualities in order to behave in a collaborative manner and to be successful in adapting the organization and its IT systems, such as in wanting to accomplish extraordinary results, being resilient and flexible, and wanting to work in collaborative partnerships. Finally, a long-term orientation in the organization entails that this organization maintains good and long-term relationships with all stakeholders and is aimed at servicing the customers as best as possible. These two characteristics convey an attitude of openness and service-orientation to other parties, in this case, other organizational units, which helps to increase the inclination to collaborate with those other units [44,48]. HPO factors management quality and openness and action orientation did not show significant relations with collaboration results. This might have been because these HPO factors contained characteristics that mainly relate to the (individual) relationships between managers and employees in an organizational unit.

8. Silo-Busting Scores of the Participating Organizations

With the factors of the silo-busting framework identified, it was possible to calculate the silo-busting scores and compare these with the HPO scores and collaboration results scores. Figure 2 shows the

average silo-busting scores of all participating organizations, plotted alongside the HPO 'target' score of 8.5. Previous research has demonstrated that 8.5 is considered to be an appropriate threshold for organizations to reach in order to be deemed an HPO [15]. Due to their strong correlation, we have also applied this threshold of 8.5 from the HPO factors to the silo-busting scores, meaning a score of 8.5 or above would be considered to indicate a highly collaborative organization.
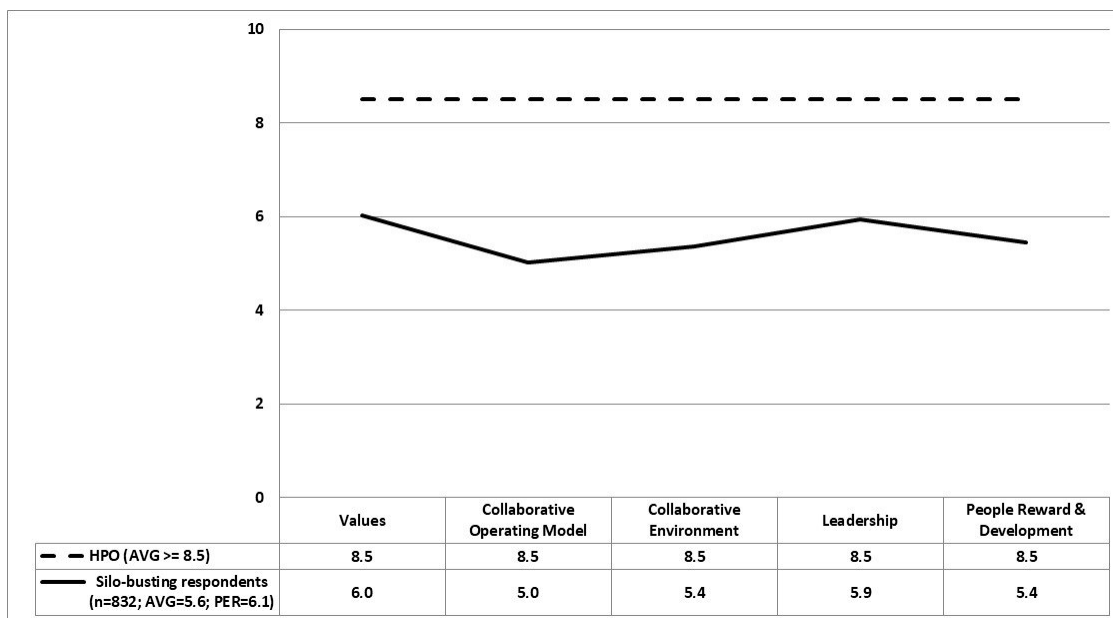

	Values	Collaborative Operating Model	Collaborative Environment	Leadership	People Reward & Development
– – HPO (AVG >= 8.5)	8.5	8.5	8.5	8.5	8.5
—— Silo-busting respondents (n=832; AVG=5.6; PER=6.1)	6.0	5.0	5.4	5.9	5.4

Figure 2. Total silo-busting scores for the 11 participating organizations.

Figure 3 gives the HPO, silo-busting, and collaboration outcome scores per individual organization.
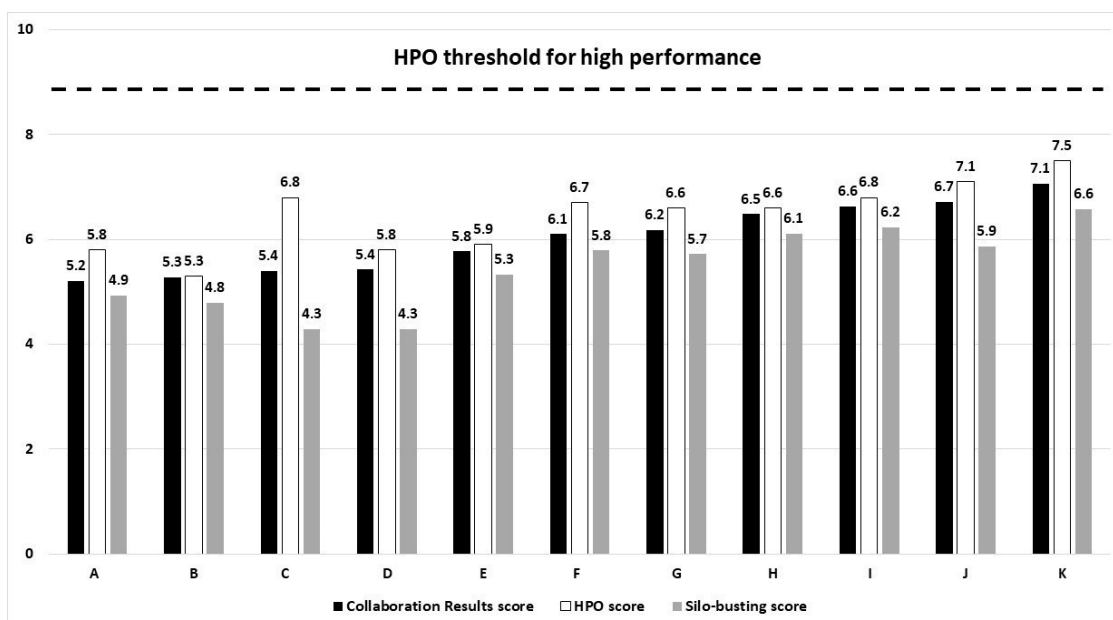

Figure 3. Average silo-busting factor, HPO, and collaboration results scores for the individual organizations.

Figures 2 and 3 show that the participating organizations, in general, achieved mid-range scores on the silo-busting and HPO factors and did not yet meet the threshold of 8.5. Looking at Figure 3, on face value, there seems to be a relationship between the HPO, silo-busting factor, and collaboration

results scores. To investigate this further, we first categorized the organizations into three groups according to their HPO scores: higher (HPO score >7—organizations J and K), mid (HPO score between 6 and 7—organizations C, F, G, H, and I), and lower (HPO score <6—organizations A, B, D, and E) performers. Then, we calculated the HPO, silo-busting factor, and collaboration results scores (see Figure 4).
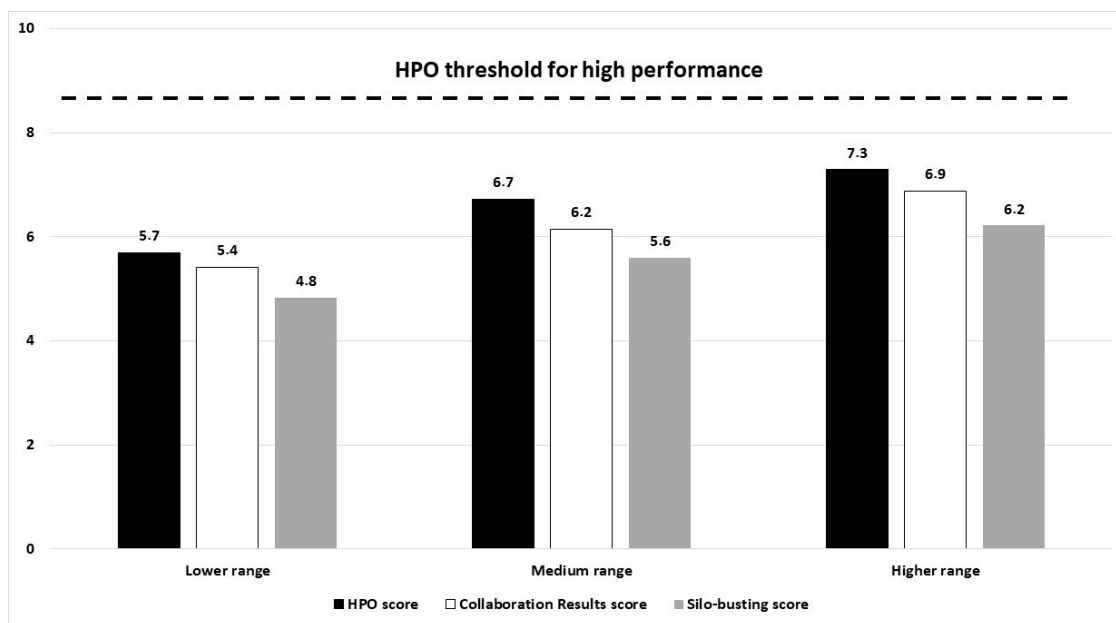

Figure 4. Scores per HPO category.

In the silo-busting framework, there are three 'systems' (HPO, silo-busting, collaboration results) and Figure 4 shows that these systems more or less move in the same direction—when the HPO score is high, the silo-busting score is also high, as is the collaboration results score. This means that higher HPO scoring organizations are also better in applying silo-busting techniques and thus they have more success in collaborating in their organization. To test whether the noticed differences are significant, we compared companies scoring low on silo-busting ('silo companies') with companies scoring high on silo-busting ('non-silo companies') with regard to their HPO and SB measures. For grouping, we used a median split, which meant that five companies were included in the silo group, and that six companies were included in the non-silo group (on the basis of their silo-busting score, a high silo-busting score meant that the organization was included in the non-silo group). Because the sample sizes varied strongly, we computed Mann–Whitney tests to test for differences. There were clear differences noticed between the two groups, with—as expected—the non-silo group scoring higher than the silo group (see Tables A6 and A7 in Appendix C).

9. Conclusions, Limitations, and Future Research

The main research question dealt with in this paper was—Is there a relationship between an organization's strength; its focus and effort on silo-busting techniques; and the quality of organizational learning, knowledge exchange, and internal collaboration? The research question was addressed by combining theory on high performance organizations with silo-busting techniques that can be found in the literature, as well as employee perceptions of internal collaboration, all in one questionnaire. This was then applied to a sample of mainly large organizations. The research results showed that there was a clear positive relationship between the application of certain silo-busting techniques by an organization, the extent of organizational learning and knowledge exchange, the quality and outcomes of collaboration, and thus the overall internal strength of the organization. Therefore, this research has contributed to the existing body of theory in this area by developing a silo-busting framework

on the basis of both theoretical and practical data, which fills a gap in the current literature. At the same time, this contribution forms the starting point of more in-depth academic research into the topic of silo-busting and collaboration, which is highly needed (see Section 4). The research also offers a practical contribution to management and organizational development thinking and action-taking. Organizations and their leaders can benefit from these practical, yet academically-robust, insights into how to lay the organizational foundations for effective silo-busting and thus better internal collaboration. In turn, as shown in our earlier research [37–41], this improved collaboration will increase the chances for organizations to become high-performing ones.

The present study has some limitations. Firstly, all data were collected using questionnaires, opening up the possibility of response set consistencies. Secondly, all data were collected at one point in time, that is, the study was cross-sectional. This implies that further research is needed in order to address the issue of causality. Research using multi-wave designs can provide more specific information about the stability and change of the variables, and about cross-lagged relationships, compared with our cross-sectional approach. Thirdly, we did not include control variables, such as organizational tenure or hierarchical position, in our research model and subsequent analysis. These might have influenced our results and could therefore be incorporated in further studies. Fourthly, further research is needed to investigate the extent to which our findings generalize to other occupational settings and/or to other countries. Nevertheless, we think that our results are noteworthy and provide good challenges for future research and cross-validation in different settings and countries. Specifically, future research should replicate this study in different types of organizations in different countries. It should also include longitudinal studies into how the silo-busting factors and characteristics can be shaped into tangible actions and whether these indeed increase in a lasting way the level and quality of collaboration and thus organizational performance over time.

Appendix A. The HPO Factors

This appendix lists the 35 characteristics of the five HPO factors.

Table A1. The five HPO factors and their 35 characteristics.

HPO Factor
Continuous Improvement and Renewal
1. The organization has adopted a strategy that sets it clearly apart from other organizations.
2. In the organization processes are continuously improved.
3. In the organization processes are continuously simplified.
4. In the organization processes are continuously aligned.
5. In the organization everything that matters to performance is explicitly reported.
6. In the organization, both financial and non-financial information is reported to employees.
7. The organization continuously innovates its core competencies.
8. The organization continuously innovates its products, processes, and services.
Openness and Action Orientation
9. Management frequently engages in a dialogue with employees.
10. Employees spend much time on communication, knowledge exchange, and learning.
11. Employees are always involved in important processes.
12. Management allows making mistakes.
13. Management welcomes change.
14. The organization is performance-driven.
Management Quality
15. Management is trusted by employees.
16. Management has integrity.
17. Management is a role model for employees.
18. Management applies fast decision-making.
19. Management applies fast action-taking.
20. Management coaches employees to achieve better results.
21. Management focuses on achieving results.
22. Management is very effective.
23. Management applies strong leadership.
24. Management is confident.
25. Management is decisive with regard to non-performers.
Employee Quality
26. Employees want to be held responsible for their results.
27. Employees want to be inspired to accomplish extraordinary results.
28. Employees are trained to be resilient and flexible.
29. The organization has a diverse and complementary workforce.
Long-Term Orientation
30. The organization maintains good and long-term relationships with all stakeholders.
31. The organization is aimed at servicing the customers as best as possible.
32. The organization grows through partnerships with suppliers and/or customers.
33. Management has been with the company for a long time.
34. The organization is a secure workplace for employees.
35. New management is promoted from within the organization.

Appendix B. The SEM Results

This appendix provides detail on the results of the SEM analysis. The TLI indices of both SEM models (SB→QC; and HPO→QC) were good (>0.98).

Table A2. Structural Equation Model Silo Busting→Collaboration Results (Coll Results).

			Estimate	S.E.	C.R.	*p*
Coll Results	←	SB_Leadership	0.117	0.028	4.182	***
Coll Results	←	SB_MutualUnderstanding	0.120	0.052	2.308	0.021
Coll Results	←	SB_CollOperatingModel	0.167	0.041	4.023	***
Coll Results	←	SB_PeopleRewardDevelop	0.295	0.039	7.618	***
Coll Results	←	SB_Values	0.217	0.035	6.177	***

*** = significant at the <0.05 level.

Table A3. Standardized regression weights for SEM model Silo Busting→Collaboration Results.

Standardized Regression Weights			Estimate
Coll Results	←	SB_Leadership	0.142
Coll Results	←	SB_MutualUnderstanding	0.113
Coll Results	←	SB_CollOperatingModel	0.180
Coll Results	←	SB_PeopleRewardDevelop	0.338
Coll Results	←	SB_Values	0.273

Table A4. Structural Equation Model HPO→Collaboration Results.

			Estimate	S.E.	C.R.	*p*	Label
Coll Results	←	HPO_CI	0.296	0.052	5.693	***	
Coll Results	←	HPO_OAO	0.010	0.065	0.155	0.877	
Coll Results	←	HPO_MQ	0.029	0.058	0.500	0.617	
Coll Results	←	HPO_EQ	0.393	0.059	6.690	***	
Coll Results	←	HPO_LTO	0.182	0.048	3.825	***	

*** significant at the <0.05 level.

Table A5. Standardized regression weights for SEM model HPO-> Collaboration results

Standardized Regression Weights			Estimate
Coll Results	←	HPO_CI	0.257
Coll Results	←	HPO_OAO	0.009
Coll Results	←	HPO_MQ	0.027
Coll Results	←	HPO_EQ	0.358
Coll Results	←	HPO_LTO	0.148

Appendix C. Silo versus Non-Silo Group

Table A6. Details on the comparison between the silo group and non-silo group.

	Group Statistics				
	Silo	**N**	**Mean**	**Standard Deviation**	**Standard Error Mean**
Continuous improvement	Silo company	248	5.9481	2.09332	0.13293
	Non-silo company	585	5.8380	1.71669	0.07098
Openness and action orientation	Silo company	248	6.5323	2.10366	0.13358
	Non-silo company	585	6.4276	1.76108	0.07281
Management quality	Silo company	248	6.5329	2.13623	0.13565
	Non-silo company	585	6.6060	1.86974	0.07730
Employee quality	Silo company	248	6.3236	2.12796	0.13513
	Non-silo company	585	6.3013	1.83208	0.07575
Long-term orientation	Silo company	248	6.8411	1.94051	0.12322
	Non-silo company	585	6.8246	1.61175	0.06664
SB leadership	Silo company	248	6.0296	2.22650	0.14138
	Non-silo company	585	5.9182	2.01484	0.08330
SB mutual understanding	Silo company	248	5.6424	2.05523	0.13051
	Non-silo company	585	5.2463	1.85594	0.07673
SB collobarative operating model	Silo company	234	5.2424	2.01732	0.13188
	Non-silo company	563	4.9322	1.83524	0.07735
SB people reward development	Silo company	248	5.5177	2.22123	0.14105
	Non-silo company	585	5.4226	1.90623	0.07881
SB values	Silo company	227	6.0870	2.32505	0.15432
	Non-silo company	534	5.9986	2.07004	0.08958
QC	Silo company	224	6.0625	2.29155	0.15311
	Non-silo company	530	6.0830	2.03455	0.08838

Table A7. Results of the Mann–Whitney tests on the difference between the silo and non-silo organizations.

	Test Statistics [a]										
	Continuous Improvement	Openness and Action Orientation	Management Quality	Employee Quality	Long-Term Orientation	SB Leadership	SB Mutual Understanding	SB Collaborative Operating Model	SB People Reward Development	SB Values	QC
Mann–Whitney U	68,677,500	68,462,500	72,244,000	70,731,000	70,308,500	70,049,000	63,666,000	59,705,500	70,370,500	57,829,500	58,922,500
Wilcoxon W	240,082,500	239,867,500	103,120,000	242,136,000	241,713,500	241,454,000	235,071,000	218,471,500	241,775,500	200,674,500	199,637,500
Z	−1.217	−1.285	−0.093	−0.570	−0.703	−0.785	−2.795	−2.083	−0.684	−1.002	−0.160
Asymptotic Significance (2-tailed)	0.224	0.199	0.926	0.569	0.482	0.432	0.005	0.037	0.494	0.316	0.873

[a] Grouping variable: Silo.

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